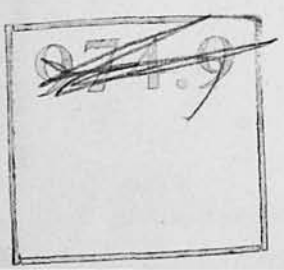

FIFTH ANNUAL REPORT

OF THE

BUREAU OF STATISTICS

OF

LABOR AND INDUSTRIES

OF

NEW JERSEY.

FOR THE YEAR ENDING OCTOBER 31st,

1882.

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TRENTON, N. J
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STATE OF NEW JERSEY. OFFICE OF
BUREAU OF STATISTICS OF LABOR AND INDUSTRIES,
TRENTON, October 31st, 1882.

To His Excellency, George C. Ludlow, Governor:

SIR: I have the honor to submit to the Senate and General Assembly, through you, the Fifth Annual Report of the Bureau of Statistics of Labor and Industries.

JAMES BISHOP, *Chief.*

ERRATA.

Page 31, in Philadelphia Sliding Scale, read "per one-half ton" instead of "per ton."
Page 118, line 12 from bottom, read "102" and "32" instead of "$102" and "$32."
Page 197, line 6 from bottom, read "censurable" instead of "considerable."
Pages 198, 209, Tables 1 and 2, add the word "pounds" to "quantity."
Page 234, line 16, read "spat" instead of "spot."
Page 237, line 1, "Littlewood" instead of "Littlenow;" line 23, "bill" instead of "nib."
Page 243, line 2 from bottom, read "endowed" instead of "endorsed"
Page 266, line 5 from bottom, read "spat" instead of "spot;" line 3 from botton, read "spats" instead of "spots."
Page 308, line 7 from bottom, read "unceasing" instead of "increasing."
Page 328, line 15 from top, read "shore-owner" instead of "share-owner."
Page 374, line 4, add "returned to shippers."

INTRODUCTION.

A knowledge of facts showing the relative earnings of capital and labor is necessary in any successful attempt at the solution of the so-called social problem. Without them the economist can arrive at no correct understanding of the phenomena of our industrial life. Yet it is evident that even here we are still at sea; for, whenever efforts to adjust the conflicting industrial interests are made, we are met with opposing theories based on anything but well-digested data, which can only be supplied through statistics obtained from year to year; and the work of the Bureau during this year, as formerly, has been prosecuted mainly with this end in view.

In Part I. will be found information concerning the earnings of wage-receivers. The "Collated Statistics Derived from Laborers" were gathered directly from the workmen of a number of our leading industrial establishments, and show the average daily or weekly wages, as well as the yearly earnings, or actual income, of many thousand employes. The number of hours worked daily, the product of a day's labor, and many other interesting facts are also given. An examination of these data seems to show that the condition of many of the laboring people in this State is far from satisfactory. In our textile industries, for example, the compensation of the employes, with few exceptions, hardly exceeds that of common laborers. This is also the case with the workmen in our iron mines. In comparatively few trades does the annual income of the best-paid mechanics exceed $700; while that of a very large proportion is considerably lower.

Ample food for reflection will also be found in the remaining chapters of Part I., as well as in Part II. of this, our FIFTH ANNUAL REPORT. The article on "Building and Loan Associations" is also submitted to the careful consideration of workingmen; for no suggestions can be more timely than those which advise them how to own their own homes, or induce them to accumulate their savings.

No apology is necessary for the large space devoted to the subjects of "Carp and Carp Culture" and our "Oyster Interests." No other State presents so many superior advantages for fish-culture as New

Jersey—a State almost surrounded by water, and threaded in every direction by water-courses in almost endless variety. By systematic and intelligent management and co-operation on the part of all interested, this State can produce an abundance of food-fish, sufficient to supply our own population and thousands of tons for our neighbors. New Jersey has natural features which should make her pre-eminent as the oyster-garden of the States. Her coast-line is fretted with the mouths of rivers, bays, inlets and coves, fertile spots for oysterculture, and yielding better-flavored mollusks than those raised in the deeper waters of the larger areas. The salt water-line of the State extends from Newark to Cape May, then, for some fifty miles, along the oyster region of Maurice Cove, in Delaware Bay, and thence some little way up the Delaware River. Yet the oyster industry of our State is not only not being developed, but is in danger of decline. It has in it none of the economics of scientific method. The natural beds, from which the seed-supply is obtained, are gradually being exhausted, and protective legislation is absolutely necessary to prevent them from becoming extinct. Ostraculture will also be advanced by giving sufficient protection to the "planters" on artificial beds. The Connecticut law of 1881, establishing a Commission of Shell Fisheries, having exclusive jurisdiction and control of all shell fisheries (with a few exceptions) within the area of that State, undoubtedly would be beneficial here. These Commissioners have power to grant, for the purpose of planting and cultivating shell fish, perpetual franchises in undesignated grounds, which for ten years have not been natural beds, to any inhabitant on payment of a fee of one dollar per acre. The net receipts from this source during the year ending November 30th, 1882, amounted to $8,149.14. It is expected that, by the spring of 1883, 90,000 acres of oyster lands will be held by cultivators under State jurisdiction (see pp. 291–294, *infra.*)

The generous policy of our State in granting bounties for the purpose of stimulating the cultivation of fibrous plants and of encouraging the manufacture of sugar, has borne fruit. From September 20th, 1880, to September 5th, 1882, there were raised by our farmers, mostly in Hunterdon County, over 1,445,250 pounds of flax stalks, on which the bounty paid was $5,000, the full amount appropriated. From March 21st, 1881, to December 30th, 1882, there was also paid a bounty of $4,770.74 upon 136,307 pounds of cleaned flax. From October 26th, 1881, to November 25th, 1882, there were paid for bounty

upon 7,072 tons of sorghum sugar-cane, raised in Cape May County, $7,072, and $3,199.14 for bounty upon 319,944 pounds of sugar manufactured at the Rio Grande Sugar Company's works, Cape May County, during the present year. The total amount paid up to the close of the year 1882, for bounties, was $18,608.18. For further information on this subject, Part V. may be consulted.

In Part VII. will be found the latest statistics of our iron mines, blast furnaces, paper mills, breweries and the dairy interest. The courtesy of the United States Census officials permits us also to present the revised statistics of our manufacturing, mining and mechanical industries, returned for the year 1880. A comparison between the totals of the censuses of 1880, 1870 and 1860, for both the United States and New Jersey, makes an interesting exhibit, favorable to our own State:

	1880.*	1870.	1860.	PER CENT. GAIN.	
				1880 over 1870.*	1870 over 1860.
Capital invested—					
United States.....	$2,790,223,506	$2,118,208,769	$1,009,855,715	36	108
New Jersey.....	106,226,593	79,606,719	40,521,048	37	96
Value of products—					
United States.....	$ 5,369,667,706	$4,232,325,442	$1,885,861,676	27.8	124.4
New Jersey.....	254,375,236	169,237,732	76,306,104	51.2	121.7
Hands employed—					
United States.....	2,738,950	2,053,991	1,311,246	34	56
New Jersey†.....	126,038	75,552	56,027	67.3	35
Wages paid—					
United States.....	$947,919,674	$775,584,343	$378,878,715	23	104
New Jersey.....	46,083,045	32,648,409	16,277,337	45	100.5

It only has been in comparatively recent years, and largely the result of the liberal policy pursued for her industrial and educational development, that the fact that New Jersey has unequaled advantages in location, soil and climate seems to have been appreciated. In 1790

* Exclusive of the manufacture of gas. This fact has been taken into consideration in all comparisons with 1870.

† Per cent. of employes, men—1880, 68.9; 1870, 76.8; 1860, male, 77. Per cent. of employes, women—1880, 21.5; 1870, 14.9; 1860, female, 23. Per cent. of employes, children—1880, 9.6; 1870, 8.3.

the population of the United States was 3,929,214; that of New Jersey, 184,139. A half century later the population of this State had but doubled, while that of the whole country had been quadrupled. From 1840 to 1860 the population of New Jersey increased 80 per cent., and during the twenty years following the rate of increase was 68 3, which was larger than in any other Eastern or Middle State, or than the average in the United State, (59.2 per cent.)* This State is now one of the most densely populated in the Union, being outranked in this respect only by Rhode Island and Massachusetts. The whole country has a total area (land surface) of 2,900,170 square miles, on which there are 8,955,812 dwellings, inhabited by 9,945,916 families, composed of 50,155.783 individuals; or an average to the square mile of 3.09 dwellings, 3.43 families and 17.29 persons. The area of the land surface of New Jersey is 7,455 square miles, on which there are 190,403 dwellings. Our population includes 1,131,116 persons, or 232,309 families. To every square mile there are 24.54 dwellings, 31.16 families, and 151.73 inhabitants. In Rhode Island there are 254 87 and in Massachusetts 221.78 persons to every square mile of territory.

In 1789, Morse in his "Geography and Gazetteer of the United States," affirmed that "New Jersey has a greater proportion of barren land than any of the States;" and a few years later it was stated in "Winterbottom's View of the United States of America," that "as much as five-eighths of the southern counties and one-quarter of the whole State is almost a sandy, barren waste, unfit in any part for cultivation." There were "a number of towns in this State of nearly equal size and importance and none has more than two hundred houses."

These historians could hardly have anticipated that in less than a century the average value of the farm lands of New Jersey, per acre, would be $65.15, or considerably above the average of any State in the Union. According to the report of the United States Department of Agriculture (1879), the value of cleared land per acre in this State was $82.42. Our 34,307 farms, valued at $190,895,833, contain 2,929,773 acres, of which 2,096,297, or all but 28.4 per cent., are im-

*The percentage of increase of the population of New Jersey by decades (from 1790 to 1880) has been: 1790 to 1800, 14 6; 1810, 16.2; 1820, 12.9; 1830, 15.6; 1840, 16.3; 1850, 31.1; 1860, 37.2; 1870, 34.8; 1880, 24.8.

proved land.* This proportion of improved to unimproved land is only surpassed in the States of Illinois, Iowa, New York and Ohio. "The lands in Southern New Jersey, formerly most remote from markets," observes the State Geologist, "are now easily reached by railroads. The thriving towns and villages along these roads, and the fine farms, which have been cleared and put in cultivation since the railroads opened access to them, prove that the lands are desirable for agricultural use, as well as for supplying pleasant and healthy locations for those seeking country homes. The soil is light and easily cleared and cultivated, and responds quickly and generously to cultivation. The lands which are designated on the State map as oak lands, were under the old system of farming considered to be of but little value, but now by judicious use of fertilizers they are made to produced paying crops. The older settlements of Hammonton, Egg Harbor City and Vineland, and the numerous later settlements along the lines of the West Jersey, Camden and Atlantic and the New Jersey Southern Railroad are producing immense quantities of fruit, etc., for the market. * * These settlements are all new, the oldest one of them being only about twenty years old, and the grounds upon which they are located were in forest until that time. The settlers are now getting to have comfortable homes, fruit trees in bearing and gardens and fields well tilled and productive."

Our State is a network of railroads, having more than 1,869 miles of track, or 1 to every 4.25 square miles of area. This proportion of mileage to area is alone exceeded in Massachusetts, where it is 1 to 4.15. The average for the whole country is only 1 to 27.67. During the decade ending December 31st, 1881, there were built in New Jersey 488 miles of track, or 1 to every 15 3-10 square miles of area; in Massachusetts, 1 to 24 4-10. We can also claim pre-eminence to the latter State in the fact that, while there a State debt has been incurred in the building of railroads, ours are the result of private enterprise, the total capital invested being $214,068,349. The cost of our railroads and equipments has been $168,618,315.

While New Jersey in territorial extent is only the thirty-fifth among the thirty-eight States of the Union, it is the nineteenth in population and the eighth in the assessed value of real and personal property,

* Improved land in 1870, 1,976,474; in 1860, 1,944,441; in 1850, 1,767,991. The percentage of unimproved to total land in farms was: 1880, 28.4; 1870, 33.9; 1860, 34.9; 1850, 35.7.

($572,518,361,)* although only the tenth in the amount of tax levied, ($8,958,065.) In the value of its agricultural productions, which amount to $30,000,000,† it is the twenty-fifth in relative rank. The value of the products of its manufacturing and mechanical industries exceeds $254,380,236, being outranked as a manufacturing State only by New York, Pennsylvania, Massachusetts, Illinois and Ohio. In many special industries our State occupies a still more favorable position, notably in the manufactures of silk and of stone and earthenware, where it takes the first rank, over one-third of the total products being produced here. The output of its mines of non-precious minerals is valued at $3,391,782, and in this respect it takes the seventh place, although fourth in the list of iron-producing States; while it is the largest producer of zinc ore.

From the earliest settlements the promotion of education has been recognized as among the foremost duties of the State. As early as 1693 our first school law was enacted by the General Assembly of East New Jersey, assembled at Perth Amboy, the preamble setting forth that "the cultivation of learning and good manners tends greatly to the benefit of mankind, which has hitherto been much neglected in this province." The common schools, which have prospered and become a power in New Jersey, are a growth of the seed that was planted by legislative action nearly two centuries ago; and to-day we have a public school system second in efficiency to none in the United States, supported in part by interest from a State fund, accumulated from the proceeds of sales of the lands of the State under water, now amounting to $3,376,727.27, and yearly increasing, so that the time is not far distant when our schools will be literally free and school taxes‡ will be unknown.

* These are the figures returned by the United States Census agents. The county assessors' returns for 1880 only foot up $518,617,518. It is a well-known fact that in some counties the local assessment is much below the real valuation of property.

† Estimated value of all farm productions (sold, consumed, or on hand) for 1879, $29,650,756.—U. S. CENSUS.

According to the report of the United States Commissioner of Agriculture (1881) the average cash value per acre of the principal crops of the farm, taken together, for the year 1881, was: for New Jersey, $19.26; for the whole country, $13.17.

‡ Total amount appropriated for all school purposes during 1882, $2,142,384.74. Total valuation of school property, $6,270,778.00. Total census of children between five and eighteen years of age, 343,897; total enrollment in public schools, 209,526.

PART I.

THE EARNINGS OF WAGE-WORKERS.

CHAPTER 1.—INFORMATION DERIVED FROM LABORERS, BASED ON BLANK NO. 3 FOR EMPLOYES:

I.—REMARKS BY EMPLOYES.

II.—COLLATED STATISTICS FROM SEPARATE ESTABLISHMENTS: SHOWING THE NUMBER OF EMPLOYES—MEN, WOMEN AND CHILDREN—THE WAGES EARNED, QUANTITY PRODUCED, AND THE NUMBER OF HOURS CONSTITUTING A DAY'S LABOR.

CHAPTER 2.—RATE OF WAGES OF FARM LABORERS IN THE UNITED STATES.

CHAPTER 3.—COMPARATIVE RATES OF WAGES IN THE UNITED STATES AND OTHER COUNTRIES.

CHAPTER 4.—WAGES AND PRICES.

CHAPTER I.

INFORMATION DERIVED FROM LABORERS.

Based upon Blank No. 3 for Employes.

During the year, which has been one of unbounded production in almost every department of industrial activity, our wage-workers, as a general rule, have been steadily employed, and the tendency, except in the textile industries, has been towards an advance in wages; but the advantages which would otherwise have been derived from these results have been neutralized by the increased cost of living, resulting from the high prices of almost every article needed for household consumption. In many of the cotton mills there has been a reduction of the hours of labor from eleven and over to ten hours a day. This is justly considered by the operatives to be a great benefit, for the effect of this humane act of the employers will certainly effect an improvement in the employe's condition—physical as well as otherwise. In nearly all the factories in the State ten hours now constitute the regular day's work; although the old barbarous system of a long day of toil has not yet been abandoned in a few localities.

While in some parts of the country protracted strikes have occurred, materially interrupting the business in those sections, our State has been exempt, with few exceptions, from such disputes between employer and employed. The strike of the freight-handlers, employed by the railroad companies centring at Jersey City, for an advance of wages from seventeen to twenty cents per hour, was the most important and serious, as there were over six hundred of our workmen affected thereby. The lesson taught—that they are utterly unable to contend with powerful corporations by spasmodic revolts which characterized this strike—will long be remembered by wage-workers; and, if appreciated, will partially compensate for the failure. Other strikes have also taken place, among which may be mentioned those of the coopers, at Jersey City, and of the wire-workers, bricklayers and employes in the building

trades at Newark. These were unsuccessful; but that of the employes in the glass-works of Whitney Brothers, at Glassboro, which occurred in April, resulted in the concession of their demands for weekly payments, a reform which has since been followed in all the other glass-works in that section of the State. The strike of the window glass-blowers in all except two of the South Jersey establishments began in September and still continues (December, 1882.) It affects about three hundred employes.

From the tables given below, the number of persons employed, the quantity produced, and the wages received by the different classes of employes in many of our industrial establishments, can be ascertained. These statistics were obtained from the wage-workers themselves, who returned answers to questions asked in Blank No. 3, many adding remarks of their own. These "remarks," some of which are reproduced in this connection, will show what our laboring men think of the existing condition of affairs.

The following circular was issued for the purpose of obtaining information from employes:

[BLANK No. 3, FOR EMPLOYES.]

TRENTON, July 1st, 1882.

In the preparation of the Fifth Annual Report of the Bureau of Statistics of Labor and Industries, in order to fulfill the purpose for which the Bureau was created, it is important to have the hearty support and co-operation of all who are interested in the labor questions of the day and in the establishment of closer relations, so as to bring about greater harmony of interest, between employer and employed.

The law creating this Bureau directs us to collect, assort, systematize and present, in annual reports, statistics relating to all departments of labor in the State, especially in its relation to the commercial, industrial, social, educational and sanitary condition of the laboring classes. Workmen, especially, are asked to aid us in securing the necessary information; but the public generally also are invited to assist by furnishing such facts as will facilitate the work we have in hand. We, therefore, earnestly request every person to whom copies of this blank are sent, to fill up and return the same at his earliest convenience.

Suggestions on any subject of interest to wage-workers will be carefully considered. Information is particularly desired concerning the general social condition and habits of the workmen in particular establishments.

Accurate answers to the following questions are also respectfully requested.

JAMES BISHOP, *Chief.*
CHARLES H. SIMMERMAN, *Secretary.*

1. The establishment in which you are employed; name of firm, industry and place of business?.....

2. Whole number of hands employed?..... men?..... women?..... children under 14 years of age?.....

3. The different subdivisions of labor, the number of hands employed in each (men, women and children), and the method of working, whether by day, week, or piece?.....

4. What constitutes a day's work (quantity produced) in each subdivision?.....

5. Whether wages have been increased or decreased during the past year, and how much?.....

6. The wages received by day, week or piece in each subdivision by men, women and children, and the number of hours worked daily?.....

7. The average annual earnings received in each subdivision by men, women and children?.....

8. Remarks.....

I. REMARKS BY EMPLOYES.

Hunterdon County Cotton Mill Employe—"Very little beyond a living can be realized, even by the most rigid economy, at the present high prices of provisions."

Paterson Silk Mill Employes—"Last year was hard on those with families, because of the increased cost of living." "Cost of living exceedingly high." "With flour at $10 a barrel; beef, 18 to 25 cents per pound, and vegetables in proportion, where is the chance, at $2 per day, to lay by for a rainy day?" "Cost of living so high that nothing can be saved." "Cost of living enormous. No decent house can be obtained for less than $12 to $15 per month." "Wages were very much reduced (25 per cent.) because of the increased cost of living."

Morris County Silk Mill Employes—"Cost of living as high as everywhere." "Better have steady work and high prices than no work and low prices."

Morris County Miners—"Cost of living is about 10 per cent. higher than elsewhere. Workmen are compelled to buy at the agent's store, under penalty of being discharged." "The truck system is in operation here." "The truck system makes high prices." "The prices at the agent's store are from 6 to 10 per cent. higher than at the cash stores." "Store system and forced trade." "The truck system is unjust to both workmen and the community. The tradesman cannot compete with the agent's store, for the workmen must trade there." "Truck system and high prices. It is time that this barbarous system was abolished, not by legislation, but by a wholesome public opinion." "It is getting to be very unpopular with the men, and public generally. Only a question of time when it will be abolished."

Warren County Organ Factory Employe—"Cost of living entirely too high for the wages." Essex County—"Wages should be raised to keep pace with increased cost of living."

Union County (Enameled Oil Cloth)—"The hands complain of the high cost of living."

Morris County (Powder Works)—"Living is about 10 per cent. cheaper than in the cities."

Hunterdon County (Spoke Factory)—"The cost of living is high; but with steady employment some money is saved. A family of six can live ordinarily well here on $500 per year."

Warren County—"At present high prices, iron-workers cannot save much above a living."

Mercer County (Printer)—"The necessary outlay for rent, fuel, provisions, clothing, &c., is considerably more than it should be, especially in case of a man with family. He is forced to do his utmost to make his income cover his expenses. During the past year house rents and all household necessaries have increased from 20 to 30 per cent., while wages in our business have remained stationary. While a barely decent living could be earned before, it is considerably more difficult now."

Hudson County Horse Railroad Employe—"My rent is $6 per month; 63 cents a week for coal; 35 cents for wood; for clothing, $40 per year. My groceries, vegetables, meats and sundries, $5 to $7 a week."

Passaic County Machinist—"Vegetables are higher here than in any other part of the State."

Hunterdon County (Vulcanized Rubber)—"On account of the high temperature required in the works the rubber business is considered unhealthy, as it subjects the operatives to the liability of taking cold, unless great care is observed when going out of the factory. There is a night school here four months in the year, but the average attendance is but 12 scholars, which is not to be wondered at when the many hours of labor are taken into account."

Essex County (Machinery, Steam Engines, &c.)—"None of the employes have been compelled to lose any time during the year (except holidays) on account of not having work to do; but many of the men are accustomed to waste as much as a week at a time—'too much alcohol.' I find if any one undertakes to talk with them, or advances the idea of better things, he is laughed at. The difference in the condition of the workmen and the middle class cannot be changed until this indifference and ignorance among the former is overcome. As to the cost of living, after clothing myself, wife, and three children, keeping them at school, paying high taxes and insurance, I have nothing left to show for my year's work. I keep myself paid up in a beneficial society and mutual life insurance society."

"Payment in the miscellaneous industries, *i. e.*, where men are not employed in factories or for single firms, is not so regular, for they are often out of work. The increased cost of living is thus felt more. The hours of work are ten per day, except for women at dressmaking, millinery, &c., who work an indefinite number of hours, greatly to the injury of their health. It would be far better for us to pay more for our linen. Seventy-five cents or a dollar for a shirt, means fifteen hours of toil for a woman to get a bare subsistence."

Cumberland County (Bleaching Company)—"Some trouble occurred in May, when the workmen demanded payment every two weeks and reduction of work to 10 hours daily. The demands were acceded to, and no strike, but good feeling, has been the result. This firm encourages night schools, contributes largely toward the library and reading-room of the working people. It is expected that the 'Workingmen's Institute' here will also receive pecuniary aid from this source."

"High prices and monthly payments will always go together, because monthly payments necessitate the credit system, which makes high prices."

"In Somerset County the old system of a long day's work, abandoned in nearly every factory in the State, still is in force. Ten hours a day is the rule almost everywhere now. The discussion on the so-called 'Child Labor Bill' in the Legislature of 1882, although not passed, served to call the attention of manufacturers to the enormity of allowing women and children to work over ten hours a day. But the employers in Somerset do not seem to have fallen into line; but there, generally, in factories where women and children are employed, they are worked eleven hours daily. This should not be, but, even without further legislation on the subject, those firms should adopt the reforms which the enlightened reflection of the other manufacturers has conceded."

"These monthly payments are a very serious matter to workmen in these times of high prices. The railroad company [Pennsylvania Railroad Machine Shops, Lambertville,] pays about the middle of the month, and then only the wages due at the beginning. Consequently, although at the time of payment there is due to the men six weeks' pay, they only receive four weeks' wages, the rest always being kept back. As very few workmen have more than one week's work ahead, they are compelled to trade on credit in order to obtain their household necessaries. Credit means an advance of at least 10 per cent. on the cost of living. Therefore, if the wages were

paid weekly, it would amount to an advance of 10 per cent. But in addition to this, monthly payments are a great inconvenience. It is often difficult for a laboring man to obtain credit. Sickness and other misfortunes may have used up all the spare money, and, as sometimes weeks elapse before the next pay day, the family will be nearly destitute.

"Corporations, at all events, should be compelled by law to pay weekly, and not be allowed to oppress their workmen in this way. This matter should attract the attention of our legislators. Frequent payments are more important to wage-workers than an increase of wages. Otherwise wage-workers and their families do not enjoy the fruits of their hard-earned compensation; the purchasing power of their wages is decreased, and they are kept dependent and in debt. The only excuse offered for 'long' payments is, that it is more expensive, requiring a larger number of officials to make them."

Hunterdon County (Flax, Jute and Hemp Mills)—The manager of these works says: "That there should be a stringent law passed to prevent women and children from being employed so many hours a day. He has travelled extensively in Europe, and has had charge of factories in Belgium, France, England and Scotland, and his observation has convinced him that it is a great wrong, and for the cause of humanity, as well as for the future business interests of the country, both employer and employe should join together to lessen the hours of labor of women and children."

Morris County (Rubber Combs and Jewelry)—"The proprietor of these works has, since he assumed the entire control, shown a great deal of interest in the welfare of his employes. Among his first acts was to refuse to employ children under 14 years of age, except in cases of widowed mothers, or where it could not be otherwise avoided without causing suffering. He says that the school and play-ground are the places for children under 14 years of age; and although his business is such as to make the employment of small children profitable, he refused upon the grounds of humanity and the future good of society.

"He also abolished the truck system and adopted weekly payments—a great boon to all wage-workers. He is now organizing a sick-benefit fund, and is contemplating other reforms to promote the interest and happiness of his employes, morally and intellectually. Among other means to this end, he offers three prizes of $50, $75 and $100, to be given to the three heads of households who make the surroundings of their homes the most attractive and beautiful. (Many of the employes own their own homes.)

"The employes all speak of him in the highest terms. He believes that the true policy of the employer, in order to succeed well with his employes, is to make it the interest of the latter to serve him faithfully, and to make himself worthy of their respect by treating them as fellow men."

Essex County Satchel Maker—"The introduction of piece work, the employment of boys, and the subdivision of labor, as now practiced, have been the curse of our trade. At first it enabled the men to make a little more money, but it gradually lowered the standard, until at present a man is compelled to work like a machine to earn a decent living. As a proof of this I would state that twenty years ago a man was better off after finishing two dozen railroad bags than he is now after finishing seven dozen. In regard to living, there is no doubt that when the wages are stationary and the cost of necessaries increases, dissatisfaction among workmen also increases."

"The Superintendent of the Glendon and Andover Iron Companies reports, that these companies provide their employes with houses, rent free, although they pay the same wages as other establishments. This results in securing a better class of men, who are steady."

II. COLLATED STATISTICS FROM SEPARATE ESTABLISHMENTS.

TABLE No. 1.

Condensed Statement Showing the Annual Wages of Employes in some of Our Leading Industries.

COTTON MILLS.

Overseers	$1000	$1500	Spoolers	$300	$350
Second Boss	500	600	Doffers	100	
Weavers	300	450	Backers	100	150
Card Grinders	300	425	Slubbers	180	
Pickers	250	400	Blacksmiths	650	
Speeders	250	400	Carpenters	600	675
Strippers	200	375	Engineers	500	
Fillers	250		Firemen	500	
Spinners	600		Machinists	550	600
Warpers	275	550	Laborers	350	375
Frame Tenders	150	250			

SILK MILLS.

Doublers, Children	$200	$225	Soft Silk Winders and Throwers, Women	$300	
Quillers "	200	225	Children	180	
Cloth Pickers	400	450	Soft Silk Winders (Hudson Co.), Women	320	
Warp "	700	900	Spinners (Hudson Co.)	380	
Twisters	600	650	Spoolers "	250	
Warpers	500	550	Transferrers "	310	
Weavers	600	650	Weavers "		
" Ribbon	400	800	" Men	400	
Winders	350	400	" Women	380	
Dyers, Boss	1500		" Children	240	
" Ordinary	900		Bobbin Manufactory—		
Finishers	500		Roughers	450	
Budlers	500		Finishers	625	
Machine Workers	500				
Soft Silk Winders and Throwers, Men	600				

PRINT WORKS.

Calico Printers	$1000	$1250	Folders, Women	$250	
Engravers	800	1250	Color Mixers, Men	400	500
Sketchers, Men	600	1250	" Women	250	
" Women	250		Back Tenders	350	375
Dyers, Boss (1)	1000	1500	Laborers	300	350
" " (2)	500	650	Women in different departments	225	
" Ordinary	350	425			
Folders, Men	475	600			

FLAX SPINNING.

Boss Dyers	$900	Spinners	$275
Other Bosses	750	Reelers	275
Flax Dressers	525	Spoolers	130
Carders	250	Doffers	130
Preparers	250	Dyers	350

BLEACHING WORKS.

Bleachers, Boss	$700	Folders and Packers	$500
" Others	400	Sewers, Boss	600
Dyers	400	" Others	350
Finishers	400	Firemen and Engineers	600
Dryers, Men	450	Machinists and Carpenters	600
" Boys	125	Laborers	400

WOOLEN MILLS.

Weavers	$300 to $500	Dyers	$300 to $1000
Spinners, Men	700 to 900	Sorters	500 to 800
" Children	100 to 200	" Children	200
Jack Spinners	575	Fullers	350
Self-Acting Mule Spinners	125	Dryers	330
Finishers, Men and Boys	270 to 350	Giggers	350
" Women and Girls	175	" Women	300
Carders, Boss	900	Piecers	175
" Men	200 to 350	Repairers	500 to 600
" Boys	150	Overseers	750 to 1000
Strippers	250	Carpenters	700
Grinders	250 to 300	Machinists	600 to 700
Tenders	225 (av.)	Engineers and Firemen	550
Pickers	300 to 330	Laborers	350

IRON WORKERS.

(Machine Shops, Foundries, Iron Furnaces and Iron Rolling Mills.)

Foundry Workmen—		File Manufactory—	
Skilled	$600 to $750	Others	$700
Not skilled	450	Women	500
Machine Shop Workmen—		Galvanized Sheet Iron Workmen	600
Skilled	600 to 900	Pilers and Drag Outs	350
Not skilled	300 to 500	Spoke Drivers	550
Blacksmiths	600 to 900	Heaters	1000 to $1075
" Helpers	350 to 500	" Helpers, First	400 to 425
Engineers	600 to 700	" " Second	320 to 330
Firemen	400 to 550	Rollers	575 to 600
Puddlers	1050 to 1100	Muck Roller	700 to 750
" Helpers	340 to 350	Roughers	415 to 420
Pattern Makers	525 to 900	Catchers	320 to 325
Moulders	450 to 900	Casters (Pig Iron)	550 to 650
" Helpers	375	Fillers "	475 to 550
Core Makers	475 to 625	Tappers "	550
Rivet Factory Employes	900	Laborers	320 to 350
File Manufactory—			
Journeymen	1000		

CARRIAGE FACTORIES.

Blacksmiths	$600 to	$700	Finishers	$600	
" Helpers	300		Gear Makers	700	
Body Makers	400 to	650	Painters	450 to	$700
" Helpers	100 to	200	" Helpers	50 to	300
Trimmers	450 to	800	Silver Platers	600	
" Helpers	50 to	200			

MINING IRON ORE.

Contractors	$1500 to	$2500	Miners, Ordinary	$350 to	$450

MACHINE SHOPS (Locomotive.)

Blacksmiths, Job Workers	$1300		Machinists	$650	
" Day "	450		" Helpers	450	
Erecters, Turners, Finishers, Job "	1000		Car Wheel Makers	600	
Erecters, Turners, Finishers, Day "	450		Car Axle "	600 to	$700
Boiler Makers	700		Engineers	600	
Foundry Workmen	625		Firemen	550	
			Laborers	312 to	325

SHOEMAKERS.

Men	$600 to	$650	Edge Trimmers	$625 to	$700
Women	250 to	275	" Setters	625 to	700
Children	150 to	175	Beaters-Out	410 to	462
Lasters, Heelers, Trimmers, Burnishers, Finishers,	550 to	650	Stock Fitters	412 to	425
			Heel Burnishers	212 to	250
			Tackers (Machine)	425 to	450
			McKay and Goodyear's Machine Operatives	250 to	600
Cutters	525 to	650	Fitters	200 to	375

SHIP YARDS.

Ship Carpenters	$850 to	$900	Machinists	$700	
Caulkers	850 to	900	Blacksmiths	700 to	$800
Carpenters and Joiners	700		Rivet Drivers	750	

ORGAN MANUFACTORIES.

Case Makers	$600 to	$700	Tuners	$750 to	$900
Action "	600 to	700	Box Makers	600 to	700
Fly and Varnish Finishers	700 to	800	Women	250	
			Boys	200	

POTTERS.

Pressers	$750		Mould Makers	$750	
Jiggerers	800		Kilnmen	600	
Handlers	625		" Foremen	625	
Turners	750		Firemen	670	
Throwers	900		Dippers	650	
Dish Makers	1000		Packers	675	
Sagger Makers	800		Women	200 to	$225

JEWELERS.

Foremen	$1150	to $2200	Melters	$900	
Colorers	1200		Other Mechanics (av.)	650	to $800
Tool Makers	850	to 900			

PAPER MILLS.

Men	$350	to $600	Machinists	$450
Women	225	to 325	Firemen	550
Children	150		Laborers	325
Engineers	450	to 650		

TABLE No. 2.

COTTON AND WOOLEN MILLS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
104	Camden County...	All employes.....	232	112	70	50	....	....	.....	.....	.....	11 hours daily; payments monthly.
	Woolen Mills....	Weavers	....	30	70	....	....	....	9 to 13 cents per yard.....	$350 to $400.....	14 to 16 yards.	
		Jack spinners.....	....	8	....	....	....	....	$1 per 100 runs.....	575.....	100 runs.	
		Cloth finishers	....	20	....	....	....	....	7 50 per week.....	350		
		Carders	....	8	....	....	....	....	Boss, $18; others, $4 to $6 per week...	Boss, $900; others, $200 to $300		
		Strippers	....	2	....	....	....	....	$5 per week.....	$250		
		Grinders	....	2	....	....	....	....	6 "	300		
		Pickers.....	....	5	....	....	....	....	5 to $7 per week.....	300 (av.)		
		Dyers	....	10	....	....	....	....	10 average per week.....	450 "		
		Wool sorters	....	8	....	....	....	....	10 to $15 "	600		
		Laborers	....	10	.. .	....	....	....	1 25 per day	325		
		Loom overseer.....	....	1	....	....	....	....	20 per week	1000		
		Machinists and carpenters.....	....	8	....	....	....	....	12 to $15 per week.....	650		
		Children.....	....	....	....	50	....	....	2 to $3 50 "			
81	Passaic County....	All employes.....	485	289	125	71	....	....	.....	.....	.....	Ran day and night all the year. 60 hours constitute a week's work.
	Woolen goods, blankets, flannels, overcoating, &c.	Weavers.....	....	125	50	....	....	....	By piece work, 10 to 12 cents per yard for blankets.....	$375.....	Blanket, 10 to 20 yards; cloth, 15.	
		Carders.....	....	18	....	....	17	....	Men and boys average $5 per week....	250		
		Spinners.....	....	....	....	....	40	....	$2 per week.....	100		
		Pickers.....	....	25	....	....	....	....	6 "	300		
		Dyers.....	....	16	....	....	....	....	1 per day.....	300		
		Mule piecers.....	....	11	....	....	....	16	Girls, $3 50; men, $8 per week			
		Wool and rag sorters	....	....	25	....	....	3	$3 50 per week.....	175		
		Finishers.....	....	54	20	36	....	....	5 50 "	275		
		Repairers	....	18	....	....	....	....	2 per day.....	600		
83	Passaic County....	All employes.....	148	60	60	28	....	....	.....	.....	.....	60 hours constitute a week's work. All overtime paid at the same rates
	Broadcloth, shoddy, &c.	Weavers.....	....	25	....	....	....	....	By piece, 9 to 10 cents per yard.....	$350.....	12 to 14 yards.	
		Carders.....	....	4	....	....	4	....	.....	250		
		Spinners	....	....	....	....	8	....	$2 25 per week.....	Boys, $125		
		Piecers.....	....	....	....	....	....	6	3 50 "	Girls, 175		
		Pickers.....	....	7	....	....	....	....	6 "	$300		
		Dyers.....	....	8	....	....	....	....	6 "			
		Finishers.....	....	8	....	....	10	....	5 50 " average.....	275		
		"	....	....	4	....	....	4	3 50 "	175		
		Doublers	....	....	....	....	....	....	2 50 "			
		Repairers.....	....	4	....	....	....	....	2 per day	600		
		Overseers.....	....	....	....	....	....	....	15 per week.....	800		
82	Passaic County....	All employes.....	213	110	63	40	....	....	.....	.....	.....	60 hours a week's work; day or night or part of night.
	Broadcloth and shoddy.	Weavers	....	20	....	....	....	....	9 cents per yard.....	$300.....	12 yards.	
		Spinners	....	....	....	....	10	....	$2 per week.....	100		

TABLE No. 2—CONTINUED.

COTTON AND WOOLEN MILLS—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
82	Passaic County.... Broadcloth and shoddy.	Carders	....	5	....	....	5	....	$5 per week	$250		
		Pickers	....	26	....	....	....	....	6 "	300		
		Dyers	....	16	....	....	....	....	6 "	300		
		Finishers	....	20	....	....	10	....	5 50 "	275		
		Repairers	....	10	....	....	....	....	2 per day	600		
		Overseers	....	6	....	....	....	....	3 "	900		
		Shoddy Department.	....	20	30	25	....	....	Men, $6; women, $3 50; children, $2 25 per week			
76	Cumberland Co.... Woolen goods, light cassimere &c. .	All employes	103	50	47	6	....	....				Work 60 hours per week.
		Weavers	....	5	35	....	....	....	8 cents per cut	$350		
		Card tenders	....	8	....	....	....	....	$4 50 per week	225		
		" strippers	....	2	....	....	....	....	5 "	250		
		" grinders	....	2	....	....	....	....	5 "	250		
		Pickers	....	2	....	....	....	....	6 "	300		
		Spinners	....	3	....	....	....	....	5 "	250		
		Self-acting mules	....	....	....	6	....	....	2 50 "	125		
		Dyers	....	10	....	....	....	....	15 "	750		
		Sorters	....	8	....	....	....	....	15 "	750		
		Overseers	....	4	....	....	....	....	15 "	750		
		Repairers	....	4	....	....	....	....	10 to $12 per week	500		
		Other hands	....	2	12	....	....	....	Men, $7; women, $4 per week	Men, $350; women, $200		
105	Somerset County.. Woolen mills.	All employes	410	239	100	71	....	....				Work 11 hours per day. Pay monthly. Ran full time during the year.
		Weavers	....	75	90	....	....	....	Per yard—blankets, 3 cents; cloths, 8; fancy, 10¼	$400 to $500	Blanket, 40 to 50 yards; cloth, 15 to 20; fancy cloth, 15 to 20.	
		Card strippers	....	10	....	....	....	....	$1 per day			
		" feeders	....	....	....	....	12	....	3 per week			
		" tenders	....	10	....	....	6	....	9 " boys, $5			
		Spinners	....	10	....	....	14	....	15 to $18 per week; boys, $5	$700 to $900; boys, $200		
		Fullers	....	18	....	....	3	....	7 per week	$350		
		Gig room	....	22	....	....	....	....	7 "	350		
		Finishing room	....	20	10	....	10	....	7 " women, $6; boys, $5			
		Dyers	....	25	....	....	....	....	10 to $15 per week	500 to $800		
		Pickers	....	12	....	....	6	....	7 per week; boys, $4 50			
		Engineers & firemen.	....	4	....	....	12	....	1 75 per day (av.)	550 (av.)		
		Dryers	....	1	....	....	....	....	1 20 "			
		Wool sorters	....	12	....	....	8	....	15 per week	800; boys, $200		
		Overseers	....	8	....	....	....	....	15 to $20 per week	800 to $1000		
		Laborers	....	10	....	....	....	....	7 50 "	350		
		Machinists	....	8	....	....	....	....	2 to $2 50 per day	700		
		Carpenters	....	4	....	....	....	....	2 50 "	700		

112	Somerset County.. Woolen mills.	All employes	241	141	56	....	24	....				Work 11 hours per day. Pay monthly. Ran full time during the year.
		Weavers	....	40	50	....	....	....	Per yard—blankets, 3 cents; cloths, 8 to 10¼	$350 to $400	Blanket, 40 to 60 yards; cloth, 15 to 25.	
		Carders	....	15	....	....	8	....	$1 to $1 50 per day; boys, $3 50 per wk.	300 to $350; boys, $150		
		Spinners	....	6	....	....	10	....	15 to $18 per week; " $4 to $5 " ..	$750 to $900; boys, $200		
		Fullers	....	12	....	....	2	....	7 per week	$350		
		Giggers	....	15	....	....	....	....	7 "	350; women, $300		
		Finishers	....	18	6	....	....	....	1 15 per day; women, $1	325		
		Dyers	....	8	....	....	2	....	15 to $20 per week	800 to $1000		
		Dryers	....	6	....	....	....	....	1 20 per day	330; boys, $125		
		Pickers	....	8	....	....	2	....	1 20 " boys, 40 cents	330 " 125		
		Machinists	....	4	....	....	....	....	2 "	600		
		Carpenters	....	3	....	....	....	....	2 50 "	700		
		Laborers	....	6	....	....	....	....	1 25 "	350		
106	Somerset County.. Woolen mills.	All employes	237	144	62	....	31	....				Work 11 hours per day. Pay monthly. Ran full time during the year.
		Weavers	....	42	56	....	....	....	Per yard—blankets, 3 cents; cloths, 8 to 10¼	$350 to $400	Blanket, 40 to 60 yards; cloth, 15 to 25.	
		Carders	....	16	....	....	10	....	$1 to $1 50 per day; boys, $3 50 per wk.	300 to $350; boys, $150		
		Spinners	....	7	....	....	10	....	15 to $18 per week; " $4 to $5 " ..	$750 to $900; boys, $200		
		Fullers	....	10	....	....	4	....	7 per week	$350		
		Giggers	....	16	....	....	....	....	7 "	350; women, $300		
		Finishers	....	16	6	....	....	....	1 15 per day; women, $1	325		
		Dyers	....	8	....	....	3	....	15 to $20 per week	800 to $1000		
		Dryers	....	6	....	....	....	....	1 20 per day	330; boys, $125		
		Pickers	....	6	....	....	4	....	1 20 " boys, 40 cents	330 " 125		
		Machinists	....	4	....	....	....	....	2 "	600		
		Carpenters	....	3	....	....	....	....	2 50 "	700		
		Laborers	....	6	....	....	....	....	1 25 "	350		
		Overseers	....	4								
71	Camden County.... Manufacturing Cotton goods—45,000 spindles.	All employes	687	212	315	160	....	....				All time workers have been advanced, on an average, 10 per cent., besides reduction in hours of work from 11½ to 10.
		Weavers	.....	75	225	....	....	....	From 23 to 50 cents per cut (50 yards).	$300 to $450	Weaving—Plain muslin, per loom, 8 to 10 cuts per week; 23 cents a cut. Printing cloth, per loom, 4 to 5 cuts per week; 45 cents a cut. Plain muslin, double cut, per loom, 4 cuts per week. Gingham, 2 looms, 8 to 9 cuts per week; 45 and 50 cents a cut. Spinning—Average 1160 pounds per week. Speeder tenders, 8 to 14 hanks per day. Number of looms used by one person, 2 to 8; average, 4. Gingham looms, average, 2 and 3.	
		Carding room	....	30	60	....	....	....				
		Spinning "	....	30	15	160	....	....				
		Spinners	....	....	....	....	....	....	$1 18 per 100 pounds yarn	600		
		Warpers	....	1	15	....	....	....	6 to $8 per week	300 to $400		
		Watchmen	....	2	....	....	....	....	8 "			
		Engineers & firemen	....	8	....	....	....	....	Engineers, $12; firemen, $10 per week.	Engineers, $600; firemen, $500		
		Machinists	....	30	....	....	....	....	$11 50 per week	$600		
		Blacksmiths	....	3	....	....	....	....	13 "	650		
		Carpenters	....	8	....	....	....	....	15 "			
		Laborers	....	25	....	....	....	....	7 50 "	375		
		Card grinders	....	....	....	....	....	....	7 to $8 50 per week	350 to $425		
		" strippers	....	....	....	....	....	....	5 to 7 50 "	250 to 375		
		" pickers	....	....	....	....	....	....		300 to 350		
		Speed tenders	....	....	....	....	....	....	12 to 15 cents a hank	300 to 400		
		Frame "	....	....	....	....	....	....	90 cents a side	175 to 250		
		Others, spin'g room	....	....	....	....	....	....	$2 50 to $5 per week	150 to 250		
		Overseers	....	....	....	....	....	....	20 to $30 "	1000 to 1500		
		Second bosses	....	....	....	....	....	....	11 50 "	550 to 600		
94	Hunterdon County Cotton yarn.	All employes	67	13	25	29	....	....				Work 11 hours per day. Pay monthly.
		Speeders	....	1	9	....	....	....	10 cents per hank; man, $2 per day	$250; man, $600	Speeders, 10 to 15 hanks per day. Spinning-frame tenders and fillers, 1 side.	
		Slubbers	....	1	4	6	....	....	$3 60 to $4 per week " 2 " ..	180 " 600		
		Drawing-frame tenders	....	1	....	8	....	....	3 60 (av.) " 2 " ..	180 " 600		

TABLE No. 2—CONTINUED.

COTTON AND WOOLEN MILLS—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
94	Hunterdon County	Spinning-frame tenders	....	1	....	7	....	....	1 per side; man, $2 per day	$250; man, $600		
		Fillers	....	....	2	8	....	....	1 "	250		
		Carders	....	4	....	....	....	....	9 per week	450		
		" boss	....	1	....	....	....	....	18 "	900		
		" second boss	....	1	....	....	....	....	12 "	600		
		" grinders, &c.	....	1	....	....	....	....	8 "	400		
		Pickers	....	2	....	....	....	....	5 "	250		
		Spoolers	....	....	10	....	....	....	7 "	350		
20	Passaic County.... Cotton factory.	All employes	500	143	392	25	40	....				Ran full time. Annual earnings of weavers generally about $400. Regular working time, 10 hours per day. Pay promptly every 2 weeks.
		Carding room	....	30	30	10	....	....	$8 (av.); children, $4 (av.) per week		Netting woven per day, 96 yards. Great variety of cotton goods woven by piece work, upon which the weavers average from $8 to $9 per week.	
		Mule spinning room	....	30	....	....	40	....	8; boys, $4 per week			
		Frame " "	....	10	15	15	....	....	Men, $6; women, $5; children, $3 per week			
		Spooling and warping room	....	....	*100	....	....	....	Average $1 per day			
		Weaving room	....	73	147	....	....	....	Mosquito net, 3 to 3½ cents per 8 yds.	($8 to $9 per week); $400 average.		
69	Camden County... Gingham Works; 500 looms, 17,000 spindles.	All employes	377	85	207	85	....	....				Time workers advanced 10 per ct.; also reduction of hours from 11¼ to 10 per day.
		Weavers	....	25	175	....	....	....	45 to 50 cents per cut	$350	Weavers, 3 cuts per week per loom; one person running 2 to 3 looms. Spinners average 1075 pounds per week. Speeders, 8 to 15 hanks per day.	
		Carding room	....	10	25	5						
		Speeders	....	....	....	....	....	....	10 to 15 cents per hank	275		
		Grinders	....	....	....	....	....	....	$7 to $9 per week	350		
		Strippers	....	....	....	....	....	....	$5 to $8 "	275		
		Pickers	....	....	....	....	....	....	$6 to $8 "	250		
		Spinning room	....	15	7	80						
		Spinners	....	....	....	....	....	....	Average $1 20 per 100 pounds	600		
		Warpers	....	....	....	....	....	....	$6 to $10 per week	275		
		Frame tenders	....	....	....	....	....	....	90 cents per side	150		
		Others in sp'g room	....	....	....	....	....	....	$2 25 to $5 per week	200		
		Watchmen	....	2								
		Engineers & firemen	....	3	....	....	....	....	Engineers, $12; firemen, $10 per week	Engineers, $600; firemen, $500		
		Carpenters	....	3	....	....	....	....	$2 50 per day	$675		
		Machinists	....	15	....	....	....	....	$11 per week	550		
		Laborers	....	12	....	....	....	....	$7 50 "	375		
76½	Sussex County..... Steaming Co., for making mineral wool.	All employes	11	6	....	5	....	....				See foot-note
		Engineers	....	2	....	....	....	....	$2 per day	$600		
		Laborers	....	4	....	....	5	....	$1 25 " boys, 75 cents	350; boys, $175		

70	Atlantic County—Cotton factory; 1500 spindles.	All employes	267	55	122	90	....	....	.....	.....	.....	Time workers advanced 10 per ct.; also reduction of hours from 11¼ to 10 per day.
		Weavers	....	25	85	....	....	....	21 cents per single cut; double, 42	$325	Weaving—Plain muslin, 6 cuts per loom per week; do., double cut, 3 cuts. Plain fine muslin, single cut, 6 per loom; do., double, 3. Speeder tending—9 to 10 hanks per day. Frame tending—⅓ to 1½ sides. Spinning—1000 per week (average.)	
		Carding room	....	10	20	....	....	....				
		Grinders	....	....	....	....	....	....	$8 per week (av.)	400		
		Strippers	....	....	....	....	....	....	5 " "	275		
		Speed tenders	....	....	....	....	....	....	9 and 10 cents per hank	250		
		Pickers	....	....	....	....	....	....	$7 per week (av.)	325		
		Spinning room	....	10	8	50	....	....				
		Spinners	....	....	....	....	....	....	$1 18 per 100 pounds (av.)	600		
		Others	....	....	....	....	....	....	1 50 to $4 per week	150 to 200		
		Frame tdrs. & others	....	5	....	40	....	....	90 cents per side per day	150 to 200		
		Warpers	....	1	4	....	....	....	$7 per week (av.)	350		
		Overseers	....	....	....	....	....	....	20 to $30 per week	1200		
		Second bosses	....	....	....	....	....	....	11 50 "	550		
		Machinists	....	....	....	....	....	....	11 "	575		
		Blacksmiths	....	....	....	....	....	....	13 "			
		Carpenters	....	....	....	....	....	....	2 50 per day	600		
		Laborers	....	....	....	....	....	....	8 per week	400		
68	Cumberland Co.... Cotton factory; 30,000 spindles.	All employes	491	151	235	105	....	....	.....	$300 to $400	.....	Time workers advanced 8 per ct.; also reduction of hours from 11¼ to 10 per day.
		Weavers	....	50	175	....	....	....			Weaving—9 cuts, 30 in., light, per loom per week, 17 to 18 cents per cut; 3 cuts, twilled, 80 picks to an in., per loom per week, 40 cents per cut; 4 cuts, 34 in., plain, one loom per week, 25 cents per cut; 4 cuts, heavy plain, one loom per week, 43 cents per cut; 3 cuts, 2 twilled and 2 plain, one loom per week, 49 cents per cut. Spinning—1400 spindles, No. 36 yarn, average 1100 pounds per week, $1 per 100 pounds; 1088 spindles, No. 36 yarn, average 1075 pounds per week, $1 04 per 100 pounds; 1020 spindles, No. 36 yarn, average 1050 pounds per week, $1 09 per 100 pounds; 1400 spindles, No. 42 yarn, average 850 pounds per week, $1 37 per 100 pounds; 1088 spindles, No. 42 yarn, 800 pounds per week, $1 41 per 100 pounds. Carding—Speeder tenders average 6 to 10 hanks per day; frame tenders, sometimes 2 to a side, sometimes 1 and sometimes 3 to 2 sides; average number of looms run by one person, 4; sometimes, 8.	
		Overseer	....	1	....	....	....	....	$30 per week			
		Second boss	....	1	....	....	....	....	11 50 "			
		Carding	....	25	35	5	....	....				
		Overseer	1	....	....	....	....	....	25 "			
		Second boss	1	....	....	....	....	....	11 50 "			
		Grinders	2	....	....	....	....	....	6 to $10 per week	300 to 400		
		Strippers	4	....	....	....	....	....	4 to 6 "	200 to 300		
		Pickers	2	....	....	....	....	....	6 to 8 "	300 to 400		
		Card tenders	25									
		Speed "	30	....	....	....	....	....	12 to 18 cents per hank	300 to 400		
		Spinning	....	20	15	100						
		Overseer	1									
		Second boss	1									
		Spinners	18	....	....	....	....	....	.....	600		
		Doffers	18	....	....	....	....	....	$2 per week	100		
		Backers	15	....	....	....	....	....	2 to $4 per week	100 to 150		
		Frame tenders	40	....	....	....	....	....	90 cents per side	150 to 200		
		Others	42	....	....	....	....	....	$2 to $4 per week	100 to 200		
		Warpers	....	1	10	....	....	....	Overseer, $15 per week; girls, $6	300		
		Watchmen	....	2	....	....	....	....	$8 per week	400		
		Engineers & firemen	....	4	....	....	....	....	10 to $12 per week	550 to 600		
		Carpenters	....	6	....	....	....	....	12 per week	600		
		Blacksmiths	....	1	....	....	....	....	15 "	650		
		Machinists	....	25	....	....	....	....	Foremen, $20; others, $12 per week	600		
		Laborers	....	15	....	....	....	....	$8 per week			
		Overseers	....	....	....	....	....	....	.....	1200 to 1500		
		Second bosses	....	....	....	....	....	....	.....	500 to 550		
95	Hunterdon County Flax, jute and hemp.	All employes	80	20	....	....	....	....	$1 50 to $2 per day	500	.....	60 hours per week. Pay monthly.
			....	....	25	....	....	....	4 to 6 per week	250		
			....	....	....	35	....	....	3 to 5 " for boys; girls, $1 to $2	225 for boys; $75 for girls		
142	Camden County... Carpet yarn.	All employes	110	50	....	....	....	....	7 50 "			
			....	....	60	....	....	....	4 50 "			

QUANTITY PRODUCED.—This factory produces 4000 pounds of "mineral wool" per day. It is made out of iron ore unfit for any other purpose. This is the only establishment of the kind in the State; there being only one other in the United States. The wool, after manufacture, has the appearance of cotton, for which, without a close inspection, it would be taken. Fire will not burn it; and it meets with a ready sale, being used in upholstery, the rubber business, &c.

* Women and girls.

TABLE No. 2—CONTINUED.

PRINT WORKS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
18	Passaic County.... Flax spinning works. Only one in State.	All employes.....	487	125	214	150	....	....	Bosses, $15 to $18 per week.....	.....	.....	Work 10 hours a day. Pay every two weeks.
		Flax dressers.....	....	*73	....	....	†3	....	Boss, $15; others, $10 75.....	$525	120 pounds per day.	
		Carders.....	....	*3	24	....	....	....	$5 per week (av.).....	250		
		Preparers.....	....	*1	40	....	....	....	5 " "	250		
		Spinners.....	....	*1	100	....	....	....	5 10 " "	275		
		Reelers.....	....	*1	100	....	....	....	5 10 " "	275		
		Dyers.....	....	*41	....	....	....	....	7 50 " " boss, $18.....	350		
		Spoolers.....	....	*1	40	....	....	....	2 60 " " " 15.....			
		Doffers	....	*1	....	....	....	‡150	.....	130		
75	Camden County... Print works.	All employes.....	95	67	28	....	....	....	.....	.....	.....	Only reduction of hours. Same wages. Work 10 hours.
		Calico printers.....	....	4	....	....	....	....	$22 per week.....			
		Back Tenders.....	....	4	....	....	....	....	7 "	$350		
		Engravers.....	....	2	....	....	....	....	25 "	1250		
		Sketchers.....	....	1	....	....	....	....	25 "	1250		
		"	....	4	....	....	....	20	12 " girls, $5.....	600; girls, $250		
		Color mixers.....	....	10	8	....	....	....	9 " women, $5.....	450; women, $250		
		Dyers, boss & others.	....	22	....	....	....	....	1st boss, $20 per wk; 2d, $10; others, $8	1000, $500, $400		
		Laborers.....	....	20	....	....	....	....	.....			
77	Passaic County.... Print works.	All employes.....	160	130	30	....	....	....	.....	.....	.....	60 hours are a week's work. A part of time work was slack, but more overtime has been made than was lost from stoppage of factory.
		Calico printers.....	....	7	....	....	....	....	$25 per week.....	$1250		
		Back tenders.....	....	7	....	....	....	....	7 "	350		
		Engravers.....	....	6	....	....	....	....	25 "	1250		
		Sketchers.....	....	2	2	....	....	....	25 " women, $5.....	1250; women, $250		
		Color mixers.....	....	20	....	....	....	....	10 "	500		
		Folders.....	....	6	$28	....	....	....	12 " women, $5.....	600; women, $250		
		Dyers, boss & others	....	52	....	....	....	....	1st boss, $30 per wk; 2d, $12; others, $8	1500, $600, $400		
		Laborers.....	....	30	....	....	....	....	$7 per week.....	300		
78	Passaic County.... Dye and print works.	All employes.....	219	165	54	....	....	....	.....	.....	.....	60 hours are a week's work. A part of time work was slack, but more overtime has been made than was lost from stoppage of factory.
		Calico printers.....	....	10	....	....	....	....	$25 per week.....	$1250		
		Back tenders.....	....	10	....	....	....	....	7 50 "	375		
		Engravers.....	....	9	....	....	....	....	24 "	1200		
		Sketchers.....	....	3	4	....	....	....	24 " women, $5.....	1200; women, $260		
		Color mixers.....	....	30	....	....	....	....	10 "	500		
		Folders.....	....	11	50	....	....	....	11 " women, $5 25.....	550; women, $250		
		Dyers, boss & others	....	82	....	....	....	....	Boss, $30 per wk; 2d, $13; others, $8 50	1500, 650, 425		
		Laborers.....	....	50	....	....	....	....	$7 per week.....	350		
79	Passaic County.... Print works.	All employes.....	111	91	20	....	....	....	.....	.....	.....	This factory has not run on full time.
		Calico printers.....	....	5	....	....	....	....	$25 per week.....	$1000		
		Dyers, boss and 2d..	....	2	....	....	....	....	1st boss, $25 per week; 2d, $12.....	1000, $600		
		" ordinary.....	....	35	....	....	....	....	$8 per week.....	350		
		Back tenders.....	....	5	....	....	....	....	7 50 "	300		
		Engravers.....	....	4	....	....	....	....	20 "	800		

		Sketchers	....	2	....	....	....	....	20 "	800	
		Color mixers	....	15	....	....	....	....	10 "	400	
		Folders	....	4	....	....	....	....	11 50 "	475	
		Laborers	....	20	....	....	....	....	7 50 "	300	
		Women dif. dep'ts	....	20	....	....	....	....	5 50 "	225	
80	Camden County Print works.	All employes	116	96	20	....	....	....			Reduction of hours to 10 per day. No change in wages.
		Calico printers	....	5	....	....	....	....	$22 per week	$1100	
		Back tenders	....	5	....	....	....	....	7 "	350	
		Engravers	....	4	....	....	....	....	22 "	1100	
		Sketchers	....	1	2	....	....	....	22 " women, $5	1100; women, $250	
		Color mixers	....	17	....	....	....	....	10 "	500	
		Folders	....	4	‖18	....	....	....	11 " women, $5	550; women, $250	
		Dyers, boss and 2d	....	2	....	.. .	....	....	1st boss, $20 per week; 2d, $11	1000, 550	
		" ordinary	....	35	....	....	....	....	$8 per week	400	
		Laborers	....	25	....	....	....	....	7 "	350	
67	Cumberland Co. Bleachery.	All employes	86	....	....	....	....	....			Work 10 hours per day. There has been a change from 11 to 10 hours.
		Finishers	....	15	....	....	....	....	$8 per week	$400	
		Dyers	....	20	....	....	....	....	8 "	400	
		Folders and packers	....	20	....	....	....	....	10 "	500	
		Bleachers	....	4	....	....	....	....	Boss, $14; others, $8	400	
		Sewers	....	1	2	....	....	....	20 cents per 100 seams (500 per day)	350	
		Firemen & engineers	....	3	....	....	....	....	$12 per week	600	
		Machinists, Carptrs.	....	10	....	....	....	....		600	
		Dryers	....	2	....	....	2	....	Men, $9 per week; boys, $3 50	400	
		Laborers	....	7	....	....	....	....	$8 per week	400	
		Boss sewer	....	....	....	....	....	....	12 "	600	

* Including one boss. † Boy apprentices. ‡ Between 8 and 12 years old. § Women who work in room. ‖ Women in folding room.

TABLE No. 2—CONTINUED.

SILK MILLS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
1	Passaic County.... Silk manufacture	All employes.....	151	99	46	6	....	....	.....	.....	.....	60 hours per week is the regular time, but in busy times, for mos. together, it is often as high as 80 hours; while in slack times it often is only 30 or 40. Thus the over and under-time about equaled each other last year.
		Weavers.....	....	60	30	....	....	....	Average 14 cents per yard.....	$600 to $650 (av.)*..	Weavers average 15 yards per day; winders, 3 pounds; pickers 100 yds. There is great difference in quantity produced, according to fineness, weaving from 12 to 20 yards.	
		Warpers.....	....	7	2	....	....	....	" $1 75 per day.....	500 to 550 "		
		Winders.....	....	15	6	....	....	....	" 40 cents per pound.....	350 to 400 "		
		Warp pickers.....	....	17	....	....	....	....	" 3½ cents per yard.....	700 to 900 "		
		Cloth "	....	....	5	....	....	....	" $8 per week.....	400 to 450 "		
		Quillers.....	....	....	....	4	....	....	" 4 "	200 to 225 "		
		Twisters.....	....	....	3	....	....	....	" 13 50 "	600 to 650 "		
		Doublers.....	....	....	....	2	....	....	" 4 "	200 to 225 "		
2	Silk manufacture	All employes†.....	69	20	39	10	....	....	See No. 1.....	See No. 1.		
3	"	" †.....	171	50	100	21	....	....	"	"		
4	"	" (a).....	182	62	100	20	....	....	"	For hand loom weavers, see 11.		
5	"	" †.....	86	25	51	10	....	....	"	See No. 1.		
6	"	" (b).....	265	70	160	35	....	....	"	Hand loom, see 11.		
7	"	" (c).....	147	40	82	‡25	....	....	"	"		
8	"	" (d).....	231	75	131	25	....	....	"	"		
9	"	" (e).....	321	173	100	‡48	....	....	"	For ribbon loom, see No. 12.		
10	"	" (f).....	461	203	207	50	....	....	"	See No. 12.		
11	"	" (g).....	478	150	250	78	....	....	Hand loom weavers, $10 to $15 per week. (g).....	Average of hand loom, $400.....	.....	11, 12, 13, 25—All these firms profess to have no children under 14, but a child that wants employment can always get it by pretending to be older.
12	"	" (h).....	389	171	257	75	....	....	Ribbon weavers, $4 15 per cut 7 in. (h)	Average $600. Varies from $400 to $800.(h)		
13	"	" (i).....	692	400	292	90	....	....	See No. 12.....	See No. 12.		
25	"	" (j).....	589	284	225	80	....	....	"	Ribbon weavers average $700.(j)		
19½	Hudson County.... Silk dress goods.	"	700	300	300	100	....	....	.....	.....	.....	10 hours a day. Wages decreased 10 per cent. in weaving department.
		Raw silk winders...	....	....	....	....	....	14	All piece work is paid monthly, except twisting and weaving, which is paid as soon as work is done.....	.....	75 pounds per day raw silk (winding, spinning, cleaning, doubling); 60 pounds (reeling); 400 pounds (soft silk winding); 150 pounds (transferring.)	
		Spinners.....	....	10								
		Cleaners.....	....	....	....	100						
		Doublers.....	....	20								
		Reelers.....	....	....	....	....	8					
		Soft silk winders....	....	....	100	....	....	....	.....	$320		

		Transferrers	....	....	6						
		Warpers	50								
		Spoolers	15								
		Twisters	15								
		Weavers	200	....	....	....	....	....	Men, $400; women, $380; child'n, $240		
19	Passaic County.... Silk manufacture. 23 establishments.	All employes	844	261	394	189	....	....			In addition to these figures, it is estimated that there are 500 silk hand loom weavers in private dwellings; they buying their own yarn. In this way weavers, with only small capital, can work for themselves.
		Weavers	510	....	....	....	....	....	Average 14 cents a yard	About $600§	
		Warpers	54	....	....	....	....	....	$1 75 a day	" 500§	
		Winders	121	....	....	....	....	....	40 cents per pound	" 350§	
		Quillers	31	....	....	....	....	....	$4 per week	" 200§	
		Warp pickers	102	....	....	....	....	....	3½ cents per yard	" 700§	
		Cloth "	31	....	....	....	....	....	$8 per week	" 400§	
		Twisters	25	....	....	....	....	....	13 50 per week	" 600§	
		Doublers	22	....	....	....	....	....	4 "	" 200§	
26	Passaic County.... Soft silk winding, throwing, braiding, &c.	All employes(a)	....	50	250	....	25	75	Average, men, $2 per day; women, $9 per week; boys, $5; girls, $4 to $7...		These factories have run steadily on full time the past year.
		" (b)	90	12	50	....	8	25	Average, men, $2 25 per day; women, $1 50; boys, $1 20; girls, 75 cents.		
		" (c)	....	12	60	....	....	....	Average, male, $2; female, $1 per day		
		" (d)	....	10	50	....	5	....	" men, $2; women, $1 25; boys, $1; girls, 75 cents.		
		Total in Paterson....	7300	2600	3400	1300	....	....	Average, men, $2 per day; women, $1; children, 60 cents; av. all, $1 20.		
27	Passaic County.... Silk dyeing and finishing.	All employes	....	370	....	....	....	....	No piece work.		
		Finishers	....	60	....	....	....	....	$10 to $12 per week	$500 (av.)	
		Dyers	....	30	....	....	....	....	18 to 20 "	900 "	
		Machine workers	....	20	....	....	....	....	10 to 12 "	500 "	
		Budlers	....	10	....	....	....	....	10 to 12 "	500 "	
		Helpers (laborers)..	....	....	....	....	....	....	Average $8 per week	400	
		Boss dyer	....	1	....	....	....	....	$30 per week	1500, net.	
		Total in Paterson....	1981	1280	443	330	....	....	Average, boss dyer, $1,500; dyers, $900; other male operators, $1 50 per day; female, $1; children, 60 cents.		

SILK MILLS—Continued.

RECAPITULATION—Total Number Employed in Silk Business in Paterson.

All employes	15,291
Ribbon hand and power loom weavers	3,505
Warpers, winders, quillers, pickers, twisters, doublers	2,505
Soft silk winders, throwsters, &c	7,300
Dyers and finishers	1,981

*All these averages represent the earnings during ordinary running time, and do not take in long periods of sickness, or lost time through accidents by fire, repairs, drunkenness, &c. Power looms. ‡ Under 14 years. § The annual earnings are based on the supposition that the factories ran ordinarily steady, which was the case last year; all reporting full time. (a) Power looms, 95 weavers; hand looms, 50. (b) Power looms, 150; hand, 25. (c) Power looms, 50; hand looms, 50. (d) Power looms, 100; hand looms, 50. (e) Power looms, 00; ribbon, 100. (f) Power looms, 150; ribbon, 100. (g) Power looms, 200; hand, 100. Hand loom weavers make from $10 to $15 per week. They are only required for superior work, nd very few can have constant employment. Their average annual earnings are not much over $400, on account of being out of employment so much. (h) Power looms, 200; ribbon, 25. ibbon weaving requires the greatest skill, and none but men are allowed to do it. It is paid at $4.15 per cut of 7 inches, but it varies according to width and fineness. Average annual earngs vary from $400 to $800, according to the time employed. (i) Power looms, 300; hand, 100; ribbon, 50. (j) Weavers, 250; ribbon weavers, 100. If there is steady work, or nearly so, l the year, ribbon weavers make $800; some $1000; but average not above $700.

TABLE No. 2—CONTINUED.

SILK MILLS—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
42	Morris County.... Silk manufacture. Also throwster and soft silk winding.	All employes.....	156	72	90	*6	....	....	.....	.....	.....	10 hours per day is the working time.
		Weavers.....	....	40	60	....	....	....	13 cents per yard.....	Factory running since Jan. 1, 1882.	Weaving, 16 yards; winding, 2½ lbs.; warp picking, 100 yards. Ribbon loom weavers work by the cut, which is, for 7-in. ribbon, 20 pieces, 10 yards long, woven on loom at the same time; 200 yards make a cut. Very few can weave a cut per day; but it is done with the aid of a helper. A cut is rather more than an ordinary day's work.	
		Warpers.....	....	4	6							
		Winders.....	....	8	17	....	....	....	40 cents per pound.			
		Quillers.....	....	....	....	4	....	....	$4 per week.			
		Warp pickers.....	....	17								
		Cloth "	....	....	5	....	....	....	8 "			
		Twisters.....	....	3	....	....	....	....	13 "			
		Doublers.....	....	....	....	2	....	....	4 "			
		Throwster depar'nt.	150	....	....	....	....	....	Men average $2 per day; women, $9 per week; boys, 50 cents; girls, 75 cents per day.			
42½	Morris County.... Throwster and soft silk winding.	All employes.....	200	....	....	....	....	....	Just begun operations.			
15	Passaic County.... Bobbin manufacture.	All employes.....	16	12	....	4	....	....	.....	.....	.....	Work 10 hours per day. Dusty work. Not in good sanitary condition. Firm good to employes No strikes.
		Roughers.....	....	5	....	....	....	....	$1 50 per day.....	$450		
		Finishers.....	....	7	....	....	....	....	2 00 "	625		
		Total in Paterson, 4 establishments:										
		Finishers.....	....	23	....	....	....	....	.....	.....	.....	No trouble has ever existed between employer and employe. Wages in cash. Best feeling prevails.
		Roughers.....	....	20								
		Boys (help).....	....	10								

* Under 14 years.

TABLE No. 2—CONTINUED.

BOOTS AND SHOES.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
62	Merriane	All employes	254	104	150	....	....	....				Advance in wages, 10 and 15 per ct.
	Ladies', Misses' and Children's fine Shoe manufactory.	Sole leather room	....	10	11	....	....	....	$2 per day	$600	There are 75 divisions of labor in this establishment, but most of the work is done by the day or week.	
		Cutting	....	26	....	....	....	....	3 highest; $1 lowest, for learners	Journeymen, $900; Learners, $300		
		Bottoming	....	39	40	....	....	....	Men, $3; women, $1	Men, $750; women, $300		
		Fitting	....	....	93	....	....	....	Average $1 10 per day	$330		
		Packing	....	13	6	....	....	....	Men, $1 50 per day; women, $1	Men, $400; women, $300		
		Turning	....	9	....	....	....	....	$1 per day	$300		
		Box making	....	6	....	....	....	....	2 "	600		
		Engineer	....	1	....	....	....	....	3 "	900		
64	Cumberland Co.	All employes	96	37	50	9	....	....				
	Shoe factory.	Cutting	....	7	....	....	....	....	$11 per week	$550		
		Fitting	....	....	47	....	....	....	7 50 "	375		
		Stock fitting	....	6	....	....	....	....	8 50 "	425		
		Lasting	....	8	....	....	....	....	11 50 "	575	60 pairs a day.	
		McKay machine	....	1	....	....	....	....	12 "	600		
		Beating out	....	1	....	....	....	....	8 50 "	425		
		Heeling	....	1	....	....	....	....	13 "	650		
		Edge trimming	....	3	....	....	....	....	13 50 "	700		
		" setting	....	3	....	....	....	....	13 50 "	700		
		Heel burnishing	....	2	....	....	....	....	4 50 "	225		
		Tacking machine	....	1	....	....	....	....	9 "	450		
		Other employes	....	2	3	9	....	....	Men, $8; women, $5 50; children, $3 50	Men, $400; women, $275; children, $275		
63	Cumberland Co.	All employes	105	41	53	11	....	....				10 hours per day.
	Shoemakers.	Cutting	....	8	....	....	....	....	Highest, $18 per week; lowest, $4; average, $12	$600		
		Fitting	....	....	50	....	....	....	Highest, $12 per week; lowest, $3; average, $8	400		
		Stock fitting	....	7	....	....	....	....	$9 per week	450		
		Lasting	....	9	....	....	....	....	12 "	600	60 pairs a day.	
		McKay machine	....	1	....	....	....		12 "	600		
		Beating out	....	1	....	....	....	....	9 "	462		
		Heeling	....	1	....	....	....	....	13 "	610		
		Edge trimming	....	4	....	....	....	....	14 "	625		
		" setting	....	3	....	....	....	....	14 "	625		
		Heel burnishing	....	2	....	....	....	....	5 "	250		
		Tacking machine	....	1	....	....	....	....	9 50 "	450		
		Other employes	....	4	3	11	....	....	Men, $8; women, $6; children, $4	Men, $400; women, $300; children, $200		

TABLE No. 2—CONTINUED.

BOOTS AND SHOES—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
65	Cumberland Co.... Shoemakers.	All employes.....	52	20	27	5						
		Cutting.....	....	4	....	....	....	....	$10 50 per week.....	$525		
		Fitting.....	....	....	25	....	....	....	7 25 "	362		
		Stock fitting.....	....	3	....	....	....	....	8 25 "	412		
		Lasting.....	....	4	....	....	....	....	11 25 "	580.....	60 pairs a day.	
		McKay machine.....	....	1	....	....	....	....	11 75 "	590		
		Beating out.....	....	1	....	....	....	....	8 25 "	410		
		Heeling.....	....	1	....	....	....	....	12 75 "	462		
		Edge trimming.....	....	2	....	....	....	....	13 25 "	660		
		" setting.....	....	1	....	....	....	....	12 75 "	630		
		Heel burnishing.....	....	1	....	....	....	....	4 25 "	212		
		Tacking machine.....	....	1	....	....	....	....	8 75 "	425		
		Other employes.....	....	1	2	5	....	....	Men, $7 75 per week; women, $5 50; children, $3 75.....	Men, $362; women, $275; children, $162		
66	Cumberland Co.... Shoe factory.	All employes.....	37	13	21	3	....	....	.....	.....	.....	10 hours per day.
		Cutting.....	....	2	....	....	....	....	$10 75 per week.....	$537		
		Fitting.....	....	....	20	....	....	....	7 40 "	375		
		Stock fitting.....	....	2	....	....	....	....	8 25 "	410		
		Lasting.....	....	3	....	....	....	....	11 50 "	550		
		McKay machine.....	....	1	....	....	....	....	11 50 "	550		
		Beating out.....	....	1	....	....	....	....	8 50 "	425		
		Heeling.....	....	1	....	....	....	....	13 "	625		
		Edge trimming.....	....	....	....	....	....	....	13 "	625		
		" setting.....	....	1	....	....	....	....	13 "	625		
		Heel burnishing.....	....	1	....	....	....	....	4 50 "	250		
		Other employes.....	....	1	2	3	....	....	Men, $7 50; women, $5 75; children, $3 50.....	Men, $350; women, $275; children, $175		
125	Burlington County Infants' shoes.	All employes.....	51	22	25	4						
		Lasting.....	....	5	....	....	....	....				
		Heeling.....	....	3	....	....	....	....				
		Trimming.....	....	2	....	....	....	....	3 cents per pair.....	$620.....	75 pairs a day.	
		Burnishing.....	....	3	....	....	....	....				
		Finishing.....	....	5	....	....	....	....				
		Cutting.....	....	3	....	....	....	....				
		Fitting and other w'k	....	....	25	....	....	....	$4 to $6 per week.....	200 to $300		
		Goodyear machine..	....	1	....	4	....	....	$10 "	500		

126	Burlington County Ladies', Misses' and Infants' shoes.	All employes	64	28	30	6						Advance in wages, 5 per cent.
		Lasting		6								
		Heeling		4								
		Trimming		2								
		Burnishing		4								
		Finishing		6								
		Cutting		4				18 to 20 cents per doz.; infants, 1 to 1¾				
		Fitting and other w'k			30			$4 to $6 per week		200 to $300		
		McKay machine		1				10 "		500		
		Goodyear machine		1								
		Children				6						
127	Ladies', Misses' and Infants' shoes.	All employes	23	14	9							10 hours per day. Pay weekly.
		Lasting		3				4 to 7 cents per pair		550 to $600	50 to 60 (ladies' and misses') a day.	
		Heeling		2				4½ to 5 " " infants', 1¼		550 to 600	55 to 65 " " "	
		Trimming		1				5 " " " 1¼			48 to 50 " " "	
		Burnishing		2				3 to 5½ " " " 1¼			50 to 60 " " "	
		Finishing		3				3½ to 4 " " " 1¼		600	50 to 60 " " "	
		Cutting		2				20 cents per doz. pairs			12 to 15 dozen a day.	
		Fitting			9			8 to 10 cents per pair		300	12 to 15 pairs a day.	
		McKay machine		1				$10 per week		500		
133	Burlington County Infants' Shoe factory.	All employes	32	14	12	6						10 hours per day. Pay weekly. Advance in wages, 5 per cent.
		Lasting		3				By piece, 1 to 1¾ cents per pair		Average $600	150 to 200 pairs.	
		Heeling		2								
		Trimming		1								
		Burnishing		2								
		Finishing		3								
		Cutting		2								
		Fitting			12					$450		
		McKay machine										
		Goodyear "		1						500		
		Children				6						
135	Burlington County Ladies', Misses' and Infants' shoes.	All employes	52	26	20	6						Small advance in wages.
		Lasting		6				Ladies' and misses', 4½ cents a pair		575 to $600	50 pairs ladies' and misses' a day; infants', 130	
		Heeling		4								
		Trimming		2								
		Burnishing		4								
		Finishing		6								
		Cutting		3				20 cents per dozen			12 dozen a day.	
		Fitting			20							
		McKay machine						$4 50 to $5 per week		200 to $250		
		Goodyear "		1								
		Children				6						
134	Burlington County 19 additional firms engaged in Shoe manufacturing.	All employes	250	150	75	25		Men average $12 to $15 per week		600 to $650		Average advance in wages, 5 per cent.
								Women " 5 "		250		
								Children average 2 50 "		150		
143	Camden County... Ladies', Misses' and Children's shoes.	All employes	68	41	27							Average advance in wages, 5 per cent.
		Lasting		9				3 to 5 cents per pair		Men average $575	Ladies' and misses', highest, 60 pairs; lowest, 50 pairs. Infants', highest, 140 pairs; lowest, 125 pairs per day.	
		Heeling		6								
		Trimming		3								
		Burnishing		6								
		Finishing		9								
		Cutting		6								
		Fitting			27					$350		
		McKay machine		1						500		
		Goodyear "		1						500		

TABLE No. 2—CONTINUED.

BOOTS AND SHOES—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
144	Camden County... Infants' shoes.	All employes.....	23	14	9							
		Lasting.....	....	3	....	....	....	....				
		Heeling.....	....	2	....	.. .	....	....				
		Trimming	....	1	....	....	....	....	1 to 1¾ cents per pair.....	{Highest, $600; lowest, $500.}	Highest, 150 pairs; lowest, 125.	
		Burnishing.....	....	2	....	....	....	....				
		Finishing.....	....	3	....	....	....	....				
		Cutting	....	2	....	....	....	....	9 cents per dozen.			
		Fitting.....	....	....	9	....	....	....	.....	$350		
128	Burlington County Infants' Shoe factory.	All employes.....	38	26	12							
		Lasting.....	....	6	....	....	....	....				
		Heeling.....	....	4	....	....	....	....				
		Trimming.....	....	2	....	....	....	....	1¾ cents per pair.....	600.....	140 to 150 pairs a day.	
		Burnishing	....	4	....	....	....	....				
		Finishing	....	6	....	....	....	....				
		Cutting	....	3	....	....	....	....	20 cents per dozen.			
		Fitting.....	....	....	12	....	....	....	9 cents per pair	310.....	12 to 15 pairs.	
		McKay machine.....	....	1	....	....	....	....	$5 per week.			
129	Burlington County Infants' Shoe factory.	All employes.....	23	14	9	....	....	....	.....	.....	.....	10 hours. Weekly payments. Slight increase in wages
		Lasting.....	....	3	....	....	....	....				
		Heeling.....	....	2	....	....	....	....				
		Trimming.....	....	1	....	....	....	....	1¼ cents per pair.....	650.....	Average 140 pairs.	
		Burnishing	....	2	....	....	....	....				
		Finishing.....	....	3	....	....	....	....				
		Cutting	....	2	....	....	....	....	20 cents per dozen.			
		Fitting.....	....	....	9	....	....	....	8⅓ cents per pair	300		
		Goodyear machine..	....	1	....	....	....	....	$5 per week.			
131	Burlington County Ladies', Misses' and Infants' shoes.	All employes.....	155	86	54	15	....	....	.....	.....	.....	10 hours. Weekly payments. Slight increase in wages
		Lasting.....	....	18	....	....	....	....	4½ cents per pair.....			
		Heeling.....	....	12	....	....	....	....	4 " "		{55 pairs 60 " 48 " 50 " 56 "} 150 doz. of infants' shoes.	
		Trimming.....	....	6	....	....	....	....	4½ " "	$650.....		
		Burnishing.....	....	12	....	....	....	....	4 " "			
		Finishing.....	....	18	....	....	....	....	3½ " "			
		Cutting.....	....	12	....	....	....	....	20 cents per dozen.....	$650.....	12 to 14 doz. per day.	
		Fitting	....	....	54	....	....	....	9 cents per pair.....	300		
		McKay machine.....	....	4	....	....	....	....	$10 per week	500		
		Goodyear "	....	4	....	....	....	....	10 "			
		Children.....	....	....	....	15	....	....				
132	Burlington County Ladies', Misses' and Infants' shoes.	All employes.....	137	73	50	14	....	....	.....	.....	.....	10 hours. Weekly payments. Wages increased 5 per cent.
		Lasting.....	....	16	....	....	....	....				
		Heeling.....	....	10	....	....	....	....				
		Trimming.....	....	5	....	....	....	....	Average 4 cents per pair.....	625.....	50 pairs ladies' or misses'; 125 to 150 of infants'.	
		Burnishing.....	....	10	....	....	....	....				
		Finishing.....	....	16	....	....	....	....				
		Cutting.....	....	10	....	....	....	....	*20 cents per dozen*.....	625.....	*12 doz. per day.*	
		Fitting	....	....	50	....	....	....	8⅓ to 9⅓ cents per pair.	325.....	11 to 12 doz. per day.	
		McKay machine.....	....	3	....	....	....	....	$9 to $10 per week.....	500		
		Goodyear "	....	3	....	....	....	....	9 to $10 "	500		
		Children.....	....	....	....	14	....	....	.....	100 to $200.		

TABLE No. 2—CONTINUED.

POTTERY.

Census number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
55	Mercer County.... Potters.	All employes.....	3042	1880	403	759	....	....	.....	.....	.....	There are employed in the white ware potteries in the State about 2000 men, also about 460 women, and 800 children between 7 and 16 years of age, whose earnings average from $1 50 to $4 per week. The proportion of hands in these subdivisions holds good for all the establishments. The wages given are those paid by the Trenton White Ware Manufacturing Potters' Association.
		Pressers.....	....	7	....	....	....	....	8-inch vegetable dish, covered, $1 40 per dozen.....	$750.....	2 dozen per day; help, $1 per week.	
		Jiggerers.....	....	6	....	....	....	....	7-inch plates, flat, 10 cents per dozen.	800.....	50 " " help and use of power cost $14 per week.	
		Handlers	....	2	....	....	....	....	Tea cups, 4 cents per dozen.....	625.....	65 dozen per day; help, $3 per week.	
		Turners	....	1	....	....	....	....	{ Oyster bowls (30's), 9 cents per doz. { Mugs (30's), 8 cents per dozen.	{ $750.....	{ 26 dozen per day. { 30 " "	
		Throwers.....	....	1	....	....	....	....	Oyster bowls (30's), 6 cents per dozen.	$900.....	100 " " help, $2 50 per day.	
		Dish-makers.....	....	2	....	....	....	....	10-inch flat dish, 18 cents per dozen...	1000.....	30 " " " 1 50 "	
		Sagger-makers	....	1	....	....	....	....	{ Common oval, 4 cents each. { Cup saggers, 3 cents each.	{ $800.....	{ 150 per day; help cost $11 per week. { 200 " " " "	
		Mould-makers.....	....	2	....	....	....	....	$2 50 per day.....	$750		
		Kilnmen (foremen).	....	1	....	....	....	....	2 25 "	625		
		"	....	10	....	....	....	....	2 "	600		
		Firemen.....	....	....	....	....	....	....	2 75 "	670		
		Dippers.....	....	....	....	....	....	....	2 50 "	650		
		Packers	....	2	....	....	....	....	55 cents per crate; 15 cents per barrel, each.....	675.....	5 crates.	
		Warehousemen	....	3	....	....	....	....	$1 50 per day; foreman, $2 50.....	425		
		Laborers	....	....	....	....	....	....	1 25 "	375		
		Stampers (foremen)	....	....	1	....	....	....	5 per week.....	225		
		"	....	....	5	....	....	....	4 "	200		
		Gloss ware-room....	....	....	5	....	....	....	4 "	200		

TABLE No. 2—CONTINUED.

JEWELRY.

Office number.	Location and Industry.	Subdivisions of Labor.	Total number of hands employed.	Number of Men.	Number of Boys.	Number of Girls.	Piece Workers.	Week Workers.	Men employed in Teams.	Men working Single.	Highest Wages per Week.	Lowest Wages per Week.	Average Annual Earnings.	Price Paid for Work by the Piece or Dwt.	No. of employes under 14 years of age.	Average Amount of Time Lost.	REMARKS.
195	Essex County..... Jewelers.	All employes.....	90	48	12	30	....	....	....	....	.....	.....	.....	.....	....	.....	Wages are lower in this shop than elsewhere; but hands work over-time. Began in August, and continued until Christmas, to work as late as 9 P. M. Fine chains are made for 10 to 12 cents per dwt.; best chains made by week-workers.
		Foremen	3	3	....	....	....	....	....	....	$25 00	*	$1,150 00	.....	....	.....	
		Finishers.....	1	1	....	....	....	....	....	....	.....	.....	.....	.....	....	.....	
		Chain-makers	71	34	12	25	28	43	20	....	15 00	$7 00	500 00	9 to 12 cents per dwt.	....	.....	
		Spring and Swivel-makers.....	3	3	....	....	1	2	....	....	.....	.....	.....	.....	....	.....	
		Polishers.....	7	2	....	5	....	7	....	....	18 00	Girls $6	850 00	.....	....	.....	
		Colorers	1	1	....	....	....	1	....	....	30 00	.....	1,200 00	.....	....	.....	
		Melters	1	1	....	....	....	....	....	....	20 00	.....	900 00	.....	....	.....	
		Tool-makers.....	1	1	....	....	....	1	....	....	18 00	.....	850 00	.....	....	.....	
		Laborers	1	1	....	....	....	1	....	....	8 00	.....	400 00	.....	....	.....	
194	Essex County..... Jewelers.	All employes	55	36	8	11	....	....	....	....	.....	.....	.....	.....	....	.....	Work over-time in Fall but get extra pay. Hands have 20 minutes for supper without deducting time; well satisfied with treatment. No fire escapes.
		Jewelers.....	33	27	6	....	....	....	....	....	20 00	10 00	Average, $15 per week, or $750 per year.	.....	....	6 weeks.	
		Stone setters.....	1	1	....	....	....	....	....	....	.....	.....		.....	....	6 weeks.	
		Engravers.....	4	3	1	....	....	....	....	....	.....	.....		.....	....	6 weeks.	
		Polishers	13	1	1	11	....	....	....	....	.....	.....		.....	....	6 weeks.	
		Enamelers.....	1	1	....	....	....	....	....	....	.....	.....		.....	....	6 weeks.	
		Melters	1	1	....	....	....	....	....	....	.....	.....		.....	....	6 weeks.	
		Tool-makers.....	2	2	....	....	....	....	....	....	.....	.....		.....	....	6 weeks.	
196	Essex County..... Jewelers.	All employes	26	16	8	1	....	....	....	....	.....	.....	.....	.....	....	.....	
		Foremen	1	1	....	....	....	....	....	....	.....	.....	Average, $650.	.....	....	.....	
		Jewelers.....	15	8	7	....	....	....	....	....	18 00	15 00		.....	....	4 weeks.	
		Bracelet-makers.....	4	3	1	....	....	....	....	....	18 00	15 00		.....	....	4 weeks.	
		Locket-makers	1	1	....	....	....	....	....	....	18 00	15 00		.....	....	4 weeks.	
		Stone setters.....	1	1	....	....	....	....	....	....	18 00	15 00		.....	....	4 weeks.	
		Finishers.....	1	1	....	....	....	....	....	....	18 00	15 00		.....	....	4 weeks.	
		Polishers.....	2	1	....	1	....	....	....	....	.....	.....		.....	....	4 weeks.	
		Melters	1	1	....	....	....	....	....	....	.....	.....		.....	....	4 weeks.	
190	Essex County..... Jewelers*.	All employes	74	62	16	2	....	....	....	....	.....	.....	.....	.....	....	.....	Jewelers—4 men at $18 per week; 4, at $16; 28, at $15; 1, at $20; 3, at $12. Bracelet-Makers—Piece workers, $2 to $2.75 per bracelet, according to width. Polishers—1 capper, $18 per week; 1 polisher, $18; 1 polisher, $15; 2 polishers, $12. 2 Girls, $6 per week, each.
		Foremen	1	1	....	....	1	....	....	....	30 00	.....	1,500 00	.....	....	.....	
		Jewelers.....	44	36	8	....	....	44	....	....	20 00	12 00	725 00	.....	....	.....	
		Bracelet-makers.....	4	4	....	....	2	....	....	....	22 00	18 00	800 00	.....	....	.....	
		Engravers.....	12	11	1	....	7	3	....	....	18 00	15 00	650 00	.....	....	.....	
		Polishers....	7	5	....	2	....	14	....	....	21 00	12 00	750 00	.....	....	.....	
		Enamelers.....	3	2	1	....	....	3	....	....	.....	.....	.....	.....	....	.....	
		Melters.....	1	1	....	....	....	1	....	....	.....	.....	.....	.....	....	.....	
		Tool-makers	2	2	....	....	....	2	....	....	20 00	18 00	.....	.....	....	.....	

* Average lost time in the year, 6 weeks.

192	Essex County..... Jewelers.	All employes	305	177	77	51	....	....	....	....	.....	.....	.....	.....	....	.....	Jewelers—Average wages, about $15 per week.
		Foremen	3	3	....	....	....	....	....	....	$50 00	$35 00	$2,200 00	.....	....	3 weeks.	Bracelet-makers—Piece workers, ¼-inch, $2.50; ⅛-inch, $3; 5/32-inch, $3.50; 1-inch, $4; Special order, 50 cents extra.
		Jewelers	76	61	15	....	15	....	18	43	24 00	9 00	700 00	.....	15	3 months	
		Bracelet-makers	10	10	....	....	4	6	....	....	21 00	15 00	750 00	.....	....	3 months	
		Stone setters.....	7	6	1	....	5	2	2	5	18 00	.....	750 00	$1 50 to $4 00	....	4 months	Stone Setters—2½ to 4 cts. for pearl and turquois; 20 to 50 cts. each, per diamond, and other stones according to style of setting.
		Finishers	4	4	....	....	....	4	....	4	21 00	15 00	800 00	2½ to 4 cents	....	2 months	
		* Chain-makers	94	34	35	25	29	65	34	4	24 00	7 50	600 00	.....	14	3 months	Chain-makers—Girls work by the piece and average $6 per week.
		†Spring-makers.....	3	3	....	....	3	....	....	....	18 00	.....	.....	4 to 10 cts dwt	....	4 months	
		Swivel-makers	1	1	....	....	1	....	....	1	21 00	.....	800 00	8 cts. piece.	....	3 months	
		Engravers	55	32	23	....	....	55	....	....	24 00	9 00	750 00	12 cts. piece.	....	2 months	Engravers—Boys are largely employed.
		Polishers	32	7	1	24	....	32	....	....	21 00	12 00	750 00	.....	....	2 months	Enamelers—2 girls get $4 per week each; 2 get $5. 10 hours per day; extra pay for over-time.
		Enamelers	6	3	1	2	....	6	....	....	21 00	12 00	750 00	....	....	2 months	
		Colorers.....	3	2	1	....	....	3	....	2	35 00	20 00	1,200 00	.....	....	1 month	
		Melters.....	2	2	....	....	....	2	....	2	25 00	18 00	.....	.....	....	1 month	
		Tool-makers.....	4	4	....	....	....	4	....	4	25 00	18 00	900 00	.....	....	2 months	
		Engineer	1	1	....	....	....	1	....	1	18 00	.....	900 00	....	....	none.	
		Laborers	2	2	....	....	....	2	....	....	10 00	9 00	550 00	.....	....	none.	
		Clerks	2	2	....	....	....	2	....	....	12 00	9 00	575 00	.....	....	none.	
193	Essex County..... Jewelers.	All employes	16	13	3	....	....	....	....	....	.....	.....	.....	.....	....	.....	The shop has good ventilation, and is kept clean.
		Jewelers	8	5	3	....	2	6	....	....				.....	....	3 months	
		Locket-makers	2	2	....	....	....	....	....	....				.....	....	3 months	
		Stone setters	1	1	....	....	1	....	....	....	$24 00	$15 00	Av'age, $800 00	.....	....	3 months	
		Finishers	1	1	....	....	....	1	....	....				.....	....	3 months	
		Engravers	2	2	....	....	....	2	....	....				.....	....	3 months	
		Polishers	2	2	....	....	....	2	....	....				.....	....	3 months	

* Wages increased 10 per cent. † Wages reduced 33⅓ per cent.

TABLE No. 2—CONTINUED.

IRON WORKERS.—BLAST FURNACES, ROLLING MILLS, FOUNDRIES, MACHINE SHOPS, &c.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
102	Warren County.... Furnace for casting pig iron.	All employes.....	177	....	....	....	....	....	Contractors only do piece work.....	.....	.....	Furnace ran day and night. Two sets of hands; 12 hours each. Cost of living is extremely high, but there is steady work, so that the industrious and economical can save a little.
		Casters.....	....	10	....	....	....	....	$2 25 per day	$650		
		Fillers	....	26	....	....	....	....	1 65 "	475		
		Blacksmiths.....	....	5	....	....	....	....	2 "	600		
		" Helpers.	....	5	....	....	....	....	1 50 "	450		
		Engineers.....	....	3	....	....	....	....	2 "	600		
		Firemen.....	....	3	....	....	....	....	1 75 "	550		
		Laborers.....	....	75	....	....	....	....	1 25 "	325		
		Limestone quarry...	....	50	....	....	....	....	1 25 "	325.....	.....	Quarry let out to contractors.
152	Warren County.... Furnace for casting pig iron.	All employes.....	56	52	....	....	4	....	No piece work.....	.....	.....	Ran day and night. Two sets hands, 12 hours each. Pay monthly. No store trade.
		Casters.....	....	15	....	....	....	....	$1 75 per day	$550		
		Fillers	....	7	....	....	....	....	1 75 "	550		
		Tappers.....	....	2	....	....	....	....	1 75 "	550		
		Blacksmiths.....	....	5	....	....	....	....	2 "	600		
		Engineers & firemen.	....	3	....	....	....	....	Eng'rs, $2 00 per day; firemen, $1 50.	Engineers, $600; firemen, $450		
		Laborers	....	20	....	....	....	....	$1 25 per day	$350		
		Boys.....	....	....	....	....	4	....	.75 "	175		
153	Sussex County..... Furnace for casting pig iron.	All employes.....	89	82	....	....	7	....	.....	.....	.....	Ran day and night. Two sets hands, 12 hours each. Wages increased 10 per cent. In the annual earnings no allowance is made for accidents or sickness of long duration.
		Casters.....	....	20	....	....	....	....	$1 75 per day.....	$550		
		Fillers	....	13	....	....	....	....	1 75 "	550		
		Tappers.....	....	3	....	....	....	....	1 75 "	550		
		Blacksmiths.....	....	8	....	....	....	....	2 25 "	650		
		Engineers & firemen.	....	4	....	....	....	....	Eng'rs, $2 50 per day; firemen, $1 60.	Engineers, $700; firemen, $400		
		Laborers	....	34	....	....	....	....	$1 25 per day	325		
		Boys.....	....	....	....	....	7	....	.80 "	175		
.....	Sussex County..... Furnace for casting pig iron.	All employes.....	105	100	....	....	5	....	Work by day. Wages same as in No. 152.....	.....	.....	Wages increased 10 per cent.
24	Passaic County.... Rolling Mills.	All employes.....	575	....	....	....	....	....	.....	.....	.....	From 4 to 6 weeks' vacation for repairing.
		Heaters	....	18					See Philadelphia sliding scale. Began work Jan. 1st, 1882, at the .02 7-10; June 1st, went back to .02 6-10.....	$1075 1st, $400; 2d, $350		
		Helpers.....										
		Rollers	....	7	....	....	....	....		$600; muck roller $750		
		Roughers.....	....	14						$420		
		Catchers.....	....	5						320		
		Pilers and Drag-outs	....	16	....	....	....	....	$1 25 per day.			

		Foremen	....	3							
		Laborers	....	52	....	....	....	....	$1 20 per day.		
		Puddlers	....	64	....	....	....	..	4 50 per ton (2240 pounds)	$1160	
		" helpers	....						1 20 per day	350	
		Bridge workmen	....	150	....	....	....	....	2 50 and $2 per day.		
		" laborers	....	185	....	....	....	....	1 20 per day	350	
		Machinists	....	14	....	....	....	....	2 "	550	
		Blacksmiths	....	6	....	....	....	....	3 to $1 50 per day.		
		" helpers	....	12	....	....	....	....	Average $1 80 per day.		
		Engineers	....	5	....	....	....	....	$2 25 per day	650	
		Spike drivers	....	6	....	....	....	....	2 "	550	
111	Warren County.... Sheet iron works	All employes	132								
		Puddlers	....	12	..	....	....	..	Puddlers get $4 65 per ton, and pay their helpers.		
		" helpers	....	12							
		Others	....	108	....	....	....	....	See above, No. 24	See office No. 24.	
		Galvaniz'd sheet iron	8	8	....	....	....	....	Average $2 per day	$600	
150	Warren County.... Rolling Mill.	All employes	380	....	....	....	25	....			Ran day and night; 12 hours each set. Wages were increased and decreased about 4 per cent. At present high prices, ironworkers cannot save much above a living.
		Puddlers and helpers	....	64	....	....	....	....	Puddlers, $4 65, and pay helpers.		
		Machinists	....	50	....	....	....	....	$2 25 per day	$650	
		" helpers	....	40	....	....	....	....	1 50 "	450	
		Engineers	....	4	....	....	....	....	2 "	600	
		Firemen	....	4	....	....	....	....	1 60 "	475	
		Blacksmiths	....	20	....	....	....	....	2 50 "	700	
		Carpenters	....	10	....	....	....	....	2 50 "	700	
		Boys	....	25	....	....	25	....	.75 "	200	
		Common laborers	....	30	....	....	....	....	1 25 "	325	
		Other workmen	....	133	....	....	....	....	See above, No. 24.		
151	Morris County.... Rolling Mill— Muck iron for making steel.	All employes	38	....	....	....	....	....			Ran day and night; 12 hours each set. Puddlers, with helpers, produce 1¼ tons per day. Magnetic sand from the beach is used.
		Puddlers	....	8	..	....	....	..	Puddlers, $5 per ton, and pay helpers ⅓, or $1 66	$1000	
		" helpers	....	8						330	
		Roller, 1	....	2	..	....	....	....	7 in a shift; 2 shifts; day and night; 14 men. Rollers, same as in No. 24.		
		Helper, 1	....	2							
		Roughers, 2	....	4							
		Catchers, 2	....	4							
		Drag-out, 1	....	2							
		Firemen, engineers and laborers	....	6	....	....	....	....			

PHILADELPHIA SLIDING SCALE FOR ROLLING MILLS.

Scale for one-half ton (of 2240 pounds.) Heat, 1000 pounds net. 5½ heats per day.

Iron, per pound.	Heater, per ton.	1st Helper, per ton.	2d Helper, per ton.	Roller, per ton.	Rougher, per ton.	Catcher, per ton.	Muck Roller, per ton.
$0 02 1-10	$0 69	$0 25	$0 20	$0 38	$0 26½	$0 20½	$0 49
02 2-10	70½	25	21	38½	27	21	50
02 3-10	72	21	21	39	28	21	51
02 4-10	73½	26½	21½	40	28½	21½	52
02 5-10	75	27	22	41	29	22	53
02 6-10	76½	27½	22½	42	29½	22½	54
02 7-10	78	28	23	43	30	23	55
02 8-10	79½	28½	23	43½	31	23	56
02 9-10	81	29	23½	44	31½	23½	57

TABLE No. 2—CONTINUED.

IRON WORKERS—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
35	Morris County..... Iron works and rivet factory.	All employes.....	150	150	....	....	....	....	.....	.....	.....	Wages went down 4 per cent., but in April were raised again. All these earnings are based on ordinary health.
		Heaters ..... " Helpers...	....	12	....	....	....	....	See Philadelphia Sliding Scale..	$1000..... 1st, $425; 2d, $325..	5 heats per day—1000 pounds net, a heat.	
		Rollers	....	4	....	....	....	....		$575		
		Roughers.....	....	6	....	....	....	....		415		
		Catchers.....	....	3	....	....	....	....		325		
		Muck rollers.....	....	10	....	....	....	....		725		
		Puddlers..... " Helpers..	....	34	....	....	....	....	$5 per ton of 2240 pounds..... 1 20 per day.....	1050..... 340	5 tons per week.	
		Laborers.....	....	49	....	....	....	....	$1 20 per day.....	350		
		Foundrymen	....	20	....	....	....	....	2 "	Moulders, $600		
		Foremen	....	2								
		Blacksmiths..... Other mechanics..	....	10	....	....	....	....	Average $2 per day..... " 2 "	$600		
		Rivet factory.....	30	30	....	....	....	....	$1 50 per ton—$3 per day.....	900.....	3 tons per day.	
29	Passaic County.... Iron workers—including various iron workers employed in different establishments in Paterson.	All employes.....	808	637	56	22	....	....	.....	.....	.....	Average time during year is 60 hours per week.
		Machinists.....	....	50	....	....	....	....	Average 18 cents per hour.....	Average $540		
		Foundry.....	....	12	....	....	....	....	12 av. $2 75; 13 av. $1 45 per day.			
		Machine shop.....	....	25	....	....	....	....	12 skilled, $2 50; 18, $1 45 "	.....	.....	Ran on full time during year.
		Foundry.....	....	30	....	....	....	....	50 av. $2; 25, $1 40 per day.			
		Machine shop.....	....	75	....	....	....	....	18 (skilled), av. $2 50; 32, $1 40.			
		Foundry.....	....	50	....	....	....	....	Average $2 per day.			
		Machinists.....	....	20	....	....	....	....	" 2 "			
		All employes in several shops.....	....	250	....	....	....	....	" 1 75 "			
			....	300	....	....	....	....				
	Boiler works.....	.....	....	125	....	....	....	....	$2 60, $2 50, $1 90 and $1 20 per day...	.....	.....	Full time during year.
	File manufacturers	.....	....	93	56	....	22	....	Journeymen (by piece) average $20 per week; others, $14; females, $10			
	Engineers (stationary)	.....	135	135	....	....	....	....	$2 25 per day (average)			
29½	Passaic County.... Machinist association.	All employes.....	108						.....	.....	.....	Work 11 hours per day. Pay once a month. Wages are the same as when cost of living was 20 per cent. lower.
		Machinists.....	....	35	....	....	....	....	$1 80 to $2 25 per day.			
		Millwrights.....	....	25	....	....	....	....	2 50 per day.			
		Carpenters.....	....	28	....	....	....	....	2 50 "			
		Others.....	....	20	....	....	....	....	1 20 "			
110	Union County..... Printing press works	All employes.....	192		....	....	....	....	.....	.....	.....	
		Machinists.....	....	100	....	....	....	....	$2 25 to $3 per day.....	$650 to $800		
		" Helpers..	....	30	....	....	....	....	16 to 17½ cents per hour.....	300		
		Moulders.....	....	30	....	....	....	....	$2 25 to $3 50 per day.....	700 to 900		
		" Helpers	....	5	....	....	....	....	1 25 per day.....	350		
		Blacksmiths	....	7	....	....	....	....	2 40 to $2 60 per day.....	700		
		" Helpers	....	4	....	....	....	....	1 25 per day.....	350		
		Pattern makers.....	....	4	....	....	....	....	2 25 to $3 25 per day	650 to 900		

		Carpenters	....	2	....	....	....	....	2 25 per day	650		
		Laborers	....	10	....	....	....	....	1 25 "	325		
110½	Union County..... Press works.	All employes	45	....	5	....	....	....				Wages advanced 8 per cent.
		Machinists	....	....	....	....	....	....	$2 50 per day.			
		Foundrymen	....	....	....	....	....	....	2 50 "			
		Blacksmiths	....	....	....	....	....	....	3 "			
		Painters	....	....	....	....	....	....	2 25 "			
		Boxer	....	....	....	....	....	....	2 50 "			
101	Warren County.... Foundry—pipe moulding, machinery, &c.	All employes	389	369	....	....	....	....				Work 10 hours per day. Pay once a month.
		Moulders	*340	†22	....	....	....	....	$2 15 per day	$625		
		Core makers		†6	....	....	....	....	1 60 "	475		
		Laborers		†6	....	....	....	....	1 38 "	360		
		Large pipe pit	....	5	....	....	....	....				
		Boys	....	20	....	....	....	....	5 to $8 per week	250		
		Machinists	....	12	....	....	....	....	2 50 to $3 per day	700		
		Helpers	....	4	....	....	....	....	1 40 per day	400		
		Carpenters	....	3	....	....	....	....	2 50 "	700		
		Pattern makers	....	4	....	....	....	....	2 50 "	700		
		Blacksmiths	....	5	....	....	....	....	2 50 "	700		
151	Morris County..... Machine and iron Co.—Air compressors, steam engines, mining machinery.	All employes	57									
		Foundry moulders	....	11	....	....	....	....	2 50 "	700		
		" laborers	....	5	....	....	....	....	1 25 "	350		
		Machinists	....	29	....	....	....	....	2 50 "	700		
		Blacksmiths	....	6	....	....	....	....	3 "	900		
		Pattern makers	....	4	....	....	....	....	2 50 "	900		
		Engineers	....	1	....	....	....	....	1 75 "	700		
		Firemen	....	....	....	....	....	....	1 25 "	400		
152	Warren County... Foundry and machine works—Turbine water wheels, plows and job work.	All employes	11	....	....	....	....	....				There seems to be very little system. Wages according to demand for labor. When work is slack, wages are pushed down as low as possible, without any regard to employes
		Moulders	....	2	....	....	....	....	$1 50 per day	$450		
		Pattern makers	....	1	....	....	....	....	1 75 "	525		
		Machinists	....	3	....	....	....	....	1 75 "	525		
		Engineers	....	1	....	....	....	....	2 "	600		
		Wood workers	....	2	....	....	....	....	1 75 "	500		
		Blacksmiths	....	1	....	....	....	....	2 "	600		
		Foreman	....	1	....	....	....	....	2 "	600		
93	Hunterdon County Foundry and machine works—Steam engines, Car axles, &c.	All employes	139	....	....	....	....	....				Work 10 hours per day. Pay once a month. The axle makers work mostly by piece; the rest by day. Difficult to estimate quantity produced.
		Machinists	....	25	....	....	....	....	$2 25 to $2 50 per day	Average $650		
		Car axle makers	....	24	....	....	....	....	2 to 3 "	" 700		
		Foundry moulders	....	12	....	....	....	....	2 25 per day	" 625		
		" helpers	....	12	....	....	....	....	1 35 "	" 350		
		Blacksmiths	....	15	....	....	....	....	2 to $3 per day	" 675		
		" helpers	....	10	....	....	....	....	1 50 per day	" 425		
		Wood workers	....	8	....	....	....	....	2 to $2 50 per day	" 625		
		Laborers	....	25	....	....	....	....	1 25 per day	" 375		
		Engineers	....	4	....	....	....	....	2 25 "	" 575		
		Firemen	....	4	....	....	....	....	1 75 "	" 475		
36	Morris County..... Iron works.	All employes	25	25	....	....	....	....	$1 50 per day; laborers, $1 25			Work 10 hours. Pay every two weeks. No store pay. Prices for household necessaries moderate.

*In all three pits. †In each pit.

TABLE No. 2—CONTINUED.

IRON WORKERS—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
36½	Hunterdon County Brass and iron foundry.	All employes	8	8	....	....	....	....	Average $2 per day	$600		10 hours per day. Ran on full time.
41	Morris County..... Iron works and rolling mills.	All employes	200	200	....	....	....	....	Average $1 50 per day	450		Only work as a furnace for pig iron at present. Full capacity is 800 hands.
14	Passaic County.... Locomotive machinery.	All employes	790	790	....	....	....	....				Blacksmiths work 9 hours, all others 10 hours per day. Wages increased 15 per ct., which is not equal to increase in cost of living. The disproportion in annual earnings of job workers and others arise from the fact that day-workers are always the ones laid off; as in slack times the works are not shut but the number of hours reduced.
		Blacksmith shop	....	120	....	....	....	....	Job, av. $4 50 per day; others $1 80.	Job, $1300, Day $450	The piece-work is done by contracting to do a job of work; and no regularity exists in regard to quantity. Those who contract by the job hire journeymen by the day. It is a very bad system, as under it a portion of the machinists, in order to increase their own, keep another portion at very low wages. While the job workers only get fair living wages, the rest, about three-fourths of the whole number, get very low pay for tradesmen. This is one of the schemes of employers to get work done at the lowest possible rate.	
		Erecting "	....	150	....	....	....	....	" 3 50 " " 1 80.	" 1000 " 450		
		Turning "	....	60	....	....	....	....	" 3 50 " " 1 80.	" 1000 " 450		
		Finishing "	....	150	....	....	....	....	" 3 50 " " 1 80.	" 1000 " 450		
		Boiler "	....	200	....	....	....	....	$2 60 per day	Day Workers, 700		
		Foundry "	....	20	....	....	....	....	2 25 "	" " 625		
		Laborers	....	90	....	....	....	....		" " 312		
16	Passaic County...	All employes	1740	....	....	....	....	....	See No. 14			Wages increased 15 per cent.
17	Passaic County...	All employes	875	....	....	....	....	....	See No. 14			Wages increased 15 per cent.
91	Hunterdon County Railroad machine repairing works.	All employes	64	....	....	....	....	....				Pay monthly; 10 hours per day; No piece work.
		Machinists	....	20	....	....	....	....	Average, $2 25 per day	$650		
		Helpers	....	15	....	....	....	....	" 1 50 "	450		
		Car wheel makers	....	10	....	....	....	....	" 2 00 "	600		
		Laborers	....	15	....	....	....	....	" 1 25 "	325		
		Engineers	....	2	....	....	....	....	" 2 00 "	600		
		Firemen	....	2	....	....	....	....	" 1 75 "	550		

100	Warren County... Manufacturers of steam boilers.	All employes	60	50	....	10	....	....				10 hours per day; Pay monthly; Do not take apprentices but advance boys as fast as they learn
		Boiler-makers*	....	50	....	....	....	....	Skilled, average $2 35; unskilled, $1 25; Boys, 50 cents to $1 25 per day.	Skilled, $725; unskilled, $350; Boys, $275.		
150	Essex County..... Machine works.	All employes	200	....	....	....	....	....				10 hours. Wages increased 10 per cent.
		Foundry	....	60	....	....	....	....	From $2 50 to $3 25 per day; work by day; no piece work.			
		Machine shop	....	140	....	....	....	....				
142½	Camden County... File and tool works.	All employes.										
		Blacksmiths	....	25	....	....	....	....	$2 50 per day	$725		
		Machinists	....	20	....	....	....	....	2 25 "	$650		
150	Essex County .... Manufacture of wood working, shoe machines, steam engines, &c.	All employes	19	....	....	....	....	....				Wages increased 25 cents per day.
		Machinist	....	8	....	....	....	....	$2 75 per day.			
		Blacksmith	....	1	....	....	....	....	2 75 "			
		Pattern-maker	....	1	....	....	....	....	2 75 "			
		Apprentices to machinist	....	....	....	....	6	....	3 to $4 per week.			
		Apprentices to pattern-maker	....	....	....	....	1	....	3 " 4 "			
		Errand boy	....	....	....	....	1					
		Engineer	....	1	....	....	....	....	$2 50 per day.			
151	Morris County .... machine and foundry.	All employes	36									
		Foundry moulders	....	10	....	....	....	..	$2 50 per day	$700		
		" laborers	....	5	....	....	....	....	1 25 "	350		
		Machinist	....	16	....	....	....	....	2 50 "	700		
		Pattern-makers	....	3	....	....	....	....	3 00 "	900		
		Engineer	....	1	....	....	....	....	2 00 "	600		
		Fireman	....	1	....	....	....	....	1 50 "	450		
152	Essex County..... Wood working, Machinery.	All employes	15	....	....	....	....	....				10 hours per day. Wages increased 15 per cent.
		Machine departm't.	....	9	....	....	....	....	$2 00 per day.			
		Wood "	....	4	....	....	....	....	2 00 "			
		Paint room	....	2	....	....	....	....	2 00 "			
141	Camden County... Dredging machines.	All employes	58	....	....	....	....	....				Weekly payments.
		Machinist	....	14	....	....	....	....	$14 00 per week	$700		
		Blacksmith	....	8	....	....	....	....	17 00 "	850		
		Helpers	....	7	....	....	....	....	10 00 "	500		
		Ship carpenters	....	12	....	....	....	....	3 00 per day	875		
		Laborers	....	15	....	....	....	....	1 25 "	325		
		Boys	....	2	....	....	....	....	7 00 per week	350		
130	Burlington County stove works.	All employes	30									
		Machinist	....	16	....	....	....	....	$2 25 per day, average	$650		
		Laborers	....	14	....	....	....	....	1 25 "	325		

* Consisting of machinists, shearers, punchers, painters, blacksmiths, carpenters and laborers.

TABLE No. 2—CONTINUED.

MINES.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Remarks.
40	Morris County..... Mining iron ore.	All employes.....	73	73					$1 50 per day is regular wages of all who work in mine. Contractors hire their own men, and get from 75 cents to $3 a ton, according to difficulty of mining. Boys who work in the mine get the same as men.	Mine workers, about $450; contractors make from $1000 to $3000; generally from $1500 to $2000.	Quantity mined varies according to the mine—from 1 to 5 tons daily. 8 hours is a shift and a day's work. Work is continued during 24 hours, with three sets of men. Sometimes a man works 2 shifts on 1 day and 1 on the next; but one shift constitutes a day's work. Piecework means to do it in less time. This is a plan of contractors to get more work out of the men.
		Miners	....	*36							
		Capers	....	†6							
		Muckers.....	....	†6	..	....	....	....			
		Landers	....	†6							
		Engineers.....	....	‡3							
		Furnace men.....	....	†6							
		Outside men (other hands)	....	10							
45	Morris County..... Mining iron ore.	All employes.....	§239	200	....	....	....	....	.....	.....	Two men can mine from 2 to 10 tons daily. Sometimes drilling is paid for by the foot; but generally a number of feet is made a shift. So it is when work is done by the bucket. Contractors only work by the ton.
		Miners	....	§120	....	....	....	....	Contractors mine by the ton and hire their help, whom they pay $1 50 per day	Miners, $450; contractors make from $1500 to $2500.	
		Capers	....	‖30							
		Muckers.....	....	‖30							
		Landers	....	‖30							
		Engineers.....	....	¶9							
		Outside men (other hands)	....	20							
46	Morris County..... Mining iron ore.	All employes.....	79	79	....	....	....	....	Same as above. Engineers, $2 a shift.	$450 to $500	
48	Morris County..... Mining iron ore.	"	407	s407	....	....	....	....	Same as above. $7 to $9 per week for 1 shift per day.....	400 to 500	
47	Morris County..... Mining iron ore.	"	77	s77	....	....	....	....	.....	.....	Contractors make the number of buckets to a shift according to the vein; sometimes it will average as high as 10. Contractors are a part of the workmen, and work by the job, which is an agreement to move a certain portion of a vein at a certain price per ton. They generally do well. The agents give them good chances, so as to make it to their interest to get a large amount of work out of the men for small wages. The abolition *of contract system would result in increase of wages.*
		Drilling.....	....	....	....	....	....	....	$1 50 per shift is the average wages, with very few exceptions; even for boys who work with their fathers. The exception is the foreman, who generally contracts by the ton and hires his own men.....	Same as above.	
		Timbering.....	....	45							
		Shaftsmen	....	7							
		Drifting	....	7							
		Landing.....	....	7							
		Engineer.....	....	1							
		Others.....	....	10							
51	Morris County..... Mining iron ore.	All employes—Boring, blasting, landing, hoisting, timbering.....	79	79	....	....	....	....	$1 20 to $1 50 to a shift. Contractors make the best terms they can (per ton) with the agent. Sometimes they do very poorly.	$350 to $450; contractors, from $1000 to $3000.	
50	Morris County..... Mining iron ore.	All employes.....	80	80	....	....	....	....	$7 to $10; average $9 per week.....	Average $400; contractors, $1500.	
49	Morris County..... Mining iron ore.	All employes.....	200	200	....	....	....	....	$7 to $10; contractors, from $1 to $3 per ton; the lowest price generally paying best.....	Average $400; contractors, about $1200.	

52	Morris County..... Mining iron ore.	All employes.....	82	82	....	....	....	....	Average $1 50 daily for all.....	Average $450.	
53	Morris County..... Mining iron ore. 2 mines.	"	160	160	....	....	....	....	$1 50 daily for all (from $1 20 to $2)....	$350 to $450	No store system here. Wages every two weeks.
54	Morris County.....	"	50	50	....	....	....	....	7 to $9 per week.....	350 to 425	
	Iron furnace.	"	40	40	....	....	....	....	1 20 to $1 80 per day.		
55	Mining iron ore...	"	15	15	....	....	....	....	1 20 to 1 75 "	.....	No store trade.
	" " ... 2 mines.	"	35	35	....	....	....	....	1 50 per day.		
56	Mining iron ore...	"	65	65	....	....	....	....	7 to $9 per week; contractors, $20 to $30.....	Sometimes men get extra pay for extra shifts.....	No store trade. Cash every two weeks.
58	" " 2 mines.	"	135	135	....	....	....	....	$1 25 to $1 60 per day.....	$375 to $425; contractors, $1200...	Truck system.
59	Mining iron ore...	"	50	50	....	....	....	....	1 20 to 1 75 "	.....	No store trade. Cash weekly.
60	" "	"	100	100	....	....	....	....	7 to $10 per week.....	$400 to $500	Cash weekly.
61	19 mines.....	"	1000	1000	....	....	....	....	Average $1 20 to $1 50 per day.....	.....	Cash every two weeks in most of the mines.
61½	Hunterdon County 5 mines.	"	400	400	....	....	....	....	" 1 50 per day		

* 3 shifts; 12 to a shift. † 3 shifts; 2 to a shift. ‡ 3 shifts; 1 to a shift. § 3 shifts; 40 to a shift. ‖ 3 shifts; 10 to a shift. ¶ 3 shifts; 3 to a shift. s Men and boys.

TABLE No. 2—CONTINUED.

ORGAN FACTORIES.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
37	Warren County... Organ factory.	All employes.....	400	385	7	8	....	....	.....	.....	.....	Pianos are not manufactured by these firms; but when ordered are procured elsewhere. Capital invested, $250,000.
		Case makers.....	100	....	....	....	....	....	$2 50 to $3 per day.	Factory destroyed by fire during year, but rebuilt, which took four months. In consequence, annual earnings small.	1200 to 1500 organs manufactured per month.	
		Action "	70	....	....	....	....	....	2 75 to 3 25 "			
		Fly finishers.....	60	....	....	....	....	....	3 to 3 50 "			
		Turners.....	61	....	....	....	....	....	3 to 4 "			
		Box makers.....	10	....	....	....	....	....	2 50 to 2 60 "			
		Laborers.....	99	....	....	....	....	....	1 25 "			
		Varnish finishers....	....	....	....	....	....	....	3 to 4 "			
		Women.....	....	....	....	....	....	....	4 to 6 per week.			
		Boys.....	....	....	....	....	....	....	3 "			
		Clerical department:	55									
		Office manager....	....	1	....	....	....	....	.....	$1000		
		Book-keepers	....	4	....	....	....	....	.....	600 to 1200		
		Corresponding clerks.....	....	10	....	....	....	....	.....	400 to 800		
		Advertising clerks	....	15	....	....	....	....	$6 to $10 per week.			
		Copying clerks....	....	....	6	....	....	....	4 to 6 "			
		Letter recording clerks.....	....	4	....	....	....	....	4 to 6 "			
		Mailing clerks.....	....	2	....	....	....	....	6 "			
		Printing office.....	....	10	....	....	....	....	Average $10 per week.			
		Telegraph office....	....	5								
38	Warren County... Organ factory.	All employes.....	35	....	....	....	....	....	.....	.....	45 to 50 organs per month.....	Work 10 hours daily.
		Case makers.....	....	10	....	....	....	....	$2 50 to $3 per day	$700		
		Action "	....	6	....	....	....	....	2 to 3 "	650		
		Fly and varnish finishers.....	....	8	....	....	....	....	2 50 to 3 50 "	800		
		Turners.....	....	6								
		Laborers.....	....	5	....	....	....	....	$1 25 per day	350		
		Box makers.....							2 "	600		
39	Warren County... Organ factory.	All employes.....	40	34	2	4	....	....	.....	.....	50 to 60 organs per month.	
		Case makers.....	....	10	..	....	....	....	Average $2 50 per day.....	$700		
		Action "	....	8								
		Fly and varnish finishers.	....	10	....	....	....	....	" 3 "	800		
		Turners.....	....	5	....	....	....	....	" 3 "	800		
		Box makers	....	1								
		Laborers.....	....	6	....	....	....	....	$1 25 per day.....	350		
		Women.....	....	....	....	....	....	....	5 per week.....	250		
		Boys.....	....	....	....	....	....	....	4 "	200		
39½	Essex County..... Organ factory.	All employes.....	200	....	....	....	....	....	.....	.....	300 organs per month.....	Work 10 hours daily.
		Case makers.....	....	50	..	....	....	....	$2 to $3 per day.....	$600 to $650		
		Action "	....	30								

	Fly and varnish finishers	....	30	....	....	....	....	2 50 to $3 per day	700	
	Turners	....	25	....	....	....	....	2 50 to 3 25 "	750	
	Box-makers	....	5							
	Laborers	....	60	....	....	....	....	1 25 per day	350	

TABLE No. 2—CONTINUED.

CARRIAGE FACTORIES.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
1½	Warren County.... Carriage manufactory.	All employes	40	....	....	....	....	....	....	....	....	Wages paid weekly. Steady work. Some work overtime, or as much as 70 to 80 hours per week. Ten per cent. increase in wages.
		Blacksmiths	....	6	....	....	....	....	Piece and day, $1 50 to $3 per day	Blacks'ths have their helpers, and pay them $1 50 per day. They estimate the cost of each fire for employer at $5.		
		Body makers	....	8	....	....	....	....	" 1 50 to 3 "			
		Trimmers	....	6	....	....	....	....	Day, 2 50 "			
		Finishers	....	2	....	....	....	....	" 2 "			
		Gear makers	....	1	....	....	....	....	" 2 50 "			
		Painters	....	9	....	....	....	....	" 14 per week.			
		Silver platers	....	1	....	....	....	....	" 2 per day.			
		Apprentices	....	....	....	3						
2½	Warren County... Carriage manufactory.	All employes	8	....	....	....	....	....	....	....	Journeyman and helper make 3 bodies per week. Trimmer and helper, 2 tops.	
		Blacksmiths	....	2	....	....	....	....	$2 50 per day	$700		
		" helper	....	1	....	....	....	....	1 "	300		
		Body maker	....	1	....	....	....	....	8 per week	400		
		" " helper	....	1	....	....	....	....	3 "	150		
		Trimmer	....	1	....	....	....	....	9 "	450		
		" helper	....	....	....	....	....	....	4 "	200		
		Painter	....	1	....	....	....	....	2 per day	600		
		" helper	....	1	....	....	....	....	3 per week	150		
3½	Warren County... Carriage manufactory.	All employes	10	....	....	....	....	....	....	....	Body maker makes 1½ to 2 bodies per week; with helper, 3. Trimmer, 1 top per week; with helper, 2.	
		Painters	....	3	....	....	....	....	$2 per day	$600		
		" helpers	....	....	....	....	....	....	1 per week	52		
		Body makers	....	2	....	....	....	....	5 per body	500		
		Trimmer	....	1	....	....	....	....	9 per top	500 to 600		
		" helper	....	....	....	....	1	....	1 per week	52		
		Blacksmith	....	1	....	....	....	....	2 per day	600		
		" helpers	....	2	....	....	....	....	1 "	300		
4½	Warren County... Carriage manufactory.	All employes	7	....	....	....	....	....	....	....	....	Work ten hours a day. Full time during the year.
		Blacksmiths	....	2	....	....	....	....	$1 75 per day	$550		
		Trimmer	....	1	....	....	....	....	16 per week	800		

TABLE No. 2—CONTINUED.

CARRIAGE FACTORIES—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
		Trimmer, helper	....	1	....	....	....	....	$2 per week.			
		Painter	....	1	....	....	....	....	9 "	$450		
		" helper	....	1								
		Body maker	....	1	....	....	....	....	$13 per week	650		
		" " helper	....	1								
5½	Warren County... Carriage manufactory.	All employes										
		Blacksmiths	....	2	....	....	....	....	$2; helper, $1 per day	$600; helper, $300		
		Body makers	....	2	....	....	....	....	5 per top; helper, $1 per day	500; with helpers, $700		
		Trimmers	....	2	....	....	....	....	9 "	450; with helpers, $600		
		Painters	....	2	....	....	....	....	2 per day	600		
6½	Warren County... Carriage manufactory.	All employes	8	....	....	....	....	....			Body makers, with helper, 3½ bodies per week. Trimmers, with helper 2 tops.	
		Blacksmith	....	1	....	....	....	....	$2 per day	$600		
		" helper	....	1	....	....	....	....	1 "	300		
		Body maker	....	1	....	....	....	....	5 per body	650		
		" " helper	....	1	....	....	....	....	2 per week	100		
		Painters	....	2	....	....	....	....	9 "	450		
		" helper	....	1	....	....	....	....	3 50 "	200		
		Trimmer	....	1	....	....	....	....	9 per top	700		
		" helper	....	1	....	....	....	....	2 per week	100		
7½ to 11½	Warren County... Carriage manufactory.	All employes. Five establishments	35	....	....	....	....	....			Body makers, 2 bodies per week each; with helper, 3. Trimmers, 1 to 1½ tops per week; with helper, 2	Ten hours' work per day. Work all the year.
		Blacksmiths	....	6	....	....	....	....	$2 per day	$600		
		" helpers	....	6	....	....	....	....	1 "	300		
		Wood workers, body makers	....	8	....	....	....	....	5 per body	500		
		Helpers	....	2	....	....	....	....	4 per week	200		
		Trimmers	....	7	....	....	....	....	9 per top	450		
		Painters	....	6	....	....	....	....	2 per day	600		
		" helpers	....	2	....	....	....	....	1 "	300		

TABLE No. 2—CONTINUED.

PAPER MILLS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
99	Hunterdon County Paper mill.	All employes	52	48	4	....	....	....				Run the whole 24 hours; two sets of hands, each 12 hours. Monthly pay. No piece-work. It is damp work, and unhealthy. Sanitary condition of mill not good.
		Men	....	40	....	....	....	....	Average, $1 50 per day	$450		
		Women	....	....	4	....	....	....	" 90 "	275		
		Engineers	....	2	....	....	....	....	2 25 "	650		
		Firemen	....	2	....	....	....	....	1 75 "	550		
		Laborers	....	4	....	....	....	....	1 20 "	325		
90	Hunterdon County Paper mill.	All employes	60	54	6	....	....	....				The same as above.
		Skilled workmen	....	8	....	....	....	....	$2 per day	$600		
		Partly skil'd w'kmen	....	48	....	....	....	....	1 50 "	450		
		Women	....	....	6	....	....	....	1 25 "	325		
96	Hunterdon County Paper mill.	All employes	33	29	4	....	....	....				The same as above.
		Men	....	20	....	....	....	....	Average, $1 50 per day	$450		
		Women	....	4	....	....	....	....	" 1 "	300		
		Engineers	....	2	....	....	....	....	2 "	600		
		Firemen	....	2	....	....	....	....	1 75 "	550		
		Carpenter	....	1	....	....	....	....	2 50 "	700		
		Laborers	....	4	....	....	....	....	1 25 "	325		
44	Morris County Paper mill.	All employes	40									
		Men	....	....	....	....	....	....	$1 25 to $1 50 per day.			
		Women	....	....	....	....	....	....	1 "			
72	Passaic County Manufacture tissue paper.	All employes	8	....	....	....	....	....				No piece-work.
		Engineers	....	2	....	....	....	....	$1 50 per day	$450		
		Machinist	....	1	....	....	....	....	1 50 "			
		Finishers	....	2	....	....	....	....	1 50 "			
		Cut stock	....	1	....	....	....	....	1 25 "	$400		
		Box-makers	....	....	....	....	....	3	5 per week	250		
153	Essex County Paper boxes.	All employes	30	....	....	....	....	....				These hands make 1200 boxes per day of straw board, and 8000 of patent boxes.
		Cutting straw board boxes	....	1	....	....	....	....	Average wages of men, $10 per week; women, $5 to $7 per week; children, $3 per week.			
		Cutting straw board boxes	....	....	....	....	3	....				
		Making straw board boxes	....	....	3	....	....	13				
		Patent paper boxes	....	3								
		Patent paper box making	....	....	4	....	....	3				

TABLE No. 2—CONTINUED.

SHIP BUILDERS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
138	Camden County... Ship yards. Six firms.	All employes.....	345	....	....	....	....	....	.....	.....	.....	Wages increased 25 cents a day on old work. Cash weekly. No occasion for losing time during the year, except sickness, recreation or bad weather.
		Ship carpenters.....	....	200	....	....	....	....	$3 per day.....	$850 to $900		
		Caulkers	....	75	....	....	....	....	3 "	850 to 900		
		Blacksmiths.....	....	20	....	....	....	....	2 50 "	700		
		Carpenters & joiners	....	20	....	....	....	....	2 50 "	700		
		Laborers.....	....	30	....	....	....	....	1 25 "	325		
139	Camden County... Ship building.	All employes.....	48	....	....	....	....	....	.....	.....	.....	Wages increased 25 cents a day on old work.
		Ship carpenters.....	....	30	....	....	....	....	$3 per day.....	$875		
		Caulkers	....	10	....	....	....	....	3 "	875		
		Carpenters.	....	4	....	....	....	....	2 50 "	700		
		Laborers.....	....	4	....	....	....	....	1 25 "	375		
140	Camden County... Iron ship building.	All employes.....	172	....	....	....	....	....	.....	.....	.....	Wages increased 25 cents a day on old work.
		Ship carpenters.....	....	42	....	....	....	....	$3 per day.....	$850		
		Machinists	....	36	....	....	....	....	13 50 per week.....	700		
		Blacksmiths.....	....	29	....	....	....	....	16 50 "	800		
		Rivet drivers.....	....	20	....	....	....	....	15 "	750		
		Laborers.....	....	....	....	....	....	....	1 25 per day.....	325		

TABLE No. 2—CONTINUED.

HARNESS-MAKERS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
170	Essex County..... Harness-makers.	All employes.....	60	....	....	....	....	....	.....	.....	.....	Busy about 8 mos. Lose most of the rest of the year.
		Saddle hands.....	....	4	....	....	....	....	.....	.....	100 pairs common traces per week; 25 sets common machine-stitched harness per week; 12 sets common single stirrups; medium single-stitched harness, 6 sets per week; 8 sets common buggy harness; 4 sets No. 4 harness; 8 sets common double harness; 6 sets light double harness; 1 set English coach-pads; 2 sets fine coupe single harness per week.	
		Coach-pad hands....	....	2	....	....	....	....	$16 per week.....	$620		
		Harness fitters.....	....	15	....	....	....	....	12 "	480		
		Rein-makers.....	....	2	....	....	....	....	By contract.			
		Stitchers.....	....	27	....	....	....	....	Trace makers, $9 per week.....	360		
		Cutters	....	2	....	....	....	....	$15 per week	600		
		Machine operators..	....	2	....	....	....	....	By contract.			
		Boys.....	....	....	....	....	6					
171	Essex County..... Harness-makers.	All employes.....	24	....	....	....	....	....	.....	.....	.....	Lose about 2 mos. Wages advanced 10 per cent.
		Harness hands.....	....	6	....	....	....	....	Fitters, $9 per week.....	$400		
		Gig-saddle hands....	....	2	....	....	....	....	.....	400		
		Riding-saddle hands.	....	6	....	....	....	....	.....	400		
		Stitchers.....	....	8	....	....	....	....	Average $7 per week.....	300		
		Machine operators..	....	2								
172	Essex County..... Harness-makers.	All employes.....	23									
		Saddle hands.....	....	2	....	....	....	....	$15 per week	550	No. 12, 10 sets per week; No. 8, 7 sets buggy per week; 8 sets single-stop harness per week; 2 sets coach harness per week; 4 sets light double harness per week; 1 set coach harness per week; 1 set English harness per week. A set of harness as indicated above does not include reins, pads or traces.	
		Rein "	....	1								
		Trace "	....	1	....	....	....	....	10 "	400		
		Bridle & body parts.	....	6	....	....	....	....	12 "	450		
		Stitchers	....	10	....	....	....	....	10 "	400		
		Cutter.....	....	1								
		Harness dresser.....	....	1								
		General hand.....	....	1								
173	Essex County..... Harness-makers.	All employes.....	4									
		Harness and coach pads	....	2	....	....	....	....	$2 per day.....	$500		
		Gig and express saddles	....	2	....	....	....	....	2 "	500		
169	Harness-makers...	All employes.....	20									
		Engaged in making harness, reins, traces and horse boots.....	..	15	....	....	....	....	6 stitches to in. 1¾ cts. per ft. 7 " " 2¼ " " ½ ct. inch increase ab. 8 stitches.	300 to $400		
		Saddlers.....	....	4	....	....	....	....	$16 per week	600		
		Machine operator...	....	1								

TABLE No. 2—CONTINUED.

TRUNK-MAKERS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Quantity Produced. What Constitutes a Day's Work.	Remarks.
189	Essex County..... Bag-makers.	All employes.....	96	....	....	....	....	....				Wages decreased 25 cts. per dozen satchels. The average employment does not exceed 30 weeks in the year. The rest of year is mostly idle time.
									Average wages, 10 hours work—			
		Cutters.....	....	8	....	....	1	....	$9 per week.....	$270	5 doz. bags, 7 doz. satchels per day.	
		Fitters.....	....	3	....	....	....	2	9 " girls, $4.....	200	5 doz. split, 8 doz. cloth railroad bags per day.	
		Presser.....	....	1	....	....	....	....	12 "	500		
		Operators.....	....	3	....	....	....	....	12 "	380	25 doz. bags or satchels, 50 doz. cloth bags.	
		Bag-turners.....	....	2	....	....	2	....	9 "	300		
		Framers.....	....	8	....	....	....	....	13 "	270	15 doz. bags or satchels, 18 doz. cloth bags.	
		Satchel-makers.....	....	13	....	....	....	....	9 "	350		
		Handle-maker.....	....	1	....	....	....	....	9 "	360	8 doz. bags per day.	
		Frame-mounters.....	....	3	....	....	3	....	10 "	133	2 doz. split, 1½ doz. grain leather per day.	
		Coverers.....	....	....	....	....	2	2	3 "	180		
		Other workmen.....	....	12	12	....	12	....	8 " boys and girls, $3.....	Men.....$263 Women..... 187 Boys & girls, 100	¾ doz. grain, 1 doz. split leather per day. 9 doz. handles. 5 doz. covered satchels, 10 doz. japanned per day. 4 doz. satchel or bag frames per day.	
190	Essex County..... Bag-makers—	All employes.....	63	....	....	....	....	....				The working time is 10 hours per day during 9½ months, and 8½ during 2½ mos. One foreman oversees both the first and second division, and also makes the patterns. The framers and fitters work by the piece, prices varying from $1.44 to $3.25 per doz., as there is a great difference in the workmen's skill. Boys receive from $3 to $5 per week. Girls from $8 to $10 per week.
	Leather railroad bags, leather and cloth satchels, cloth railroad bags.	FIRST DIVISION.										
		Fitting up.....	....	4	....	....	1	....	$15 highest, $6 lowest, per week.....	.....	60 doz. of the various kinds per week.	
		Turning & framing..	....	14	....	....	2					
		Wax thread machine operators.....	....	2	....	....	....	1	15 per week.			
		Handle-maker.....	....	1								
		Frame-coverer.....	....	1								
		Cutters.....	....	4	....	....	....	....	12 per week.			
		Bottom making.....	....	1	....	....	....	5	8 to $10 per week.			
		SECOND DIVISION.										
		Leather satchels..	....	5	....	....	1	....	10 to $14 per week.....	.....	27 doz. of leather satchels, and 18 doz. cloth satchels, per week.	
		Cloth satchels.....	....	1	....	....	1					
		Wax thread machine operator.....	....	1	....	....	1	....	2 50 per day.			
		Sewing machine operator.....	....	....	....	....	....	....	8 per week.			
		Cutters.....	....	2	....	....	....	....	12 week.			
		Blacking and wrapping.....	....	2								

		THIRD DIVISION.										
		Wax thread machine operator	....	1	....	....	....	....	$13 per week	.....	45 doz. enamelled cloth railroad bags per week.	
		Sewing machine operator	....	....	....	....	1	....	8 to $10 per week.			
		Fitters and door-makers	....	2								
		Framers	....	2	....	....	....	3	2 per week.			
		Trimmer	....	1								
197	Essex County..... Trunk-makers.	All employes	41	....	....	....	....	....	.....	.....	6 doz. paste board per day. Do. cutting for whole shop. 3 trunks of best work per day. Best work 6 per day. Best work 3 per day.	Ironers-off finish and do all the outside work; the liners do all the inside work.
		Cutters	....	1	....	....	....	....	$13 per week	$500		
		Ironers-off	....	31	....	....	....	....	Highest, $1 each, lowest, 25 cents per doz	300 to 400		
		Drawers-on	....	2	....	....	....	..	Week-workers, $11 per week	$300 to 400		
									Piece-workers, 25 to 59 cents per doz.			
		Liners	....	6	....	....	....	....	Highest, $1, lowest, 1½ cents, each	$300		

TABLE No. 2—CONTINUED.

RUBBER WORKS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
92	Hunterdon County Vulcanized rubber hose, belting, &c.	All employes	235	....	....	....	....	....	....	....	....	11 hours per day. Monthly payment; part pay semi-monthly.
		Skilled workmen	....	12	....	....	....	....	$12 per week	$600		
		Partly skilled men	....	96	....	....	....	....	9 "	450		
		" women	....	....	67	....	....	....	6 "	300		
		Ordinary workmen	....	10	....	....	....	....	7 "	350		
		Boys	....	....	....	....	25	....	4 50 "	250		
		Girls	....	....	....	....	....	15	3 50 "	200		
		Laborers	....	10	....	....	....	....	7 50 "	375		
73	Morris County Soft rubber.	All employes	24	....	....	....	....	....	....	....	....	10 hours per day. Very unhealthy work.
				10	....	....	....	....	$1 25 per day	$375		
				5	....	....	....	....	1 50 "	425		
				5	....	....	....	....	2 "	600		
			....	....	....	....	4	....	80 "	240		
74	Morris County Rubber jewelry and combs.	All employes	637	....	....	....	....	....	....	....	....	10 hours per day; 8 hours on Saturday. Wages increased 10 per cent. in some departments.
		Stock department	....	150	....	....	....	....	$1 25 to $3 per day	$600, average.		
		Moulding departm't.	....	....	40	....	....	....	80 "	240		
		Turning	....	60	....	....	....	....	$2 per day	600		
		Grinding	....	30	....	....	....	....	1 25 to $2 50 per day	350 to $650		
		Cutting	....	50	15	....	....	....	Men, $1 90 per day; women, $1	Men 550; wmn. 300		
		Sawing	....	30	....	....	....	....	$11 per week	$550		
		Rubbing	....	80	....	....	....	....	12 "	600		
		Polishing	....	40	....	....	....	....	12 "	600		
		"	....	....	70	....	....	....	5 "	250		
		Packing	....	10	....	....	....	....	1 75 per day	525		
		"	....	....	30	....	....	....	90 "	275		
		Paper boxes	....	5	....	....	....	....	1 50 "	450		
		"	....	....	25	....	....	....	1 "	300		
		Carpenters	....	5	....	....	....	....	2 to $2 50 per day	625		
		Blacksmiths	....	3	....	....	....	....	2 25 per day	600		
		Machinists	....	4	....	....	....	....	2 "	600		

TABLE No. 2—CONTINUED.

PRINTING ESTABLISHMENTS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Quantity Produced.	Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	What Constitutes a Day's Work.	
32	Passaic County.... Printing establishment, book, job and newspaper.	All employes.....	5	....	....	....	....	....	Piece work, 30 cents per 1000 ems..... Job printers and others on time work, $10 to $12 per week. Women, $7 to $10 per week. Boys, 3 to 5 " Girls, 2 to 4 "	Annual earnings of men about $800.		
32½	Mercer County.... Printing establishment, book, job and newspaper.	All employes..... Journeymen.....	40	35	....	....	5	....	..... $14 per week, or 35 cents per 1000 ems.	..... $800	.....	Mostly time-work; very few employed on piece-work.
154	Middlesex County Printing establishment, book, job and newspaper.	All employes..... Job and book work . Newspaper and piece work.....	22	18 8 10	4	....	....	....	..... $2 to $3 per day..... Men, 30 cts.; women, 25 cts. per 1000 ems.....	..... $600 to $900 Men, $900; women, 400, or $18 and $8 per week.	.....	Job workers, 10 hours during 8 months; 8 hours during 4 months; piece-workers, 6 to 7 hours daily, averaging from 8000 to 10,000 ems.
		Reporters ..... Book-keeper..... Porter..... Foremen	....	2 1 1 2	....	....	....	....	$15 per week. 20 " 9 " 15 to $18 per week.			
156	Middlesex County. Printing establishment, book, job and newspaper.	All employes..... Job workers..... Newspaper compositors..... Reporter..... Office boy.....	9	9 3 4 1	....	....	 1	....	..... $10 per week..... 22 cts. per 1000 ems, (7500 daily.) $12 per week. 3 "	..... Average earnings in both departments, $540.	....	For job department, 10 hours is a day's work: in newspaper department, from 8 up.
157	Middlesex County. Printing establishment, book, job and newspaper.	All employes..... Compositors..... Jobbers ..... Press room..... Carriers..... Collector..... Editorial dep't.....	22	11 3 2 2 .... 1 3	6 6	....	5 .... 5	....	Day hands, $2 to $2 50 per day; piece hands, $6 to $13 per week—22 cents per 1000 ems..... $1 50 to $2 50 per week	Men, time and piece, $600 to $700; women, piece, $300 to $450. $75 to $125		

TABLE No. 2—CONTINUED.

GLASS BLOWERS.

The following table was compiled at the office of the President of the Green Glass Bottle and Vial Blowers League, Eastern Division. The earnings are the average monthly wages for the blast commencing September 1st, 1881, and ending June 30th, 1882. The average time worked was nine and a half months.

LOCATION.	Journeymen Blowers.	Apprentices.	Total Blowers.	Furnaces and Tanks.	Pots.	Size of Pots—Inches.	Furnaces not in operation during the blast	Factories.	Average monthly wages of Journeymen.
Millville, N. J.	94	25	119	4 f	28	40	1	5	$130 00
Salem, "	52	27	79	3 f	17	32x46	.....	3	110 00
Clayton, "	59	20	79	1 t 3 f	10	45	1	4	100 00
Glassboro, N. J.	72	35	107	4 f	18	45x58	.....	6	102 00
Williamstown, N. J.	36	30	66	1 t 3 f	10	32x48	.....	3	85 00
Bridgeton, "	62	20	82	3 f	15	45	1	4	100 00
Winslow, "	15	8	23	2 f	10	40	1	2	100 00
Camden, "	24	2	26	1 f	8	42	.....	1	100 00
North Clayton, "	26	4	30	1 f	5	46	.....	1	100 00
Tansboro, "	12	12	24	1 f	5	44	.....	1	95 00
Woodbury, "	30	.....	30	1 f	.....	.....	.....	1	122 00
Totals	482	183	665	28	126	.....	4	31	.....
By establishments	.....	.....	.....	.....	.....	.....	.....	.....	$104 00
By individuals	.....	.....	.....	.....	.....	.....	.....	.....	112 20
Brooklyn, N. Y.	38	8	46	2 f	10	45	.....	1	$125 00
Baltimore, Md.	62	45	107	4 f	20	45	.....	3	107 00
Philadelphia, Pa.	78	22	100	3 f	24	.....	1	3	98 00
Stroudsburg, "	9	13	22	2 f	5	45	1	2	106 00
Honesdale, "	29	10	39	2 f	12	45	.....	2	113 00
Poughkeepsie, N. Y.	30	4	34	1 t	.....	.....	.....	1	145 00
Clyde, "	13	5	18	1 f	8	44x46	.....	1	125 00
Lancaster, "	16	3	19	1 f	5	28x35	.....	1	112 00
Lockport, "	14	2	16	1 f	7	32x45	.....	1	140 00
Binghampton, "	19	4	23	1 f	5	44	.....	1	110 00
Williamsburg, "	18	9	27	2 f	8	45	.....	3	120 00
Scranton, Pa.	10	3	13	1 f	4	40	.....	1	120 00
Ellenville, N. Y.	22	14	36	2 f	11	45	.....	2	125 00
Bridesburg, Pa.	36	13	49	2 f	12	45	.....	2	100 00
Montreal, Canada	45	10	55	1 t 1 f	5	32x48	.....	2	110 00
Hamilton, "	30	8	38	2 f	14	38	.....	2	95 00
Totals	469	173	642	29	150	.....	2	28	.....
By establishments	.....	.....	.....	.....	.....	.....	.....	.....	$115 68
By individuals	.....	.....	.....	.....	.....	.....	.....	.....	112 33

Glass blowers work by the piece. Their present price-list was adopted in 1864; since which, slight changes have been made from time to time, in consequence of changes that have been made in the methods of work; and all fluctuations in wages have been made by a percentage of or on the basis list-price, which is 60 cents per gross for blowing 1-ounce prescription vials; 92 cents for 8-ounce. 61 cents per gross for 1-ounce oval vials, and $1 per gross for 8-ounce. 64 cents per gross for 1-ounce panel vials, and $1.20 for 8-ounce. Mineral-water bottles, 12-ounce weight, 11 cents per dozen. Wine bottles, 6 to gallon, 18-ounce weight, 14 cents per dozen; 5 to gallon, 22-ounce weight, 16 cents per dozen. The prices of other kinds and sizes of bottles are fixed on scale which corresponds with these prices; the whole, at present, subject to a discount of 10 per cent. Fruit jars, quart Masons, 9 cents per dozen; ½-gallons, 12 cents per dozen, net. The blowers do not pay anything for help or tools; all are provided by the employers. There are employed at the various bottle factories in this State, 510 snappers-up and mould boys; ages, 10 to 16 years; wages, $3 to $4 per week. 175 carrying-in, oven and gathering boys; ages, 14 to 20 years; wages, $4 to $6 per week. 29 master sheerers, $50 to $100 per month; averaging $79. 70 sheerers, wages, $35 to $50 per month. 68 packers, $28 to $45 per month. Batch makers, $40 to $45 per month. Laborers, $1.10 to $1.25 per day.

TABLE No. 2—CONTINUED.

MISCELLANEOUS.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed.						Wages Received.		Remarks.
			Total.	Men.	Women.	Children.	Boys.	Girls.	Day, Week or Piece.	Annual Wages.	
159	Hudson County.... Paper hanging and painting.	All employes.....	3	....	....	....	....	....	.....	.....	59 hours per week. Work about 7 months in the year. Wages increased 50 cents per day in spring.
		House painting.....	....	....	....	....	....	....	$2 per day.....	$450	
		Fresco painting.....	....	....	....	....	....	....	2 "	450	
		Kalsomining.....	....	....	....	....	....	....	2 "	450	
		Paper hanging.....	....	....	....	....	....	....	By piece.		
162	Middlesex County. Terra-cotta.	All employes.....	268	....	....	....	15	....	.....	.....	10 hours per day. Monthly payment.
		Model and mould-makers.....	....	9	....	....	....	....	$1 per day.		
		Model and mould-makers.....	....	16	....	....	....	....	3 50 "		
		Modelers.....	....	10	....	....	....	....	25 cents per hour; 8 hours per day.		
		"	....	10	....	....	....	....	52 " " " "		
		Pressers & finishers.	....	55	....	....	....	....	$1 50 to $1 75 per day.		
		Fitters and shippers.	....	45	....	....	....	....	1 50 per day.		
		Kilnmen.....	....	....	....	....	....	....	1 50 "		
		Laborers	....	....	....	....	....	....	1 25 "		
		Fire brick depart'nt.	....	30	....	....	....	....	Work done by contract.		
164	Middlesex County. Terra-cotta.	All employes.....	56	....	....	....	....	....	.....	.....	9 men make 8000 fine bricks a day. A boy and man press 3000 daily. Monthly payment.
		Model architectural terra cotta.....	....	1	....	....	....	....	$1 25 per day.		
		Model architectural terra cotta.....	....	2	....	....	....	....	3 50 "		
		Pressers & finishers..	....	5	....	....	....	....	1 50 to $1 75 per day.		
		Fire brick depart'nt.	....	36	....	....	....	....	1 25 per day.		
		"	....	14	....	....	....	....	1 50 "		
168	Hudson County.... Cigar making.	All employes.....	11	....	....	....	....	....	.....	.....	Cigar makers work 8 to 9 hours per day, and make 200 to 400 cigars; stripper, 10 hours.
		Cigar-makers.....	....	9	....	....	....	....	$5 50 to $9 per 1000.....	$575	
		Strippers (boys).....	....	....	....	....	2	....	4 to $6 per week.....	250	
31	Passaic County.... Cigar making.	All employes.....	3	....	....	....	....	....	.....	.....	10 hours. In cheap work, wages increased $1 per 1000 cigars; 300 made daily by mould; 200 by hand. Seed mould work, 1700 per week.
		Cigar-makers.....	....	3					By piece—Seed mould work, $8 per 1000; mixed mould work, $9 per 1000; long filler mould, $1 advance; Havana mould work, $2 advance	Average $12 per week 10 months in year.	
167	Hudson County.... H. R. R.	All employes.....	183	....	....	....	....	....	.....	.....	12 hours. 9 trips per day.
		Conductors.....	....	53	....	....	....	....	Trips that require 1 hour and 20 minutes, 22½ cents a trip; trips which take 2 hours and 10 minutes, 37½ cents.....	$600	
		Drivers.....	....	60							
		Stablemen.....	....	25							
		Trackmen.....	....	25							
		Extra helpers.....	....	20							

TABLE No. 2—CONTINUED.

MISCELLANEOUS—Continued.

Office number.	Location and Industry.	Subdivisions of Labor.	Hands Employed. Total.	Men.	Women.	Children.	Boys.	Girls.	Wages Received. Day, Week or Piece.	Annual Wages.	Remarks.
98	Hunterdon County Spoke manufactory.	All employes	83	....	....	....	....	....	....	....	Work 10 hours a day. Pay weekly.
		Spoke turners, finishers	..	28	....	....	....	....	Highest, $15 per week; lowest, $9 50..	Average $600	
		Machine sawyers	....	10	....	....	....	....	$12 per week, average	$600	
		Wheel-makers	....	15	....	....	....	....	11 " "	550	
		Helpers	....	20	....	....	....	....	9 " "	450	
		Laborers	....	10	....	....	....	....	7 50 "	300	
		Engineers	....	....	....	....	....	....	12 "	600	
		Fireman	....	....	....	....	....	....	8 "	400	
33	Morris County Powder works.	All employes	40	32	....	....	8	....	....	....	Work 10 hours a day. The 40 hands employed produce 8000 pounds per day.
									12 men, $2 per day	$600	
									20 " 1 50 "	450	
									8 boys, 60 cts. "	150	
34	Morris County Powder works.	All employes	29	26	....	....	3	....	....	....	Work 10 hours a day. The 29 hands employed produce 7000 pounds per day.
									Foreman, $3 per day	$900	
									10 men, 2 "	600	
									15 " 1 75 "	500	
									3 boys, 60 cents "	175	
43	Morris County Pocket knife factory.	All employes	30	....	....	....	....	....	Lowest, skilled workmen, $2 per day.	$600 to $700	
									Highest, " 2 50 "		
									Unskilled workmen, $1 25 to $1 50 "	350 to 400	
108	Union County Enameled oil cloth.	All employes	57								
		Preparation room	....	24	....	....	....	....	Highest, $15 per week; lowest, $9		
		Printing machine	....	1	....	....	....	....	$15 per week.		
		Marble cloth room	....	4	....	....	....	....	12 "		
		Block printing	....	3	....	....	....	....	13 "		
		Engineers	....	2	....	....	....	....	15 "		
		Blacksmith	....	1	....	....	....	....	15 "		
		Carpenters	....	2	....	....	....	....	15 "		
		Laborers	....	3	....	....	....	....	9 "		
		Graining department	....	2	....	....	2	....	12 " boys, $3 50.		
		Boiling "	....	2	....	....	....	....	15 "		
		Trimming "	....	....	4	....	7	....	7 " " 5.		
143¾	Camden County Oil cloth works.	All employes	80								
		Printers	....	20	....	....	....	....	$2 75 per day	$650	
		Others	....	60	....	....	....	....	10 per week	500	
108½	Union County Moulding making and planing.	All employes	15	15	....	....	....	....	Highest, $2 per day	600	
									Lowest, 1 50 "	450	

109	Union County.....	All employes.....	16	....	....	....	....	....	.....	.....	10 to 12 hours a day.
	Steam carpet and feather bed cleaning.			10	....	....	....	....	$1 25 to $2 per day.....	$500	
					6	....	....	....	1 per day.....	300	
30	Passaic County....	All employes.....	510	....	....	....	....	....	.....	.....	⅓ dozen best shirts a day's work; 1¼ dozen lowest-priced a day's work. There are employed in shirt making in the city of Paterson about 1300 hands.
	Shirt manufactory.	Bookkeeper and other men.....	....	10	....	....	....	....	Men average $10 per week.....	$500	
		Foreladies.....	....	....	20	....	....	....	$7 to $12 per week.....	550	
		Machine operators..	....	....	107	}	..	....	{ Highest, $6 per doz.; lowest, 90 cts. }	{$500	
		Ironers.....	....	....	30	}	..	....	{ Operators, from $8 to $12 per week. }	{ 550	
		Starchers.....	....	....	30	....	....	....	.....	$400	
165	Essex County.....	All employes.....	139	....	....	....	....	....	.....	.....	Wages paid weekly. Granite cutters work 10 hours a day; 8 hours on Saturday. Brownstone cutters, 8 hours per day, and lose time in frosty weather, or about 3 months in the year.
	Granite and brownstone.	Granite cutters.....	....	86	....	....	....	....	$3 per day.....	$650 to $700	
		Brownstone cutters.	....	44	....	....	....	....	3 75 "		
		Blacksmith.....	....	9	....	....	....	....	2 50 "		
163	Essex County.....	All employes.....	20	....	....	....	....	....	.....	.....	Pay weekly. Business confined to 10 months in the year.
	Bluestone works	Stone cutters.....	....	12	....	....	....	....	$2 50 per day.		
		Laborers.....	....	8	....	....	....	....	2 "		
161	Essex County.....	All employes.....	40	....	....	....	....	....	.....	.....	Pay weekly. Work all the year.
	Marble and granite works.	Cutters.....	....	30	....	....	....	....	Highest, $3 50 per day; lowest, $2 50..	Average $900	
		Polishers.....	....	10	....	....	....	....	$2 25 per day.....	$625	
158	Essex County.....	All employes.....	125	....	....	....	....	....	.....	.....	Steady work, except 2 weeks, during the year. Wages increased 10 per cent.
	Saw manufactory.	14 departments in all.		98	....	....	....	....	Average $2 per day.		
		Women do the wood polishing and etching on the same.			5	....	....	....	$6 per week.		
						5					
							14	....	3 "		

MISCELLANEOUS INDUSTRIES OF PATERSON.

Passaic County.	Bricklayers and plasterers..	480	....	$3 00 per day.
	Barber shops (50).....	150	....	Average, $9 per week and board; highest, $14 and board.
	Bakeries (50).....	125	....	Average, $10 " "
	Carpenters.....	408	....	" 2 per day.
	Harness-makers.....	30	....	" 2 "
	Hod carriers.....	200	....	" 2 50 " master workmen, $2 75.
	Horse shoeing shops (9).....	{ 60	....	Shoers, $2 25 per day.
		{ 40	....	Helpers, 1 25 "
	Laborers.....	1300	....	$1 10 per day.
	Music teachers.....	26	....	10 per week.
	Planing mills (2).....	30	....	Skilled, $2; not skilled, $1 25 per day.
	Plumbers and gas fitters (12)	150	....	Average, $2 50 per day.
	Painting shops (24).....	170	....	$2 75 per day.
	Tailor shops (40).....	100	300	Men, $10 to $12 per week; women, $4 to $8.
	Carriage factory (1).....	14	....	Skilled, $2 50; partly skilled, $1 50 per day.
	" " (10).....	94	....	75 average $2 50; 19 average $1 50 per day.
	Calico printing (2).....			
	Printers.....	18	....	$25 per week, (piece-work.)
	Other hands.....	150	....	Average, $10 per week.

There are about 25 per cent. more than these, but they are transient workmen. Carpenters' wages have been raised 25 cents per day; painters', 50 cents. The city pays its laborers only $1 per day, and job contractors frequently get them for less. There is a great surplus of laborers, at least 300 being constantly unemployed. The carriage manufacturing business has been brisk; steady work nearly all the time; no increase in wages.

TABLE No. 2—CONTINUED.

MISCELLANEOUS—Continued.

Location and Industry.	Miscellaneous Industries.	Hands Employ'd			Wages Received.	
		Total.	Men.	Women.	Day, Week or Piece.	Annual Wages.
Union County	Bakers	.....	19	.....	Average wages, $10 00 per week	$500
Plainfield.	Barbers	.....	9	.....	" " 9 00 "	450
	Blacksmiths	.....	25	.....	" " 12 00 "	600
	Butchers	.....	15	.....	" " 12 00 "	600
	Bricklayers and masons	.....	25	.....	" " 16 50 "	750
	Carpenters	.....	50	.....	" " 15 00 "	600
	Dress-makers	.....	.....	20	" " 6 00 "	250
	Harness-makers	.....	11	.....	" " 10 00 "	450
	Horse-shoers	.....	8	.....	" " 15 00 "	700
	Hod carriers	.....	10	.....	" " 2 00 per day	450
	Laborers	.....	100	.....	" " 1 25 "	300
	Milliners	.....	.....	10	" " 5 00 per week	200
	Painters	.....	20	.....	" " 16 50 "	750
Hunterdon County	Bricklayers	.....	40	.....	$2 75 per day	550
Lambertville.	Carpenters	.....	40	.....	2 50 "	500
	Masons	.....	25	.....	2 75 "	450
	Hod carriers	.....	30	.....	2 00 "	450
	Laborers	.....	100	.....	1 25 "	300
Burlington County	Bakers	.....	10	.....	8 00 per week	400
Burlington.	Barbers	.....	9	.....	7 50 "	350
	Blacksmiths	.....	20	.....	15 00 "	750
	Butchers	.....	8	.....	2 50 per day	500
	Carriage workers	.....	25	.....	9 00 per week	400
	Gardeners	.....	4	.....		450
	Laborers	.....	100	.....	1 25 per day	325
	Masons	.....	20	.....	3 00 "	800
	Painters	.....	20	.....	3 00 "	750
	Shoe-makers	.....	10	.....	10 00 per week	450
	Tailors	.....	10	.....	10 00 "	400
	Dress-makers	.....	.....	15	6 00 "	300
	Milliners	.....	.....	10	6 00 "	300
	Tailors	.....	.....	10	5 00 "	250
Union County.						
Planing and sawing mill	All employes	15	15	.....	1 25 to $2 50 per day	500
Sash and blind factory	All employes	16	16	.....	2 00 to 2 50 "	600
Plumbing, steam and gas fitting	All employes	25	25	.....	2 50 to 3 00 "	800
Men's clothing	All employes	60	20	.....	$12 00 to $15 00 per week for men 4 00 to 8 00 " " women	600 200 to $400
Morris County.						
Excelsior for upholstery	All employes	16	16	.....	$2 00 per day	600
Saw-mills, (4)	All employes	10	10	.....	1 50 "	400
Grist-mill	All employes	2	2	.....	2 00 "	600
Turning and engraving rolls, (calico prints)	All employes	11	11	.....	$2 00 to $2 50 per day, (skilled). 1 25 per day, (not skilled.)	600

CHAPTER II.

RATE OF WAGES OF FARM LABORERS IN THE UNITED STATES.

[FROM THE SPECIAL REPORT OF THE UNITED STATES DEPARTMENT OF AGRICULTURE, FOR MAY, 1882.]

"In 1866, from returns embracing about 1500 counties, the average rate was found to be $15.50, with board, showing an apparent increase of about 72 per cent. in one generation. At the same date the average monthly wages, when board was not provided, was $26 for the whole country; and for the States employing white labor almost exclusively, $28. In the next three years there was a material decline in the value of farm products, to which labor yielded more slowly, the average rate in 1869 being $25.13 for labor, without board. In 1875 another investigation showed a stronger tendency to a lower rate, somewhat more pronounced in the West and in New England than in the Middle States.

"The cumulative and extreme effect of the monetary revulsion, which commenced late in 1873, was not reached for several years after. At the next investigation, in 1879, the time of deepest depression and distress of the laboring classes in manufacturing industry, when surplus laborers had been thrown into competition with farm labor, a general and heavy reduction was recorded. It was greatest now in manufacturing States, amounting to 30 per cent. in New England; 25 in the Middle States, and but 14 in the Western. The neighborhoods contiguous to great manufacturing centres suffered the largest decrease.

"The present investigation shows the degree of recovery during the past three years of business activity and financial confidence. The following statement presents the average monthly rate of wages (without board) in employment by the season or year:

	1882.	1879.	1875.	1869.	1866.
Eastern States	$26 61	$20 21	$28 96	$32 08	$33 30
Middle States	22 24	19 69	26 02	28 02	30 07
Southern States	15 30	13 31	16 22	17 21	16 00
Western States	23 63	20 38	23 60	27 01	28 91
California	38 25	41 00	44 50	46 38	35 75

"The changes are shown in these approximate percentages of decrease and increase of sections:

	Eastern.	Middle.	Western.	Southern.
Decrease from 1866 to 1879	39	35	30	14
Increase from 1879 to 1882	24	12	14	13

"The following table presents the average rates of wages of farm labor, with and without board, in 1866, 1869, 1875, 1879 and 1882:

Statement showing the average monthly rate of wages, by the year, for the years respectively named.

STATES.	1882.		1879.		1875.		1869.		1866.	
	Without board.	With board.	Without board.	With board.	Without board.	With board.	Without board.	With board.	Without board.	With board.
Maine	$24 75	$16 15	$18 25	$11 08	$25 40	$15 94	$26 25	$16 50	$27 00	$17 44
New Hampshire	25 25	16 72	19 75	12 30	28 57	18 25	32 66	22 16	32 74	22 48
Vermont	23 37	16 00	19 00	11 50	29 67	19 37	32 40	21 40	32 84	21 00
Massachusetts	30 66	18 25	25 00	15 33	31 87	20 25	35 95	22 16	38 94	22 36
Rhode Island	27 75	17 00	23 00	13 25	30 00	19 00	32 25	20 00	34 40	20 50
Connecticut	27 90	17 37	23 29	14 23	28 25	18 50	33 00	20 75	34 25	21 54
New York	23 63	15 36	20 61	13 19	27 14	17 80	29 28	18 64	29 57	19 32
New Jersey	24 25	14 20	20 22	11 53	30 71	16 78	32 11	19 02	32 27	18 98
Pennsylvania	22 88	14 21	19 92	11 46	25 89	16 10	28 68	18 05	29 91	18 84
Delaware	18 20	12 50	17 00	9 50	20 33	11 67	22 00	13 00	24 93	13 25
Maryland	16 34	9 89	14 00	8 95	20 02	11 42	21 55	12 00	20 36	12 76
Virginia	13 96	9 17	11 00	7 66	14 84	9 21	15 28	9 65	14 82	9 36
North Carolina	12 86	8 80	11 19	7 66	13 46	8 82	12 76	7 91	13 46	8 15
South Carolina	12 10	8 10	10 25	6 66	12 84	8 19	11 54	7 34	12 00	7 66
Georgia	12 86	8 70	10 73	7 38	14 40	8 79	14 70	9 70	15 51	9 67
Florida	16 64	10 20	13 80	8 73	15 50	10 75	16 10	10 91	18 00	12 12
Alabama	13 15	9 09	12 20	8 30	13 60	9 40	15 19	10 52	13 40	9 80
Mississippi	15 10	10 09	13 31	9 28	16 40	11 25	17 11	11 21	16 72	11 58
Louisiana	18 20	12 69	16 40	11 27	18 40	12 20	21 37	12 62	20 50	12 42
Texas	20 20	14 03	18 27	11 49	19 50	13 37	18 83	13 21	19 00	12 72
Arkansas	18 50	12 25	17 12	11 31	20 50	13 00	25 25	16 60	24 21	15 80
Tennessee	13 75	9 49	12 73	8 69	15 20	10 00	16 81	11 00	19 00	12 58
West Virginia	19 16	12 46	16 98	10 94	20 75	13 10	21 39	13 87	25 35	16 47
Kentucky	18 20	11 75	15 17	10 00	18 12	12 00	18 84	12 57	20 23	13 65
Ohio	24 55	16 30	20 72	13 34	24 05	16 33	26 35	16 74	28 46	18 96
Michigan	25 76	17 27	22 88	14 64	28 22	18 46	31 01	20 03	31 26	20 48
Indiana	23 14	15 65	20 20	12 76	24 20	16 14	25 42	17 03	27 71	18 72
Illinois	23 91	17 14	20 61	13 01	25 20	16 87	27 32	17 69	28 54	18 72
Wisconsin	26 21	17 90	21 07	13 81	25 50	16 45	30 08	18 47	30 84	19 87
Minnesota	26 36	17 75	24 55	15 62	26 16	16 36	28 61	17 94	31 65	21 10
Iowa	26 21	17 95	22 09	13 90	24 35	16 11	28 39	17 87	28 34	18 87
Missouri	22 39	13 95	17 59	11 84	19 40	13 15	24 47	16 38	26 75	18 08
Kansas	23 85	15 87	20 67	13 28	23 20	14 65	28 96	18 38	31 03	19 81
Nebraska	24 45	16 20	23 04	14 86	24 00	14 75	33 25	19 18	38 37	24 64
California	38 25	23 45	41 00	26 27	44 50	28 60	46 38	28 69	45 71	30 35
Oregon	33 50	24 75	35 45	23 86	38 25	25 67	.....	.....	35 75	22 53
Colorado	36 50	27 08	35 00	20 00	38 50	21 14	.....	.....	67 50	42 12
Utah	.....	.....	28 87	20 50	35 50	25 33	.....	.....	44 71	26 32
New Mexico	.....	.....	22 10	13 80	22 75	14 25	.....	.....	25 00	16 50
Dakota	.....	.....	28 56	16 57	32 50	20 50	.....	.....	30 20	20 00

"The influence of manufactures upon agriculture is seen in the wages of farm labor as well as in prices of farm production. The rate is higher in Massachusetts than in any other State east of the Rocky Mountains. It is seen in the West as well, affecting the averages of States lying side by side. Proximity to large cities increases the rate. New Jersey has the advantage of extensive manufactures within her limits, and the added advantage of cities immediately on her borders holding a population of three millions of people engaged in manufactures.* The effect is as follows:

STATES.	1882.	1879.	1875.	1866.
New York	$23 63	$20 61	$27 14	$29 57
New Jersey	24 25	20 22	30 71	32 27
Pennsylvania	22 88	19 92	25 89	29 91

"Only in times of manufacturing depression, as in 1879, does New Jersey report wages as low as those of New York, whose rural territory extends to the great lakes.

"Whenever other industries flourish, and the number of persons employed in agriculture are fewer than those engaged in other occupations, it is found that the wages of farm labor are higher than in districts more exclusively agricultural; and statistics show further that the prices of farm products are also higher, and the gross and net earnings of the farm proprietor are greater. Whether from manufactures, mining or commerce, the non-agricultural population is relatively in smaller proportion to the whole people, the law of supply and demand inevitably secures a higher reward to rural labor.

"The higher wages in harvest will uniformly be found in the wheat-growing States of the Northwest and California, because of the extraordinary prominence of a single crop, which is an absorbing specialty. In the winter-wheat region, Michigan, for a similar reason, offers high wages for labor in harvest. The harvest in the South is a longer season, not so exacting in demands for immediate and speedy conclusion, and wages are, therefore, lower relatively than transient service in the West.

*In our State a large proportion of the farm hands is employed in the trucking business. These receive a higher rate of wages than the ordinary farm laborers.

"The range of rates in the present investigation runs from $1.05 in Alabama, to $2.65 in Dakota."

Table showing the rate of wages of agricultural labor per day in harvest.

STATES.	1882.		1879.		1875.		1869.		1866.	
	In harvest, without board.	In harvest, with board.	In harvest, without board.	In harvest, with board.	In harvest, without board.	In harvest, with board.	In harvest, without board.	In harvest, with board.	In harvest, without board.	In harvest, with board.
Maine	$1 52	$1 22	$1 42	$1 09	$1 99	$1 49	$2 17	$1 65	$2 02	$1 56
New Hampshire	1 71	1 35	1 25	96	2 06	1 64	2 37	1 95	1 98	1 52
Vermont	1 75	1 35	1 29	97	2 28	1 85	2 46	2 00	2 32	1 85
Massachusetts	1 75	1 35	1 50	1 00	1 90	1 50	2 37	1 95	2 41	1 92
Rhode Island	1 60	1 30	1 30	95	2 00	1 50	2 37	1 75	2 23	1 71
Connecticut	1 65	1 33	1 60	1 25	2 06	1 53	2 40	1 90	2 43	1 90
New York	1 89	1 47	1 53	1 18	2 25	1 75	2 53	1 99	2 41	1 92
New Jersey	2 09	1 74	1 55	1 30	2 56	2 03	2 63	2 09	2 68	2 38
Pennsylvania	1 73	1 30	1 33	99	2 01	1 51	2 23	1 73	2 32	1 80
Delaware	1 60	1 25	1 37	1 00	1 83	1 41	1 87	1 50	2 09	1 62
Maryland	1 52	1 15	1 43	1 12	1 81	1 34	2 16	1 67	2 00	1 68
Virginia	1 27	99	1 16	96	1 48	1 21	1 48	1 13	1 46	1 21
North Carolina	1 20	85	99	76	1 17	1 00	1 37	1 04	1 53	1 17
South Carolina	1 08	78	89	68	1 17	1 01	1 15	90	1 25	93
Georgia	1 10	80	98	61	1 29	99	1 24	90	1 48	1 06
Florida	1 12	80	1 02	73	1 00	72	1 25	87	1 12	83
Alabama	1 05	80	96	77	1 40	1 15	1 24	95	1 27	1 04
Mississippi	1 23	95	1 00	85	1 40	1 00	1 56	1 27	1 65	1 14
Louisiana	1 10	85	1 03	77	1 30	1 05	1 54	1 13	1 66	1 20
Texas	1 39	1 08	1 30	94	1 52	1 20	1 58	1 26	1 65	1 32
Arkansas	1 34	1 02	1 38	1 08	1 50	1 25	1 67	1 40	2 07	1 52
Tennessee	1 30	1 00	1 28	98	1 62	1 20	2 10	1 59	2 01	1 54
West Virginia	1 30	1 00	1 26	95	1 55	1 20	1 78	1 29	1 78	1 31
Kentucky	1 54	1 18	1 49	1 15	1 79	1 46	1 83	1 38	2 10	1 70
Ohio	1 79	1 41	1 51	1 17	2 05	1 60	2 15	1 72	2 20	1 73
Michigan	2 13	1 76	2 02	1 55	2 50	2 00	2 76	2 25	2 62	2 14
Indiana	1 89	1 58	1 68	1 28	2 20	1 75	2 16	1 77	2 23	1 76
Illinois	1 91	1 54	1 52	1 18	2 20	1 83	2 34	1 94	2 41	1 91
Wisconsin	2 50	2 10	2 11	1 70	2 40	1 92	2 45	1 96	2 68	2 15
Minnesota	2 61	2 16	2 63	2 25	2 82	2 30	2 90	2 36	2 68	2 27
Iowa	2 25	1 81	1 66	1 57	2 57	2 10	2 85	2 24	2 38	1 88
Missouri	1 59	1 23	1 47	1 17	1 75	1 43	2 30	1 84	2 15	1 72
Kansas	1 70	1 35	1 70	1 32	1 86	1 46	2 08	1 63	2 31	1 82
Nebraska	1 95	1 57	2 17	1 66	2 40	1 98	2 41	2 00	2 65	2 15
California	2 30	1 86	2 27	1 76	2 50	2 00	2 82	2 04	2 56	2 06
Oregon	1 92	1 50	2 02	1 54	2 11	1 72	.....	.....	2 40	1 80
Colorado	2 21	1 80	2 08	1 55	2 33	1 50	.....	.....	4 17	2 87
Utah	2 00	1 56	1 82	1 43	2 20	1 75	.....	.....	3 42	2 49
New Mexico	1 65	1 40	1 00	67	1 35	90	.....	.....	1 50	1 12
Washington	.....	.....	2 15	1 61	2 40	2 00	.....	.....	3 00	2 25
Dakota	2 65	2 19	.....	.....	2 37	1 90	.....	.....	2 50	2 00

Table showing the average rate of wages per day, in transient service, other than harvesting.

STATES.	1882.		1879.		1875.		1869.		1866.	
	Without board.	With board.	Without board.	With board.	Without board.	With board.	Without board.	With board.	Without board.	With board.
Maine	$1 18	$0 91	$0 97	$0 72	$1 46	$1 05	$1 48	$1 05	$1 49	$1 13
New Hampshire	1 30	97	98	74	1 50	1 12	1 79	1 41	1 67	1 26
Vermont	1 20	90	91	64	1 51	1 11	1 76	1 28	1 76	1 32
Massachusetts	1 45	1 08	1 05	75	1 44	1 12	1 92	1 37	1 83	1 38
Rhode Island	1 28	1 00	1 00	50	1 62	1 18	1 73	1 18	1 83	1 33
Connecticut	1 30	98	1 50	88	1 50	1 16	1 87	1 37	1 75	1 29
New York	1 29	93	92	68	1 48	1 06	1 64	1 19	1 75	1 23
New Jersey	1 21	86	99	68	1 45	1 00	1 63	1 15	1 68	1 20
Pennsylvania	1 20	85	96	63	1 37	95	1 43	1 04	1 59	1 10
Delaware	1 10	80	75	50	1 04	70	1 30	95	1 31	94
Maryland	83	55	75	48	1 06	71	1 20	77	1 31	96
Virginia	70	48	63	44	78	51	80	55	82	57
North Carolina	68	46	58	41	72	51	74	49	72	50
South Carolina	65	45	53	41	71	55	70	50	69	45
Georgia	70	49	58	44	83	60	83	60	99	70
Florida	75	55	76	53	93	70	96	72	1 00	74
Alabama	72	51	69	50	75	53	86	61	78	55
Mississippi	75	55	78	55	1 07	80	1 10	90	1 34	89
Louisiana	80	60	85	62	1 00	74	1 04	83	1 08	70
Texas	93	70	92	66	1 14	84	1 16	84	1 31	98
Arkansas	88	62	86	60	1 10	80	1 36	1 02	1 34	88
Tennessee	72	50	69	50	95	60	1 05	68	1 15	83
West Virginia	82	59	80	55	1 05	75	1 14	79	1 31	92
Kentucky	87	60	77	53	1 03	72	1 10	77	1 21	86
Ohio	1 19	89	1 00	83	1 35	1 00	1 44	1 05	1 54	1 13
Michigan	1 30	96	1 16	82	1 55	1 10	1 66	1 17	1 78	1 30
Indiana	1 08	78	90	69	1 30	95	1 36	1 01	1 45	1 06
Illinois	1 19	90	1 01	73	1 37	1 01	1 50	1 13	1 62	1 21
Wisconsin	1 33	99	1 12	79	1 42	1 00	1 56	1 15	1 78	1 28
Minnesota	1 37	1 02	1 27	94	1 50	1 07	1 64	1 18	1 75	1 35
Iowa	1 34	99	1 12	80	1 38	1 01	1 52	1 13	1 62	1 19
Missouri	1 00	70	67	59	1 07	73	1 44	1 02	1 44	1 07
Kansas	1 12	80	1 05	72	1 30	90	1 56	1 12	1 65	1 19
Nebraska	1 21	91	1 29	90	1 43	1 00	1 62	1 26	1 93	1 45
California	1 71	1 29	1 65	1 23	1 84	1 30	2 13	1 50	2 26	1 72
Oregon	1 33	1 00	1 44	1 08	1 47	1 15	.....	.....	1 75	1 40
Nevada	.....	.....	.....	1 25	.....	.....	.....	.....	3 00	2 50
Colorado	1 63	1 14	1 83	1 19	1 75	1 16	.....	.....	3 29	1 93
Utah	1 57	1 10	1 46	1 12	1 80	1 40	.....	.....	2 27	1 63
New Mexico	1 28	1 00	81	56	85	50	.....	.....	1 00	90
Dakota	1 50	1 11	1 34	92	1 62	1 08	.....	.....	2 00	1 50
Wyoming	.....	.....	.....	.....	3 08	2 36	.....	.....	.....	.....

CHAPTER III.

COMPARATIVE RATES OF WAGES IN THE UNITED STATES AND OTHER COUNTRIES.

A great deal has been written recently concerning the comparative cost of labor in this country and Europe. In order to show how unsatisfactory and misleading these comparisons have been, because so little is known on the subject, there being no reliable data on hand, a portion of the report of the Hon. Joseph Nimmo, Jr., Chief of the United States Bureau of Statistics, (Treasury Department,) on this subject, is here reproduced. This report was made on May 1st, 1881, in reply to a resolution of the United States Senate asking for information respecting the "comparative rate of wages paid in the United States, in Great Britain, in France, in Germany, and in Mexico."

While Mr. Nimmo has given a considerable amount of interesting and valuable information on this subject, he admits that it was found to be impossible "to comply fully and satisfactorily with the requirement of the Senate resolution touching presentation in tabular form of the rates of wages in the United States and foreign countries. The difficulty in the case arises both from the inadequacy and contradictory character of the available data." These, "even if correct, showing only the comparative rates of wages paid in different countries, would present but a partial and very imperfect view of the general question as to the comparative cost of production in the several countries. It appears important, therefore, that any systematic and thorough investigation of the wage question should constitute a part of a more general line of inquiry, embracing the hours of labor, the manner and extent to which machinery is employed, the relative proportion of men, women and children employed and the manner of their employment, the organization of labor, the rate of interest upon capital, the cost of erecting factories, the cost of fuel in the several countries, and

other matters having an important bearing upon the subject. Inquiries in regard to the cost of living, and in regard to the moral, intellectual and social condition of the laboring classes, would also be necessary. * * * It is probable that an intelligent and thorough investigation of all the conditions affecting the wages of labor in the various countries would tend to correct many errors, and to reconcile many seeming discrepancies in the data now available.

"This office has not sufficient light upon this intricate and complex subject of the comparative rates of wages in different countries, and in different employments, in order to pass upon the question as to the accuracy or inaccuracy of statements which to a greater or less extent are accepted as being correct. I am clearly of the opinion, however, that it would be utterly misleading to attempt to prepare a statement of comparative wages from data collected in different countries, at different times, by different men, who omit to take into consideration the various circumstances hereinbefore mentioned, and who record the results of their observations and inquiries in the absence of any harmonious effort to reach a properly comparative statement, or whose efforts are not directed by a single person competent to conduct a general inquiry upon the subject. * * *

"The wide difference between the statements made by Messrs. J. & P. Coats and the Clark Thread Company in regard to the relative rates of wages paid to operatives employed in the manufacture of thread in the United States and in Scotland, and the statement made by Mr. Carroll D. Wright, in regard to the relative rates of wages paid for labor in the manufacture of cotton cloth in the United States and in England, afford a striking illustration of what has hereinbefore been stated as to the contradictory nature of available data in regard to wages."

But, in consideration of the public interest on the subject, we deem it, with Mr. Nimmo, to be "entirely proper to present in the form of a recapitulation, the statements and opinions of persons whose utterances upon the subject command public attention and respect."

"(A.) Hon. Abram S. Hewitt, member of Congress, who has had a large experience in the employment of labor, especially in the manufacturing of iron, stated in a speech delivered in the House of Representatives on the 30th of March, 1882—

"'That as between Great Britain and the United States the rate of wages is, on the average, about 50 per cent. higher here than there.'

"Mr. Hewitt had in mind a great variety of employments and classes of labor. He added that—

"'Skilled labor is much more highly paid in the United States than in Great Britain, while the difference in common labor is not so great as I have stated, but the tendency of modern industry is to introduce machinery, by which the amount of skilled labor employed is steadily reduced.'

"(B.) Mr. Joseph D. Weeks, of Pittsburg, Pa., states that the average earnings of all the operatives employed in rolling mills and in the manufacture of pig-iron are fully 100 per cent. greater in the United States than in England.

"(C.) Hon. Jonathan Chace, member of Congress from Rhode Island, states from a large experience as a proprietor and manager of cotton mills, that the average earnings of all operatives employed in the cotton mills of Massachusetts is about 62 per cent. greater than the average earnings of operatives in England, and that the average earnings of the more highly skilled classes of laborers in the United States exceed the earnings of similar laborers in England in a much higher degree.

"(D.) Mr. Carroll D. Wright, Chief of the Massachusetts Bureau of Statistics of Labor, estimates that the average weekly earnings of a weaver in Massachusetts are only 6.8 per cent. greater than the average weekly earnings of a weaver in England, and that the average weekly earnings of a weaver and his two children in Massachusetts are 48 per cent. greater than the average weekly earnings of a weaver and his two children in England.

"(E.) The two principal manufacturers of thread are the Messrs. J. & P. Coats, of Pawtucket, Rhode Island, and Paisley, Scotland, and the Clark Thread Company, of Newark, New Jersey, and Paisley, Scotland. The former of these state, from their experience in the payment of wages for similar work in the two countries, that the average wages paid by them in the United States are 110 per cent. greater than in Scotland. And the latter, that the average wages paid by them in the United States are 101½ per cent. greater than in Scotland.

"(F.) Mr. William C. Wyckoff, Secretary of the Silk Association of America, says:

"'I regard it as entirely within bounds to state that there are paid for similar labor in silk manufacture in this country, approximately,

twice as high rates of wages as in England, three times as high as in Germany and France, and four times as high as in Italy.'

"(G.) It is estimated by the *Shoe and Leather Reporter* of New York, that tanners' wages in the United States range from 13⅓ per cent. to 57½ per cent. higher than in certain countries of Europe, and that curriers' wages in the United States range from 35⅐ per cent. to 93¾ per cent. higher than in those countries.

"It seems to be quite generally conceded that the earnings of skilled laborers in the United States exceed the wages of skilled laborers in the countries of Europe, in a much higher degree than do the earnings of unskilled laborers in the United States exceed the earnings of unskilled laborers in Europe. This is a fact of national interest, as it indicates that there is a greater stimulus to higher attainment in mechanical employments in the United States than in Europe."

The following tables are taken from the report, and are given for what they are worth:

WAGES IN WOOLEN MILLS OF UNITED STATES FOR 1880.*

Character of Work.	Massachusetts.	Maine.	New Hampshire.
Wool sorting, per day	$1 72	.....	$1 50 @ $1 85
Carding, "	70	$ 75	80 @ 90
Spinning, "	1 19	1 25	1 50 @ 1 75
Spooling, "	53	.....	75 @ 1 00
Dressing, "	1 17	.....	1 75
Drawing, "	80	.....	.....
Weaving, "	97	1 14	1 35 @ 1 60
Gigging, "	95	.....	1 15
Finishing, "	95	.....	.....
Hours of labor	10	11	11
Regularity of employment	Continuously, except a few days in spring, the mill stopped by backwater.	Full time	Full time.

WAGES IN COTTON MILLS OF UNITED STATES FOR 1880.*

Classes of employes.	Massachusetts.	New Hampshire.	New Hampshire.
Overseer, per day	$3 70	.....	$3 50
Second hand, "	2 00	.....	2 00
Picker, "	.....	.....	1 10
Card stripper, "	1 00	.....	1 10
Frame-spinner, "	74	$ 52	82
Mule-spinner, "	1 58	.....	1 55
Back boy, "	.....	.....	45
Warper, "	92	78	92
Spooler, "	81	51	90
Dresser, "	.....	1 59	.....
Weaver, "	80	78	1 10
Hours of labor	10	11	10¾
Regularity of employment	Full time	Full time	Full time.

* By Joseph D. Weeks, Esq., of Pittsburg, Pa., Special Agent of the 10th U. S. Census.

WAGES AT TANNERIES OF UNITED STATES FOR 1880.*

Classes of employes.	Pennsylvania.	New York.
Beam hand, per day	$1 30	$1 33⅓
Yard hand, "	1 25	.....
Roller, "	1 25	1 50
Bark grinder, "	1 10	.....
Laborer, "	1 10	1 25
Hours of labor	10	10
Regularity of employment	Full time	Full time.

WAGES IN IRON ROLLING MILLS IN 1878.*

Character of work.	United States	England.	
	Pittsburg.	South Staffordshire.	Warrington.
Boiling per ton	$5 00	$1 792	$1 792
Muck rolling "	57c. to 65	286	271
Shingling "	77	285	252
Bar rolling "	65	523	523
Heating "	65	653	653
Guide rolling, rounds and squares, ⅝ "	2 40	.....	1 409
Guide heating, rounds and squares, ⅝ "			
Hoop rolling 1" by No. 18 "	$4 00 to 4 80	1 26	1 269
Hoop heating 1" by No. 18 "		518	55
Sheet rolling, No. 24 "	7 16	3 097	.....
Sheet heating, No. 24 "			

WAGES IN MANUFACTURE OF PIG-IRON IN THE UNITED STATES AND ENGLAND.*

TABLE 1.—*Showing relative daily wages paid workmen about blast furnaces in England and at Pittsburg in* 1879.

Occupation.	Pittsburg.	England.	
		Cumberland.	Cleveland.
Chargers	$1 60	99	$1 40†
Fillers	1 50	99	89
Keepers	2 00	$1 22	1 87†
Keepers' helpers	1 80	77	73
Laborers	1 20½	56	.....
Blacksmiths	2 00	1 15	.....
Engine-men	2 00	1 09	1 02
Total cost of labor per ton of pig	1 25	58 3-10	69

* By Joseph D. Weeks, Esq., Pittsburg, Pa., Special Agent of the 10th U. S. Census.

† Either these are mistakes or the work is different from that done by "chargers" and "keepers" in Cumberland.

Total cost of labor per ton of pig.

At Pittsburg, Pa	$1 25
In Cumberland, England	58 3/10
In Cleveland, England	69

TABLE 2.—*Showing the cost of pig-iron in the Cumberland district, England, for one-half year to March* 31st, 1879.

[All minerals at about cost price. The company owns and raises its own minerals.]

	Quantity used.	Prices at works.	Cost per ton of iron.
	Tons. lbs.		
Ironstone	3 565	0.976	$3 20
Coal (calcining)	210	.....	11
Coke	1 203	$2 56	2 79
Limestone	1,151	89	45
			$6 55
Wages	.....	.....	69
Stores and repairs	.....	.....	17
Rates and taxes	.....	.....	8
			$7 49
A reduction of about 5 per cent., or, say	.....	.....	37
Will give about present (July, 1879,) cost	.....	.....	$7 12

TABLE 3.—*Showing the cost of a ton of pig-iron at the furnaces in the Pittsburg district in the first part of* 1879.

[Ores are Lake Superior; coke, Connellsville; limestone from the Mahoning Valley.]

	Quantity used.	Prices at works.	Cost per ton of iron.
	Tons.		
Ironstone	1.7	$9 00	$15 30
Coal (calcining)	None.	.....	.....
Coke	1.25	2 56⅔	3 20¾
Limestone	75	1 15	71¼
			$19 22
Wages	.....	.....	1 25
Stores and repairs	.....	.....	50
Taxes	.....	.....	10
			$21 07

The cost in July, 1879, would be somewhat above this, as the "boom" was in progress at that date.

TABLE 4.—*Wages paid to produce one ton of iron in Pittsburg.*

Labor in mining ore for ton of pig-iron, at $1.40 per ton of ore	$2 38
Labor in mining coal and making coke necessary to produce a ton of pig-iron,	1 25
Labor in mining limestone for ton of pig-iron	30
Labor at furnace	1 25
	$5 18

Against $3.05 to $3.17 in Cleveland, England.

The average royalty per ton of ore in the Lake Superior mines is 44 cents, or 74.8 cents per ton of pig-iron. The average royalty on bituminous coal in Pennsylvania for 1879–80, was 14 cents a ton, or 26 cents to a ton of pig-iron. On limestone the royalty to a ton of pig-iron would be about 4 cents, making total royalties $1.04.8 against 65 cents in England.

The transportation on ore sufficient to make a ton of pig-iron from Lake Superior to Pittsburg furnaces is $8.07½; on coke from the Connellsville region to Pittsburg, $1.60; on limestone, 60 cents; making a total for transportation of $10.27½ against $1.53 in England.

WAGES OF LABOR IN THE MANUFACTURE OF THREAD.

Schedule of wages paid in the United States and in Scotland, furnished by Messrs. J. & P. Coats, thread manufacturers, Pawtucket, R. I.

	In the United States.	In Scotland.
Wages paid cop spoolers per week	$6 59	$3 40
Twister-tenders, "	5 69	2 25
Doffers, "	4 37	1 94
Cleaners, "	2 63	1 52
Reelers, "	7 88	3 52
Winders, "	7 25	2 80
Wrappers and boxers, "	7 96	3 04
Dyers, "	9 84	6 32
Bleachers—men, "	11 81	5 10
Bleachers—women, "	5 25	2 43
Mechanics, "	13 13	7 94
Firemen, "	10 66	5 83

Schedule of wages paid in the United States and in Scotland, furnished by the Clark Thread Company, Newark, N. J.

	Newark.	Paisley.
GIRLS.		
Spoolers, per week	$8 00	$3 60
Reelers, "	8 00	3 60
Cop-winders, "	8 00	3 60
Twisters, "	5 50	2 35
Slippers, "	3 00	1 65
Bobbin cleaners, per week	2 50	1 50
MEN.		
Carpenters, per week	17 00	7 25
Machinists, "	18 00	7 25
Dyers, "	15 00	7 00
Bleachers, "	13 50	6 50
Firemen, "	12 50	6 00

WAGES PAID IN THE MANUFACTURE OF LEATHER.

(Abstract of data furnished by the *New York Shoe and Leather Reporter.*)

UPPER LEATHER AND CALF-SKIN MANUFACTURE.

Tanners' wages.—Eastern and Western cities of the United States, $10 to $11 per week.

Curriers' wages.—Eastern and Western cities of the United States, $14 to $15 per week. In country towns of the United States, $2 to $3 a week less.

Morocco leather tanners' wages.—New York, $12 a week; Philadelphia, $12 a week; Wilmington, Del., $10 a week; Lynn, Mass., $10 a week.

MOROCCO FINISHING BY MACHINERY.

Wages of finishers.—New York, $13 to $14 per week; Philadelphia, $13 to $14 per week; Lynn, Mass., $11 to $12 per week.

SOLE LEATHER TANNERS.

In the country towns of the United States, $1.25 per day.

In Philadelphia, Baltimore, Louisville, Cincinnati, and Chicago, $9 to $10.50 per week. Ten hours a day.

In London, England, $8.50 to $9.50 per week. Nine hours a day's work.

In the country towns of England, and in Scotland, $6 a week. Nine hours a day's work.

In Germany, 80 cents to $1 a day. Ten hours a day's work.

In French provinces, $5 to $5.50 a week.

In Paris, (France,) $1 a day.

SOLE LEATHER CURRIERS.

In country towns of the United States $1.50 to $1.60 a day. Ten hours a day.

In London, England, $10 to $13 a week. Nine hours a day.

In the country towns of England, and in Scotland, $7 to $7.50 a week.

In Leeds, England, East India tanned skins, $6.50 to $7.50 a week.

In Germany, $1 to $1.15 a day. Ten hours a day.

In the provinces of France, $5 to $6 a week.

In Paris, $9 a week.

NEW YORK CITY, May 17th, 1882.

DEAR SIR: We estimate that tanners receive 13⅓ per cent. more in the United States than in Great Britain, 54½ per cent. more than in France, and 57½ per cent. more than in Germany; and that curriers receive 35⅐ per cent. more in the United States than in Great Britain, 66⅔ per cent. more than in France, and 93¾ per cent. more than in Germany.

Very respectfully yours,

SHOE AND LEATHER REPORTER.

MR. JOSEPH NIMMO, JR.,

Chief of Bureau of Statistics, Treasury Department, Washington, D. C.

SILK MANUFACTURE.

*Rates of wages in silk manufacture per week, in dollars.**

Designation of operative.	Sex.	Average per United States census 1879–1880.	Recent in United States, 1882.	Estimated average in England.	Estimated average in Germany.	Estimated average in France.	Estimated average in Italy.
Hard silk winder†	F.	$5 25	.....	$2 96	.....	$1 40	.....
Hard silk doubler	F.	5 18	.....	.....	.....	2 45	.....
Hard silk spinner	M.	5 57	.....	.....	.....	.....	$2 10
do	F.	4 87	$5 00	.....	.....	2 00	1 44
Hard silk twister	M.	5 98	.....	.....	.....	3 42	.....
do	F.	5 67	.....	.....	.....	2 10	.....
Soft silk winder	F.	6 35	8 00	.....	.....	2 00	.....
Warper	M.	10 71	.....	.....	.....	.....	.....
do	F.	7 62	10 00	.....	.....	2 40	.....
Beamer‡	M.	12 11	.....	.....	.....	.....	.....
do‡	F.	7 72	.....	.....	.....	.....	.....
Warp twister	M.	13 96	.....	.....	.....	.....	.....
Weaver on hand-looms§	M.	14 15	.....	.....	$3 00	5 40	4 80
do	F.	8 44	.....	.....	2 72	3 00	2 28
Weaver on power-looms	M.	11 43	.....	5 40	3 00	.....	.....
do	F.	7 94	.....	4 38	.....	.....	.....
Weaver of plain common ribbons	.....	.....	.....	.....	.....	2 70	.....
Weaver of better grade ribbons	.....	.....	.....	.....	.....	3 90	.....
Weaver of fancy ribbons	.....	.....	.....	.....	.....	5 10	.....
Weaver of best novelty ribbons	.....	.....	15 00	.....	.....	9 60	.....
Weaver of damasks	M.	.....	.....	.....	3 93	.....	.....
Weaver of dress-goods	M.	.....	12 00	.....	2 73	6 00	.....
do	F.	.....	9 00	.....	1 66	.....	.....
Weaver of plush, &c	M.	.....	.....	.....	4 07	.....	.....
do	F.	.....	.....	.....	2 76	.....	.....
Loom-fixer‡	M.	15 87	.....	.....	.....	.....	.....
Finisher‡	M.	13 50	.....	.....	.....	.....	.....
Designer	M.	24 71	.....	12 00	.....	.....	.....
Lace operative (machine)	M.	14 75	15 00	9 11	.....	.....	.....
do	F.	5 00	.....	3 00	1 00	3 60	.....
Braid operative (machine)‖	M.	16 00	.....	.....	7 90	.....	.....
Braider‖	F.	5 41	.....	.....	2 32	.....	.....
Fringe-maker	F.	5 30	.....	.....	1 43	.....	.....
Dyer	M.	12 77	.....	7 00	.....	.....	3 30

* By Wm. C. Wyckoff, Esq., Secretary of the Silk Association of America.
† Lower figures are given for wages of children in England.
‡ Not separately employed under such designations in Europe.
§ Hand-looms are more used than power-looms in Europe; the reverse is true here. Statistics from Europe do not distinguish the two classes.
‖ Systems of employment here and in Europe differ materially.

A STATEMENT IN REGARD TO WAGES AND THE COST OF LIVING AT LANCASHIRE, ENGLAND, AND IN MASSACHUSETTS.

(By Hon. Carroll D. Wright, Chief of the Bureau of Statistics of Labor of Masachusetts.)

In the following comparison as to wages and cost of living in England and Massachusetts, a family of two adults and three children in each country is supposed to consume the same quantities of the same articles; that is, to be placed on equality as to scale of living, clothing and sundries not being included in either case. Each family is supposed to consist of a four-loom cotton weaver, with wife and three children, two of the latter working in the mill. In neither case is the wife supposed to work. The English weaver is a Lancashire operative, working 56 hours per

week, and his two working children are half-timers. The Massachusetts weaver works 60 hours per week, and his two working children are employed 32 weeks in the year. The wages of the English operatives are based upon the rates given in the report of Albert D. Shaw, United States Consul at Manchester, England, transmitted December 1st, 1881, to the Department of State. The wages of the Massachusetts operatives are based upon the average rates paid in the State, January 1st, 1882; the weekly wages of the children being their average weekly wages for the entire year, that is, one fifty-second of their total yearly earnings.

The Massachusetts weaver earns per week	$5 64
Two children in weave-room each average per week, $2.33	4 66
Total income per week of the family	$10 30
The Lancashire weaver earns per week	$5 28
Two children in weave-room, half-timers, each per week, $0.84	1 68
Total income per week of the family	$6 96

Excess of weekly income in Massachusetts, $3.34.

Each family is supposed to consume the following, the same being the weekly subsistence of an English operative's family of the size under consideration, presented in the Progress of Manchester, by D. Chadwick, revised by Dr. Watts, and quoted by Leone Levi, in Work and Pay (London, 1877,) p. 129. The English prices are based upon rates current in Lancashire from the report of Consul Shaw, before alluded to, December, 1881, and from other official sources. The Massachusetts prices are average rates current in said State January 1st, 1882.

Articles and quantities consumed per week.	Cost at retail in Lancashire, England.	Cost at retail in Massachusetts.
Bread, 8 four-pound loaves	$1 20	$1 28
Corn meal, half peck	22	22
Flour, 6 pounds	26	27
Fresh meat, 5 pounds	95	80
Bacon, 2 pounds	36	40
Potatoes, 40 pounds	40	84
Milk, 7 quarts	42	42
Vegetables	12	12
Coffee, Java, half pound	16	16
Tea, quarter pound	12½	15
Sugar, 3 pounds	24	30
Rice, 2 pounds	08	20
Butter, 1 pound	30	35
Molasses, 1 quart	12	16
Soap, 1½ pounds	10	10
Coal	36	62½
Oil	12	10
Rent, five rooms	1 20	1 50
Totals per week	$6 73½	$7 99½

That is to say, it would cost the family in Lancashire to live, without sundries and clothing	$6 73½
While the family in Massachusetts consuming the same things and same quantities would expend	7 99½
Extra expenses in Massachusetts per week	$1 26

We have previously shown the excess of weekly income in Massachusetts to be $3.34, and, therefore, deducting therefrom the extra expense of living, there remains a net excess of income per week in favor of Massachusetts of $2.08. Out of the total weekly income the Lancashire family would have for sundries and clothing (after providing for the items of expenditure contained in the foregoing table) the sum of 22½ cents, while the Massachusetts family would have for the same purpose $2.30½.

It should be remembered that the items of subsistence quoted are those actually consumed by a Lancashire family of the size named, and, in the comparison, the Massachusetts family is supposed to consume precisely the same articles and quantities, no allowance being made for any change in the style of living. It will be seen that the wages of the children vary more than those of the adults, and that this variation, being in favor of Massachusetts, is an important element in producing the excess of weekly income shown in that State. The wages of the children should, however, be included in the earnings of each family, as these wages are the saving factors of the income product both here and in Lancashire, it being nearly impossible to support a family containing more than three members in either locality from the earnings, in this industry, of the father only. Should the wife work in the mills and her earnings enter into the comparison, the relative position of the families as to excess of income would not be materially changed, as the wages of adult females in the two countries do not vary more than those of adult males.

We also present a comparison between the condition of a Blackburn cotton-spinner and that of a Massachusetts cotton-spinner, prepared in the same manner and on the same basis as that taken for the weavers :

The Massachusetts mule-spinner earns per week	$10 09
Two children, frame-tenders, average per week $1.85	3 70
Total income per week of the family	$13 79
The Blackburn mule-spinner averages per week	$7 80
Two children, little tenders, half-time each, per week, $0.96	1 92
Total income per week of the family	$9 72

Excess of weekly income in Massachusetts, $4.07.

Net excess after deducting $1.26, the extra weekly expenditure of the family in Massachusetts, $2.81. The family of the Blackburn spinner would have for sundries and clothing, after providing for the items specified in previous table, $2.98½, while the Massachusetts family would have for the same purpose, $5.79½.

CHAPTER IV.

WAGES AND PRICES.

EXTRACT FROM AN ARTICLE IN THE PRINCETON REVIEW, JULY, 1882, BY HON. C. D. WRIGHT, CHIEF OF THE MASSACHUSETTS BUREAU OF LABOR STATISTICS.

The question being asked by the wage-receivers all over our country to-day is, whether they are being paid the proper proportion of the results of production; and this question is asked with an anomalous condition existing, which is, that the cost of living has advanced, and is advancing, at a more rapid rate than the rate of wages. Strikes alone indicate this, for, as a rule, the strike, if honestly entered into, is simply the crude way of announcing to employers and the public that the cost of living has increased beyond the rate of wages. This condition, we say, is anomalous, for the industries of the country are very generally prosperous, and labor is very generally employed; and it is also anomalous for the reason that while wages, as a rule, keep pace with prices, there is now such difference between wages and prices that, the workingman, seeing prosperity on every hand, wonders at finding himself falling behind in his household accounts.

In view of these considerations, the value of facts relating to wages, prices and profits is readily seen; but their highest value is brought out by the comparative method. The year 1860 is a good starting-point in such comparison, because wages and prices then were low and bore quite equitable relations to each other, and because it represents *ante-bellum*. * * * The year 1872 was the last year of the period of prosperity after the war. The year 1878 was the first year of prosperity after the panic of 1873. Thus these years represent important epochs in the history of wages. * * * In general, the condition

as to wages and prices in 1860 and 1878, may be stated as follows: The average weekly wages of workingmen in manufacturing and mechanical industries in Massachusetts, allowing for the advance in the cost of living, were ten per cent. higher in 1878 than they were in 1860, no account being made of the fact that the wages in 1878 were paid for fewer hours of labor per week, in many industries, than were required in 1860. This statement relative to Massachusetts is fairly indicative of conditions in all manufacturing communities. * * * From 1860 to 1878 there was an average increase of wages of 24.4 per cent.; of prices of 14.9 per cent. From 1878 to December, 1881, there was an average increase in wages of 6.9 per cent., and in prices of 21 per cent.; and covering the whole period of twenty-one years, there was an average increase in wages of 31.2 per cent., and in prices of 41.3 per cent. That is, between 1860 and 1881 the workingman has suffered a reduction of ten per cent. in the purchasing power of his wages, and this between a dead-level year and one of general prosperity.

What reason is there for this present disparity between wages and the cost of living, and will the disparity continue? These are questions which will not only interest the economist, but are of vital importance to the wage-receiver. * * * I believe the present state of things, by which the workingman is suffering from a reduction of ten per cent. since 1860, is temporary, and that the truer and more economical conditions shown relative to the first years of the revival of trade will obtain for the greater part of the present period of prosperity. * * * In some industries wages are being reduced and will undergo further reduction for proper reasons, but, on the whole, the action of the industrial forces of the United States is tending to elevate rather than lower wages, even as they have been raised in actual amount, although just at present the cost of living shows that a reduction in purchasing power of wages received has taken place. It is a popular belief that wages advance, although tardily sometimes, with a rise in prices. This is not true as a matter of logical sequence, but merely of accident. For we accept the doctrine that wages are paid to labor out of the product of labor, and that the employer pays such wages only as he hopes or reasonably expects to get back in profits. So wages and profits may be low and the prices of commodities high. This is the real situation at the present time. * * *

Besides the influence which expected profit on production may have

in establishing the rate of wages, the number, even if small, of workmen out of employment has a very great influence in determining the rate the employer is willing to pay. For instance, if in a community where five thousand operatives are employed there are two or three hundred unemployed, the rate at which the latter are willing to work in order to secure situations often determined the rate paid to those employed, on the ground that their places can be supplied at such rate. This influence, together with that of small margins of profits in most industries at the present time, has kept wages from advancing in proportion to the cost of living; and short crops, in some instances followed by speculation in food products generally, have driven prices of the necessaries of life to very high figures. * * * *

To what influence shall the workingman turn to secure an equitable adjustment of his wages relative to his cost of living? I know of but one, and that is within himself. * * * The workingman must come to the assistance of general causes by putting himself at the best as to skill, faithfulness, temperance—and by temperance I mean the lopping off of all superfluous and harmful habits and expenditures, and turning the proceeds from such temperance into the work of bringing up his family and himself to the highest standard the talents given him will allow. * * * * * *, * *

The employers of labor are to some extent becoming imbued with the truth, that they are important, if not the most important, agents of civilization, in bringing to higher conditions and to skilled ranks the lower grades of workers. As soon as they generally take in this truth they will more fully appreciate that other: that well-paid labor insures the best protection against industrial reverses. No forced adjustment of the unequal bearing of prices on wages can be undertaken with any hope of success. All past attempts at regulating wages by law have been failures and worse. Neither free-trade nor protection can avail anything in the premises. The only solution of the wage question, so far as this age is concerned and under existing conditions, lies in intelligence and skill in labor. It is the employment of something more than mere muscular force which brings a reward higher than the measure of subsistence; while the expenditure of muscular force only never did, and probably never will, earn anything more than the bare essentials to existence. This is the law of industrial life, and on the whole it is well; for without such a law

labor would not rise in dignity and lucrativeness, and there would be no spur or incentive to progress.

The debt-burden is one of the severest growing out of the wage system which wage laborers are called upon to bear; and in this direction legislation can do much. In the general agitation for national bankruptcy laws no one hears of a demand for the relief of insolvent workingmen. All our States have insolvent laws, but on account of limitations their beneficent provisions cannot be used for the relief of wage-receivers overburden with debts.

Men engaged in large enterprises when unfortunate can, if they owe a certain amount specified by law, usually about $200, secure the benefits of the insolvent laws of the several States, or of a national bankrupt law when one is in force. The workingman, unless he owes the minimum amount specified by law, say $200, and can pay the expenses of proceedings in insolvency, another hundred, has no way of adjusting his affairs, which, though small, give him as much and even more trouble than financial disaster brings to his employer. At least one-tenth of our workingmen are in debt. Here, then, is, as I have said, one of the heaviest burdens of laborers. They see a national bankrupt law passed for the relief of insolvent debtors, for the reason that the interests of all demand that men, when overtaken by financial misfortune, shall not be deprived of their usefulness on account of a permanent burden of debt, but shall be able to begin anew those enterprises which sustain the industries of the country. The workingman admits the soundness of this reasoning, but feels that the same logic should enable him to free himself from debt and start anew with the manufacturer and merchant, whose success so largely depends upon his ability to consume the products of the nation. A man overburdened with debt, having a family dependent upon his exertions, and whose income is too small to secure the reasonable support of that family, is not the best citizen civilization ought to produce.

CONCLUSIONS DRAWN FROM STATISTICS.

Mr. Charles F. Pidgin, statistician of the Massachusetts Bureau of Labor Statistics, in a recent article in *Capital and Labor*, draws the following "conclusions from statistics:"

1. In the majority of cases, workingmen do not support their families by their individual earnings alone. 2. Ten per cent. of the wage-workers are found to have wives at work, earning on an average $101.32. 3. The average number of persons dependent for support upon each male wage-worker is 4.84. 4. Fathers rely, or are forced to depend, upon their children for from *one-quarter to one-third* of the entire family earnings. 5. Children under fifteen years of age supply, by their labor, from *one-eighth to one-sixth* of the total family earnings. Twenty-three per cent. of the male wage-receivers own their houses; of these, forty-four and a half per cent. are encumbered with more than fifty per cent. of the value. 6. The average amount paid for rent by the wage-worker is, for males, $109.07; for females, $93.62; or from twenty-two to twenty-five per cent. of the yearly wages. 7. The earnings of salaried people are eleven per cent. more than their cost of living; while, among wage-laborers, the earnings (exclusive of the earnings of minors) are less than the cost of living. 8. The families containing the greatest number of child workers occupy the most crowded rooms and the inferior class of tenements. 9. Judging from the proportionate outlay for dress, as regards entire expenses, there is no evidence that the workingmen, in obedience to fashion, indulge in an excessive or disproportionate expenditure. 10. We find no evidence or indication that a majority of workingmen spend large sums of money extravagantly or for bad habits. 11. As regards subsistence, rents and fuel, the workingmen's families pay therefor larger percentages of their income than do workingmen's families, with like incomes, in Germany or other European countries. 12. As regards clothing and sundry expenses, our workingmen's families pay therefor smaller percentages of their income than do workingmen's families, with like incomes, in the countries mentioned above. 13. More than *one-half* of the *families* save money, less than one-tenth are in debt, and the remainder make both ends meet. 14. Without children's assistance, other things remaining equal, the majority of these families would be in poverty or debt.

COST OF LIVING.

The following Table shows the Average Retail Prices, in cents, of the Articles enumerated, at the Localities named, from September 1st, 1881, to July 1st, 1882, reported each Month to the President of the Green Glass Bottle and Vial Blowers' League, Eastern Division of the United States.

LOCATION.	Sugar, per pound.	Coffee, per pound.	Tea, per pound.	Butter, per pound.	Cheese, per pound.	Molasses, per gallon.	Crackers, per pound.	Pork, per pound.	Bacon, per pound.	Lard, per pound.	Ham, per pound.
Millville, N. J.	9, 10, 11	17, 22, 32	70	25, 30, 32	14	80	12	14	15	15	16
Salem, "	9, 11, 12	18, 25, 35	88	35, 38	17	50, 65, 80	10	13	.....	16	16
Clayton, "	8, 11, 12	18, 25, 35	88	35, 40	17	50, 65, 80	10	13, 16	.....	16	16
Glassboro, N. J.	7, 9, 10	15, 20, 28	35, 75	35	16	50, 90	10	12	12	14	15
Williamstown, N. J.	9, 11, 12	22, 25, 28	60, 80	42	16	60, 80	10	12	13	14, 15	18
Bridgeton, "	6, 10	15, 35	40, 80	25, 35	16	50, 75	10	12, 13	.....	14, 15	14, 15
Winslow, "	10, 11, 12	20, 35	40, 60	38	18	.....	14	14	15	15	17
Camden, "	8, 10, 11	25, 28, 30	40, 60, 80	25, 35, 40	18	60, 90	10, 12	14	14	15	16
Port Elizabeth, "	9, 10	22, 28	22, 80	35	16	60, 70	9	12	14	13, 14	13, 15
North Clayton, "	9, 10, 11	18, 30	40, 60	25, 50	18	86	12	14, 16	.....	12, 16	14, 17
Tansboro, "	12	25	64	45	16	80	12	12	.....	15	15
Woodbury, "	8, 10	15, 23	40, 60	50	22	80	12	10, 16	10	16	18
Brooklyn, N. Y.	9, 10, 10½	20, 30	25, 50, 80	30, 35, 40	18	60	8, 10	14	14	15	15
Baltimore, Md.	8, 12	20, 30	60, 150	28, 35	18	40	10	15	12	14	20
Philadelphia, Pa.	8, 10, 11	15, 28, 35	40, 60	50	22	80	12	10, 16	10	16	12, 20
Stroudsburg, "	9½, 12	20, 40	40, 80	28	15	65	10	10	10	16	18
Honesdale, "	8, 12	20, 32	50, 150	22, 25	25	60, 80	8, 12	10, 15	12, 15	12, 15	12, 15
Poughkeepsie, N. Y.	9, 10, 10½	24, 20, 30	30, 40, 50	25, 34, 38	16	50, 80	10, 12	12, 15	12	15	14, 17
Clyde, "	9, 10, 11	25, 30, 35	50, 100	25	14	60, 80	8, 10	10, 14	12, 16	14	12, 16
Lancaster, "	10, 12	25, 30	80	34, 36	11	.....	10	10	.....	15	14
Lockport, "	8, 10	20, 30	35, 75	30	18	40	8, 10	12	12	14	12, 14
Binghampton, "	10	27	50	25	15	75	8	14	.....	16	17
Williamsburg, "	9, 10, 10½	25, 30	25, 50, 80	30, 35, 40	18	60	8, 10	14	14	15	15
Scranton, Pa.	10, 12½	29	40, 46	28, 32	16	100	10, 12	13	13	15	17
Ellenville, N. Y.	.....	20, 25, 35	70, 100	20, 25, 30	16	30, 50, 60	10, 14	8	16	14	16, 17
Bridesburg, Pa.	8, 11	15, 35	40, 60	50	22	80	12	10	10	16	18
Montreal, Canada	8, 10	25, 40	40, 75	18, 26	18	60	8, 12	12	13, 14	16	15, 16
Hamilton, "	10, 15	40, 50	50, 100	30, 35	25	100	10, 20	12, 15	12, 15	15, 18	15, 20

COST OF LIVING—Continued.

The following Table shows the Average Retail Prices, in cents, of the Articles enumerated, at the Localities named, from September 1*st*, 1881, *to July* 1*st*, 1882, *reported each Month to the President of the Green Glass Bottle and Vial Blowers' League, Eastern Division of the United States.*

Eggs, per dozen.	Beef, per pound.	Potatoes, per bushel.	Flour, per hundred.	Corn, per bushel.	Soap, per pound.	Oil, per gallon.	Coal, per ton.	Wood, per cord.	House rent, per month.	Flannel, per yard.	Muslin, per yard.	Calico, per yard.
28	22, 10	....	380, 450	....	7	18	600	500	700	10, 11, 12	10, 11	
28	10, 16, 21	100	350, 488	90	6, 7, 9	20	500	800	800	45, 55, 75	9, 10	7, 10
32	10, 16, 22	100	350, 488	60	6, 7, 9	20	500	500	800	45, 55, 75	9, 10	7, 10
28	10, 18, 20	100	350	100	6, 10	18	675	450	.....	10, 14, 30	6, 14	7
25	12, 22	130	350	85	6, 8	12, 25	750	450	300, 800	35, 45, 70	9, 12	7, 10
22, 28	10, 18	100	350	95	5, 8	.....	550	400, 500	800, 1200	12, 76	5, 6, 7, 8	5, 8
.....	10, 18	120	350, 412	85	8, 10, 12	25	650	500	175, 1000	.....	10, 20	8, 10
30	18, 25	140	bbl.1025	....	5, 8	9, 12	650	.....	1000, 1600	12, 40	6, 18	5, 12
16	10, 22	50	400, 425	75	4, 10	.....	550	350	200, 500	25, 60	5, 8	
25, 35	18, 25	....	400	....	5, 10	24	750	.....	900, 1100	28, 75	8, 10	5, 8
20	20	130	400	110	7	28	650	275	700	35, 45, 50	10, 11, 14	8, 10
20	8, 25	55	320	....	6	16						
25	8, 16, 25	100	200, 250	....	.....	8, 14	500	1000	600, 800, 1200, 1500	20, 100	6, 18	8, 10
24	12, 22	240	450	....	5, 8	20	600, 725	700	800, 1600	40, 50	10, 12	6, 8
35	18, 20	120	500	85	5, 9, 10	20	600	1050, 1200	1000, 1600	40, 60	8, 20	4, 12
25	16, 18, 25	55	350, 400	....	6	16	450	275	500, 1000	25, 45	9, 13	8, 10
25	12, 16	75	400, 550	90	10	15	350	250	800	25, 150	9, 15	8, 18
30	12, 18, 20	125	400, 475	100	4½, 6	12, 25	550	600	700, 1600	6, 25	.....	5, 12
15	10, 14	50	325, 600	75	12½	15, 25	475, 500	350, 500	600, 1000	30, 50	8, 15	6, 8
28	12, 14	....	450	....	7, 10	20	545	.....	.....	.....	13	10, 12
16	12, 14	120	375, 400	....	5, 7	10	575, 600	400	800	25, 40	8, 10	4, 5
24	16	150	425	120	8	12	460	.....	1300	30, 125	6, 25	5. 10
25	8, 16, 20	100	225, 235	....	.....	8, 14	500	1000	600, 800, 1300, 1500	45, 75	9, 10, 12	7, 10
28	20, 22	208	450	91	8	12, 25	125, 250	300	1000, 1500	.....	.....	6, 11
20	.....	80	350, 450	....	8	16, 20	.....	.....	.....	.....	6, 10, 14	5, 9
20	18, 25	55	320	....	6	16	450	.....	800	25	20	12
16	13, 15	80	300	50	.....	32	550	200, 600	600, 1000	.....	4, 15	
18, 20	10, 12	100	325, 350	100	18, 20	30	675, 700	600, 650	.....	40, 100	10, 20	10

PART II.

SUGGESTIONS IN BEHALF OF WORKINGMEN.

CHAPTER 1.—THE CONTRACT SYSTEM.

CHAPTER 2.—THE TRUCK SYSTEM.

CHAPTER 3.—THE FACTORIES ACT OF ENGLAND.

CHAPTER 4.—THE EMPLOYERS' LIABILITY ACT OF ENGLAND.

CHAPTER 5.—SOCIETY OF THE FAMILISTERE AT GUISE, FRANCE.

CHAPTER 6.—THE WORKINGMEN'S INSTITUTE AT MILLVILLE, N. J.

CHAPTER I.

THE CONTRACT SYSTEM.

The application of labor-saving machinery and the grouping of workmen in large establishments have resulted, not only in the subdivision of labor and largely in changing the old method of paying wages for time-work to that for piece-work, but also in the introduction of what is known as contract work, the practice of a single workman contracting to do specific jobs and employing other workmen to aid him in completing the work. The effect in those establishments, where this custom has become prevalent, has been to make mere specialists of a large number of workmen, who have had no opportunity of becoming thorough mechanics, to destroy their individuality and to separate the employer and employed from each other, causing the mutual distrust and want of confidence now so common. Having little or no intercourse with each other, this want of sympathy is to be expected. The employer, however kindly he may feel disposed towards his employes, is regarded by them only as a person who seeks to make the greatest amount of profit by payment of the lowest possible wages; while he, having no intercourse with his workmen, ceases to feel in their welfare the interest essential to secure their confidence and respect, without which, no harmony between employer and employed is possible. The system of contract work, under which one workman is enabled to derive a profit from the labor of his fellow employes, gives the contractor and employer a divided interest in the result. As the contractor's profits consist of the difference between the sum he receives on his contract and the amount he pays for his help, it is advantageous for him to fix wages at the lowest possible point. The workmen themselves become divided in interest, jealousies arise and a united action to maintain a permanent standard of wages is impossible. Consequently, in those establishments where the contract system prevails, the average wage is much lower than elsewhere.

The contract system is general in our iron-ore mining districts,

where the wages of seven-eighths of the miners are not much higher than those of common laborers. The "contractors" constitute about one-seventh of the workmen and realize an annual income ranging from $1,000 to $3,000, or an average of $1,500; while the ordinary miners get but $1.50 a day, averaging about $425 during the year. The daily wages paid for mining, if equitably divided, would amount to about $1.94 for each miner; but, under the contract system, seven-eighths receive nearly a half dollar less per day than they would if they were employed in the ordinary way. Many complain bitterly of this condition of things, because it enables the few, who, by reason of their education and force of character, should be leaders and helpers, to take advantage of the many and become their extortioners.

The evils resulting from the contract system are aggravated by the fact that the truck system still exists among the miners in its most odious form. This is not surprising, since the interests of the workmen are opposed, and those who profit by contract work, seek to discourage all agitation which may lead to reforms affecting their own gains.

CHAPTER II.

THE TRUCK SYSTEM.

The custom of paying wages in merchandise, instead of lawful money, so long prevalent in many parts of the State, we are glad to say, has now been generally discontinued, except in a few localities. In the counties of Morris, Warren, Sussex, Somerset and Passaic the "store system" is not yet a thing of the past, but is still made use of especially by those connected with the mining companies, the "agents," to enrich themselves and to deprive the laborers of a portion of their hard-earned wages. The reports from the workmen show that the same results follow there which have characterized this method of extortion everywhere: "Store pay and high prices of living;" "we receive our pay monthly and have to deal our living out at the company's store, where they charge ten per cent. higher than elsewhere."

Under the so-called "truck system" workmen have been deprived of the privilege of spending their wages to the best advantage, and frequently compelled to give from twenty-five to fifty per cent. more for their household supplies than would have been the case had they been paid in cash and permitted to purchase where they preferred. The evils of this system have been so often described in previous reports of this Bureau, and so universally condemned by all who have become acquainted with it, that we deem a repetition of the arguments against it needless. Nevertheless, a brief statement of the difficulties and hindrances which have met workmen in their repeated attempts at its abolition may prove interesting and instructive.

The truck system originated with our early manufactures and with their development grew to such an extent that it seemed to have become firmly established in this State. Employers used every means to suppress agitation on the part of those who objected to be paid in "store trade," and in a great measure succeeded, since the mass of workmen, who had been accustomed to no other "system," felt,

because of their want of unity, their inability to rid themselves of the evil by refusing to work. The Legislature was petitioned to enact laws which would secure the payment of wages in lawful money. But, though individual legislators from time to time advocated such measures, nothing was accomplished for many years, as employers were always ready to oppose them in force, and met any agitation on the subject by employes with discharge from employment, while little attention was given to the matter by the general public. Gradually, however, outside merchants established stores near the factories, and, anxious to compete for the trade of the workmen, began to encourage them in their efforts. The question was thus made one of public concern, and in the year 1864 an "An act for the better securing of wages to workmen and laborers in the State of New Jersey" became law, being approved April 14th, 1864.

This act provided that it should not be lawful for any iron master, foundryman, collier, factoryman, employer or company, their agents or clerks, to pay the wages of workmen or laborers by them employed in either printed, written, or verbal orders, except for the payment of money, upon any storekeeper or other dealer in merchandise; any such persons paying in such orders should forfeit the same, as if no such orders had been given. There were excepted from the provisions of this act the counties of Morris, Sussex, Somerset, Middlesex, Monmouth, Burlington, Warren, Ocean and Hunterdon, and it was further provided, that in the county of Essex it should not take effect until January 1st, 1865.

In 1877 this law was amended by the following act, which provided: "1st. That it shall not be lawful for any person or corporation in this State to issue for payment of labor any order or other paper whatsoever, unless the same purport to be redeemable for its face value in lawful money of the United States by the person giving or issuing the same; provided, however, nothing in this act contained shall be held to prevent any employer from making any deduction for money due him from any laborer or employe. 2d. That if any person or corporation shall issue for payment of labor any paper in violation of the first section of this act, he, she, or they shall be guilty of a misdemeanor, and upon conviction thereof shall be fined in any sum not to exceed five hundred dollars at the discretion of the court."

These acts, as will be seen, only applied to orders on stores. The act of 1864 in no wise interfered with the payment of wages in store

goods and merchandise; in fact, it had no application whatever to most places where the evil of store pay was the greatest. There was no adequate penalty for its violation. Only a civil suit by a workman against a rich employer, with the certainty of being deprived of employment, gave but little protection to a poor man. Such a man was more likely to permit the evil he complained of to remain than to attempt to enter into a contest in which he was sure at the outset of being worsted. Another defect was that the act only applied to one-half of the State. Employers also evaded the act of 1877 by simply making their orders and due-bills, given for payment of money, redeemable in five years after date, but acceptable at the counters of their store on presentation for merchandise. Both of these laws, therefore, were ineffectual in giving the relief sought.

In the year 1880 a more comprehensive act was introduced under the auspices of the united labor organizations of the State. After being modified in important particulars it became a law on March 12th, 1880. It is entitled: "An act to secure to workmen the payment of wages in lawful money." It provides, "That any glass manufacturer, iron master, foundryman, collier, factoryman, employer, cranberry grower or his agent or company paying to the said workmen or employes, or authorizing their clerks or agents to pay the wages, or any part thereof, in either store goods, merchandise, printed, written, verbal orders, or due-bills of any kind, except as aforesaid, shall forfeit the amount of said pay or any part of wages of said workman or employe given in store goods, merchandise, printed, written, verbal orders or due-bills of any kind, and the same not to offset against the wages of said workman or employes, but he or they shall be entitled to recover the full amount of his or their wages, as though no such store goods, merchandise, printed, written, verbal orders or due-bills had been given or paid; and no settlement made with such employer shall bar such action until after a lapse of one year from such settlement."

It also makes the offending against the act a misdemeanor and punishable by fine or imprisonment. But the following proviso practically defeated the object of the whole act: "But nothing in this act shall apply to or affect any private individual giving orders as aforesaid on a store in the business or profits whereof he has no interest, directly or indirectly, or to the offset of any debt due from such workman to any glass manufacturer, iron master, foundryman, collier,

factoryman, employer or company where said debt is voluntarily contracted by the employe, or the payment of any debt due from such workman to any glass manufacturer, iron master, foundryman, collier, factoryman, employer or company."

The object sought by the passage of the law was to secure the payment of wages in lawful money; but this proviso permitted employers to offset wages against debts owed to them by their workmen, who, only being paid at long intervals, were compelled to obtain credit in the meantime in order to live. This credit could only be obtained at the stores in which the employers were interested. The debt thus contracted was only apparently voluntary, and the trade "forced."

Having failed to find relief through law, no other remedy was left to the workmen but organized resistance. In the spring of 1882, a strike was begun at Glassboro by the employes in the glass works of Whitney Brothers for weekly payments of wages in full. This demand, after a lock-out of ten days, was conceded by the firm, and the example was followed, in the summer, by all the South Jersey firms where the system of "store-pay" prevailed. The success of this strike is, no doubt, owing, in a great degree, to the prosperous condition of the glass trade at the time; but the unity of sentiment existing among the workmen and the active sympathy they received from the adjacent towns also contributed to bring about the result.

It is hoped that the method of weekly payments will be continued. If so, there is small probability that the evils growing out of "forced trade" will be restored, for the employes, although they largely continue to deal at the employers' stores, having ready money, can exercise a discretion in regard to the price that they are willing to pay for goods. But should a revulsion in trade take place and any considerable body of workmen be thrown out of employment, whereby their power as an organized body would be weakened, there is nothing to prevent the employers from re-establishing the old order of things—store-pay and forced trade. We can see no way of preventing this result or of averting a strike, which will be the consequence thereof, except by the repeal of the proviso in the law of 1880, referred to above, which permits the store accounts of employes to be offset against their wages, as this power of the employer is the sustaining prop of the whole truck system. The assertion that this provision is necessary in order to protect the employer in his right to collect a debt from the workmen, whom he has given credit while out of employ-

ment or in case of sickness, has no force, because it makes an exception of employers, while other merchants, who credit workmen in every other part of the State, have no power to attach wages, but must depend on the ordinary modes of law to collect their debts. In both cases credit is only given because the creditor hopes, by this means, to make profit from the trade of the workmen. The provision in the law referred to is simply an endorsement of the ridiculous assumption that, because one man employs another, the employe is under obligations to spend his earnings with his employer. This claim is based on the idea that the employer, as such, is a disinterested person, and that the privilege of working is a great boon to the laborer. This, few workmen are willing to concede, especially when by it is meant that they must barter their earnings at their employer's store, which he operates solely for his own advantage, without any pretence of selling at customary rates. The capitalist is no more a disinterested public benefactor than the workman. Each contributes his share to advance the industry in which he is engaged, not as a favor to the other, but primarily to benefit himself.

CHAPTER III.

THE FACTORIES ACT OF ENGLAND.

EXTRACT FROM AN ARTICLE IN VOL VIII. OF THE ENCYCLOPÆDIA BRITANNICA, BY E. ROBERTSON.

"The long series of Factory Acts, culmininating in the Home Secretary's bill of the present session (1878,) constitutes one of the most important chapters in the history of modern English legislation. The acts assert the right of the State to control the industrial organizations which depend upon the labor of women and children. As yet the freedom of the adult male laborer has been held sacred from the interference of the legislature, but it is necessarily involved, to some extent, in the protection exercised over presons whose co-operation is necessary to their work. The gradual rise of the important principle that, in the interests of the moral and physical well-being of the community, the labor of women and children should be restricted by law within reasonable limits, may be seen by a glance at the factory bills introduced in Parliament since the beginning of the century. * * *

"By these various enactments, the State has emphatically taken under its protection the whole class of children and young persons employed in manufacturing industries. It has done this in the name of the moral and physical health of the community. The slow, but steady advance of the principle of interference may be traced in the titles of the successive statutes. It is needless here to discuss the wisdom or policy, which has now received *en bloc* the stamp of legislative approval. The substantive law of the Factories Act has been re-enacted in a measure laid before Parliament in the present session, which has already (May, 1878,) passed both Houses. In the debates in the Commons, the only question of principle seriously raised was whether the freedom of adult women ought to be curtailed by legislative interference. Mr. Fawcett's motion in the negative was rejected by a large majority.

"The following outline will give some idea of the scope of the law relating to factories and workshops consolidated by the new measure:

"Part I. contains the general law relating to factories and workshops under the following heads—(1.) Sanitary Provisions; (2.) Safety; (3.) Employment and Meal Hours; (4.) Holidays; (5.) Education; (6.) Certificates of Fitness for Employment; (7.) Accidents.

"(1.) Under the first head, the buildings must be kept in a clean state and free from effluvia arising from any drain, privy or other nuisance.

"(2.) The second contains provisions for the fencing of dangerous machinery and restrictions in the employment of children and young persons in cleaning, etc., machinery in motion.

"(3.) A child, young person or woman shall not be employed, except during the period of employment fixed as follows:

"(*a.*) In textile factories.—*For young persons and women*, the period shall be from 6 A. M. to 6 P. M. or 7 A. M. to 7 P. M.; on Saturday, from 6 A. M. till 1 P. M. for manufacturing processes, and 1.30 for all employment, if one hour is allowed for meals; otherwise at 12.30 and 1. Or, if the work begins at 7 A. M., it shall end on Saturdays at 1.30 and 2 P. M., respectively. For meal times, two hours, at least, on week days, and on Saturdays half an hour must be allowed. Continuous employment, without a meal time of at least half an hour, not to exceed four hours and a half.

"*For children.* Employment to be for half time only (in morning or afternoon sets, or alternate days.) The work-day is the same as above. A child must not be employed for two successive periods of seven days in the same set, whether morning or afternoon, nor on two successive Saturdays, nor on Saturday in any week if he has already on one day been employed more than five hours and a half. Nor shall a child be employed on two successive days, nor on the same day in two successive weeks.

"(*b.*) In non-textile factories.—*For young persons and women.* Period of employment same as before, ending at 2 P. M. on Saturdays; meal times not less than an hour and a half, on Saturday half an hour; continuous employment, without a meal, not to exeeed five hours. These regulations also to apply to *young persons in workshops.*

"*For children.* Half-time arrangements, generally, the same as before; continuous employment, without a meal, not to exceed five hours.

"Women in workshops are subject to the same regulations as young persons, if young persons or children are employed; if not, the period of employment for a woman shall be from 6 A. M. to 9 P. M. (on Saturday, 4 P. M.) Absent times for meals must be allowed to the extent of four hours and a half (Saturdays, two hours and a half.)

"The employment of young persons or children at home, where the work is the same as in the workshop or factory, but no machine power is used, is also regulated, the day being fixed at 6 A. M. to 9 P. M.; for children, 6 A. M. to 1 P. M., or 1 P. M. to 8. Meal times in factories or workshops must be simultaneous, and employment during such meal times is forbidden. The occupier of a factory or workshop must issue a notice of the times of employment, etc. No children under ten shall be employed.

"(4.) The following holidays shall be allowed to all protected persons: Christmas Day, Good Friday (or next public holiday,) and eight half-holidays, two of which may be commuted for one entire holiday.

"(5.) Occupiers must obtain a weekly certificate of school attendance for every child in their employment.

"(6.) Medical certificates of fitness for employment are required in the case of children and young persons under sixteen. When a child becomes young person a fresh certificate is necessary.

"(7.) Notice of accidents, causing loss of life or bodily injury, must be sent to the inspector and certifying surgeon of the district.

"Part II. contains special provision for particular classes of factories and workshops, such as bake-houses, print works, bleaching and dyeing works. The third schedule to the act contains a list of special exceptions, too numerous to be given in detail.

"Part III. provides for the administration of the law. Two classes of officers are to be appointed by the Secretary of State, viz.: (1.) Inspectors, charged with the duty of inspecting and examining factories and workshops at all reasonable times, and of exercising such other powers as may be necessary to the carrying out of the act; and (2.) Certifying Surgeons, to grant certificates of fitness under the act. Numerous other sections relate to penalties and legal proceedings.

"Part IV. defines the principal terms used in the act. 'Child' means a person under fourteen years of age; a 'young person' is between fourteen and eighteen; a 'woman' means a woman over eighteen. Other sections apply to Scotland and Ireland, with a temporary saving for the employment of children under ten and children over thirteen (lawfully employed at the time of the passing of the act.")

CHAPTER IV.

THE EMPLOYERS' LIABILITY ACT OF ENGLAND.

EXTRACT FROM AN ARTICLE ON "LABOR AND LABOR LAWS," BY J. E. DAVIS, IN ENCYCLOPÆDIA BRITANNICA, VOL. XIV.

"A recent important act of Parliament, the Employers' Liability Act, 1880, must be noticed. To render its provisions intelligible, it is necessary to state the general law on the subject of civil liability for negligence. A person who causes injury to the person or property of another is liable in damages to that person, and if the injury has resulted in death the right of action is extended to the representatives, on behalf of the widow or children, independent of any criminal liability incurred by the negligence. If the person who committed the negligent act is in the service of another, and the negligent act was committed in the course of the discharge of his duty, the civil liability extends to the master. This liability of the master is important to the injured person, because the servant is in most cases a much poorer person than the master. If they were equally able to pay damages, nothing would be gained by resorting to the master. But the liability of the latter was not, before 1880, extended to make the master responsible in damages if the person injured and the negligent servant were both in his service and both were performing the same kind of duty, a "common employment" as it has been termed, and if the master, so far from being guilty of any actual negligence himself, had employed a generally competent person and had provided him with the means of properly performing his duty. No vindication of the then law seems necessary, for whether the liability of employers to strangers is just or not, there is an obvious distinction between such a liability and responsibility where all parties are "rowing in the same boat," to adopt an expression used in one case, whether the injured person be a

servant or guest of the master. Both are volunteers, and both know that the master will not personally intervene. There does not appear to be any injustice in such a case in confining the liability to that of the servant personally guilty of the negligence, although a poor man. However, some apparently hard cases, especially arising out of accidents on railways, where, while a passenger could sue the company for negligence, an engine-driver's or a guard's remedy was limited to the person actually guilty of the negligence, led to the attention of Parliament being called to the subject.

"In 1877 a committee of the House of Commons, pointing out that the development of modern industry has created large numbers of employing bodies, such as corporations and public companies, to whom it is not possible to bring home personal default, and that there are other cases in which masters leave the whole conduct of their business to agents and managers, themselves taking no personal part whatever either in the supply of materials or in the choice of subordinate servants, reported thus:

"Your committee are of opinion that in cases such as these, that is, where the actual employers cannot personally discharge the duties of masters, or where they deliberately abdicate their functions and delegate them to agents, the acts or defaults of the agents who thus discharge the duties and fulfill the functions of masters should be considered as the personal acts or defaults of the principals and employers, and should impose the same liability on such principals and employers as they would have been subject to had they been acting personally in the conduct of their business, notwithstanding that such agents are technically in the employ of their principals. The fact of such delegation of authority would have to be established in such case, but this would not be a matter of difficulty. Your committee are further of opinion that the doctrine of common employment has been carried too far when workmen employed by a contractor and workmen employed by a person or company who has employed such contractor are considered as being in the same common employment."

"Three years afterwards the act in question was passed. By section 1, where personal injury is caused to a workman—

"(1.) By reason of any defect in the condition of the ways, works, machinery or plant connected with or used in the business of the employer; or, (2) by reason of the negligence of any person in the service of the employer, who has any superintendence entrusted to him, whilst in the exercise of such superintendence; or, (3) by reason of the negligence of any person in the service of the employer, to whose orders or directions the workman, at the time of the injury, was bound to conform and did conform, where such injury resulted from his having so conformed; or, (4)

by reason of the act or omission of any person in the service of the employer done or made in obedience to the rules or by-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf; or, (5) by reason of the negligence of any person in the service of the employer who has the charge or control of any signal points, locomotive engine or train upon a railway—the workman, or, in case the injury results in death, the legal personal representatives of the workman, and any persons entitled, in case of death, shall have the same right of compensation and remedies against the employer as if the workman had not been a workman of, nor in the service of, the employer, nor engaged in his work."

"Section 2 provides that a workman shall not be entitled, under the act, to any right of compensation or remedy against the employer in any of the following cases:

"(1.) Under subsection 1 of section 1, unless the defect therein mentioned arose from, or had not been discovered or remedied, owing to the negligence of the employer, or of some person in the service of the employer, and entrusted by him with the duty of seeing that the ways, works, machinery or plant were in proper condition; (2) under subsection 4 of section 1, unless the injury resulted from some impropriety or defects in the rules, by-laws or instructions therein mentioned; provided that when a rule or by-law has been approved or has been accepted as a proper rule or by-law by one of Her Majesty's principal Secretaries of State, or by the Board of Trade, or any other department of the government, under and by virtue of any act of Parliament, it shall not be deemed, for the purposes of this act, to be an improper or defective rule or by-law; (3) in any case where the workman knew of the defect or negligence which caused his injury, and failed, within a reasonable time, to give, or cause to be given, information thereof to the employer or some person superior to himself in the service of the employer, unless he was aware that the employer or such superior knew of the said defect or negligence."

"Compensation under this act, which extends to a railway servant and any person to whom the Employers' and Workmen's Act of 1875 applies, is enforced by action in the county court, after notice within six weeks of the nature and particulars of the claim, unless there was reasonable excuse for the want of notice in the case of death. The compensation is limited to three years' earnings, and the action must be commenced within six months from the occurrence of the accident, or in case of death within twelve months from the time of death.

"Neither in the United Kingdom nor abroad does the right to damages for breach of contracts override the general law as to offences, so that, if any of the parties do anything amounting to a criminal offence, a prosecution may follow, although a breach of contract is involved for which breach damages may be recovered."

CHAPTER V.

SOCIETY OF THE FAMILISTERE AT GUISE FRANCE.

CO-OPERATIVE ASSOCIATION OF CAPITAL AND LABOR.

In 1868, M. Jean Baptiste A. Godin founded at Guise, in the department of l'Aisne, France, his now famous Society of the Familistere,* a co-operative association of capital and labor, which at present possesses two works, one in France and the other in Belgium, and includes sixteen hundred and fifty-seven workmen and employes. It was formed for the purpose of promoting the progress of commerce and industry, both in agriculture and manufacture, in that district, and the development of whatever contributes to improve the material and moral condition of the workman.

M. Godin was especially qualified to make this practical attempt to solve a part of the social problem. The son of a workman, he in early life served his apprenticeship to manual labor, and thus became acquainted with the condition and needs of those who obtain their daily bread by the sweat of their brow. While making as journeyman the customary tour through France, during the early part of the present century, his attention was directed to the unsatisfactory condition of industry, the inadequate justice of the wage system, as well as the want of harmony in the social relations of the various classes in the communities through which he passed. After carefully examining many theories which were proposed as a remedy for this state of things, for this was the period when the study of social questions

* "The Association of Capital with Labor, being the laws and regulations of Mutual Assurance, regulating the Social Palace at Guise, France, by Jean Baptiste Andre Godin, the founder," translated from the French by Louis Bristol. Published and for sale by the New York Woman's Social Science Society, Room 24 Cooper Institute. Price 50 cents.

began to interest the leading minds of France, he became satisfied that the only solution was to be found in the principle of industrial association, as proposed by Fourier. Later in life, having begun a new industry in France—that of using cast instead of sheet iron in the manufacture of stoves—its success and the necessity of assistance in carrying on the enterprise gave him an opportunity of putting his theories to a practical test.

This was the origin of the association of the Familistere, a regularly constituted company, where capital enters into partnership with labor. To this its founder contributed the capital ($920,000), but the workmen who labor in the foundries form part of the association, and eventually will become owners of the entire business. They are not only paid wages, fixed by a committee of their own, ("syndicate of labor,") elected from each workshop, but also participate in the net profits, both commercial and industrial, the division being made ratably according to the wages and salaries earned during the year. Fifty per cent. of these profits is set aside to the credit of different funds, while the remainder is divided between capital and labor. Far from taking all profits for itself, capital comes in only in proportion to the amount of interest (five per cent.) received on the original investment, while labor obtains a share proportionate to salaries and wages earned. As the latter sum amounts to about $330,000, while the interest on the capital invested is only about $46,000, labor receives seven-eighths and capital one-eighth of the profits divided. But labor's share is not paid out to those entitled to it. Instead of the cash, the workmen receive "certificates of savings," the sums which they represent being placed to the holder's credit, becoming part of the capital of the association, and drawing interest. As this sum increases the amount of original capital invested by the founder decreases, and when the value of these "certificates of savings" has reached that of the original capital, the founder's interest in the business ceases, which passes into the hands of the workmen.*

*From the report of the "Committee of Supervision," made at the "regular general assembly of the Society of the Familistere de Guise," October 1st, 1882, we learn that during the short period which has elapsed since the organization the net profits realized have exceeded the sum of $410,000. $168,000 have been divided among the workmen and about $73,200 have been added to their savings. As the reserve fund has reached its legal limit of $92,000, it is proposed to apply the 25 per cent., heretofore used for this purpose, to increase the share of capital and labor from 50 to 75 per cent. of the net earnings.

But while the earnings of capital and labor are thus fairly apportioned, the spirit of industry and order is greatly strengthened by the agreeable and economical way of living provided for the employes. In France there has been established, in connection with the founderies, dwellings for about four hundred families, or twelve hundred persons—men, women and children—who work in the factories of the association. These dwellings form, not that number of separate houses, but a vast edifice, a palace in appearance, standing in the midst of parks and gardens. This is called the "Familistere," the name given to this "social palace" by its owner and founder, M. Godin, for the purpose of expressing in its title the fact that it was an abode where the love and sympathetic interest of the members for each other should make the inmates really a family. To quote the words of M. Godin: "Not being able to turn the cottage or the hut of each workman's family into a palace, we have sought to place the abode of the worker in a palace. The Familistere is, in fact, nothing else. It is the Palace of Work; the Social Palace of the future. What it is not possible to do for the benefit of families scattered and disconnected, the improvements which cannot be introduced into the chaos of the workmen's habitations either in the city or in the country, either in the cellar or the garret dwelling, what even the best constructed isolated workmen's dwellings, whatever may be their system, do not permit, the Familistere does permit; the Social Palace makes it possible, nay more, makes it necessary."

The dwellers in the "Social Palace" not only pay their rents but are accumulating a fund for buying the building. Ample provision is made for educating the young and pensioning the old. The inmates manage their own affairs by their own elected agents and have no trouble among themselves or with their employer; and the sum of happiness which they enjoy must be much greater than can be attained by an equal number of workmen living in tenements. "No attempt at improving the condition of the working classes," as Mr. Parke Godwin, late editor of the New York *Evening Post*, observed on this subject, "has attracted more of the attention of philanthropic economists. The advantages which may be commended to great manufacturing companies, or to individuals employing a large number of men, are, that, while it involves no element of mere charity, it respects individual freedom and maintains capital and labor in relations of perfect amity, and at the same time of perfect justice. To the capital-

ist it secures an adequate return for his outlay, while it provides the laborer with a beautiful, comfortable and agreeable house, where he may find the conveniences and enjoyments which are generally only within the reach of those who are rich. In some of its details the plan of M. Godin may doubtless be improved, but the general principal on which it rests seems to be sound and unobjectionable and worthy of the earnest study of all who are interested in the social advancement of our race."

The buildings which comprise the "Familistere" were begun in 1859, but not completed until 1870, the total cost amounting to $200,000. As the Familistere was built for the accommodation of workmen, its rents had to be made as low as those prevailing elsewhere. The rates charged vary from three to five cents a day, according to location on the floor. The receipts derived from this source, as well as those from the commerce carried on in supplying the population with household goods, even after placing aside a reserve fund, net M. Godin a fair interest on this part of his investment, and he has the satisfaction of knowing that his employes are kept in a palace at no more expense than they would have incurred in living in hovels.*

Some idea of the extent of the edifice may be obtained from the statement that it contains eleven hundred windows. If the apartments of which it consists were distributed into small houses, uniting with each other, they would extend for three miles five hundred and forty-four feet. It is composed of three parallelograms, with cellars, a ground floor and three stories. The centre part is thrown back, so that with the two wings it forms an outer court two hundred and

*On December 31st, 1882, the government of France conferred on the illustrious founder the Cross of the Legion of Honor. In the course of an address acknowledging the favor, M. Godin summed up the advantages of his association as follows:

1. Productive industry is so organized as to create the most complete accord between employer and employed. 2. The problem of the dwelling is solved by giving to the families of the workers comfortable and healthy apartments in the bosom of a vast palace. 3. Stores for the supply of articles in general use are formed so as to make every one, so to speak, his own purveyor and save the cost of useless intermediaries. 4. The care for the young, education, instruction and apprenticeship, are provided for within the establishments of the association, on model principles and plans. 5. Families are guaranteed against the invasion of misery by mutual assurance. 6. In sickness every one enjoys all necessary attention and assistance. 7. An honorable retreat is secured for old age, which cannot fall into destitution. 8. By association the worker receives the entire fruit of his labor, he shares in all the profits of the society in proportion to his services to it.

twenty-nine feet eight inches long, and from two hundred and sixty-three feet six inches to three hundred and twenty-nine feet deep; and has a façade of five hundred and ninety-one feet six inches. On the opposite side of this court, and in front of the centre of the structure are the buildings of the schools. The buildings forming the offices for different services depending on the palace are in front of the two wings. Each of the three parallelograms of residences contains an inner glazed court, which allows intercourse to be carried on throughout the whole extent, under cover, in all weather. At each story, there runs round these courts a gallery or balcony, protected by an iron balustrade. These galleries form a communication between all the dwellings, since each set of rooms opens on a balcony. Each parallelogram has four stair-cases, one at each corner; so that on each story one can get to the dwelling-rooms with as much freedom as if they opened directly on the street. The balcony, indeed, is nothing but a sort of street; being broad enough to allow people to pass and move about without inconveniencing each other.

The compulsory intercourse which exists in ordinary houses between neighbors whose abodes open on the landing-places of the same stair-case is not produced at the "Familistere," where the occupants have as much isolation in their rooms as most people who live in a good class of apartment-houses in the large cities. In order to secure for every one the satisfaction of general cleanliness and avert all recriminations among the occupiers, whatever is of common use, stairs, balconies, water-taps, water-closets, dust-bins, etc., are, on every story, placed under the charge of employes specially paid by the administration. Thus, perfect cleanliness is obtained without any of the occupiers having to trouble themselves about it.

They have also, schools and nurseries for their children, swimming-baths, gymnasium, library, reading-rooms, billiard-room, theatre, restaurant, co-operative store, laundry, and a general kitchen, where they can get their food cooked at cost price, if they desire to save the trouble of cooking it in their own rooms. But the school and nursery system of the Familistere, is one of its most successful departments.* For this object a complete series of school-rooms and nurse-rooms has been established. These are placed under the eyes of the parents themselves, who thus, like persons favored by fortune, have in immediate

* The expenses of the "department of the education and instruction of children," during the year ending June 30th, 1882, were about $5,000.

connection with their dwellings, nurses and special teachers for their children, and are not obliged to send them away, that they may carry on their studies. Here the infantile population is classed into seven divisions, and in each, the care bestowed on the children is gratuitous. The first division consists of the nursery for children under two years. From the first week after its birth, an infant in good health and properly vaccinated, may be admitted into the nursery. The mother has full liberty to leave it there, either for an hour or all day, as she chooses. Thus she regains the power of giving herself up to any professional work, and may be sure that during her absence her child will be thoroughly cared for. Those painful cases of desertion, which arise from so many causes among poor families, never occur at the Familistere. However poor a family may be, the child always finds in the nursery the care, food and clothes necessary for it.

The second division, for infants, "baby-room," comprises those who are from two to four years old. When a child is tidy and can walk, it is received into a sort of preparatory children's garden. In the fine season they are almost constantly in the garden, beneath the shade. The main thing looked to is whatever can develope their health. Instruction does not really begin before the third division, "child-room," that of children from four to seven. This third division is divided into two classes, and forms the infants' school. When the pupils have quit these classes, they have learned to read and have begun arithmetic, and now enter the primary school, which is intended for children from seven to nine. The other divisions are for children from nine to eleven, eleven to thirteen, thirteen to fourteen, and finally a "superior class," for older scholars.

The arrangements of the unitary dwelling make instruction obligatory; and, as every movement takes place under the eye of the parents, no child can fail in its duty without their ascertaining it. The times of going to and leaving the schools, coincide with those of going to and leaving the workshop.

The following system of instruction is followed during the school course:

1. Moral, social and political instruction.
2. Exercises of memory on this first subject.
3. Well-articulated reading, thoughtful, without irregular intonation.
4. Careful writing, teaching, and application of various kinds.
5. Orthography.
6. French composition and style.

7. Arithmetic: the four rules and proportions applied to all the needs of the business, of commerce, and of the ordinary incidents of life.
8. Universal geography, especially that of France.
9. History: principal facts of ancient history, and the modern history of France.
10. Elementary geometry; elements of algebra.
11. Linear drawing.
12. Elementary natural sciences, mathematics, chemistry and physics.
13. Practical industrial course, visits to the shops.
14. Music.
15. Gymnastics.

CHAPTER VI.

WORKINGMEN'S INSTITUTE AT MILLVILLE

In our report for 1881 attention was called to the subject of "Workingmen's Clubs" as an important factor in the successful efforts made to improve the social condition of the laboring men in this country, and the prosperous and intelligent among our citizens were urged to furnish pecuniary as well as personal aid in establishing them here. The success of these institutions in England has been most gratifying. At the annual meeting of the "Workingmen's Club and Institute Union," held in College Hall, Westminster, June 17th, 1882, Sir Thomas Brassey, M. P., in the chair, it was stated that during the twenty years of its existence, "it has been instrumental in founding upwards of one thousand clubs and institutes, having about 100,000 members." The Union had lent to affiliated clubs over 50,000 volumes of carefully selected literature. In several cities and towns in New Jersey efforts are now being made to organize such associations. The liberality of a distinguished citizen of Millville has enabled the workingmen of that pleasant South Jersey town to establish an institute and erect a suitable club-house. The considerations which induced Mr. R. Pearsoll Smith to assist in this good work, are set forth in the following sketch of the Millville Workingmen's Club, contributed by a citizen of that city:

"Situated in the "sand barrens" of South Jersey, Millville attracts few wealthy residents. It is a city of working people, possessing no men or women of leisure. On week-days, during the day-time, its streets are almost as quiet as on Sunday, but at night they swarm with the operatives of the glass works, cotton mill, bleachery and iron foundry. A few years ago Millville, like other manufacturing towns, had its full quota of drinking saloons, in which a large portion of its wealth and intelligence was wasted. Like other towns, too, it had its temperance agitators, who ten years ago determined to make renewed efforts to prohibit the sale of liquor. That which characterized their

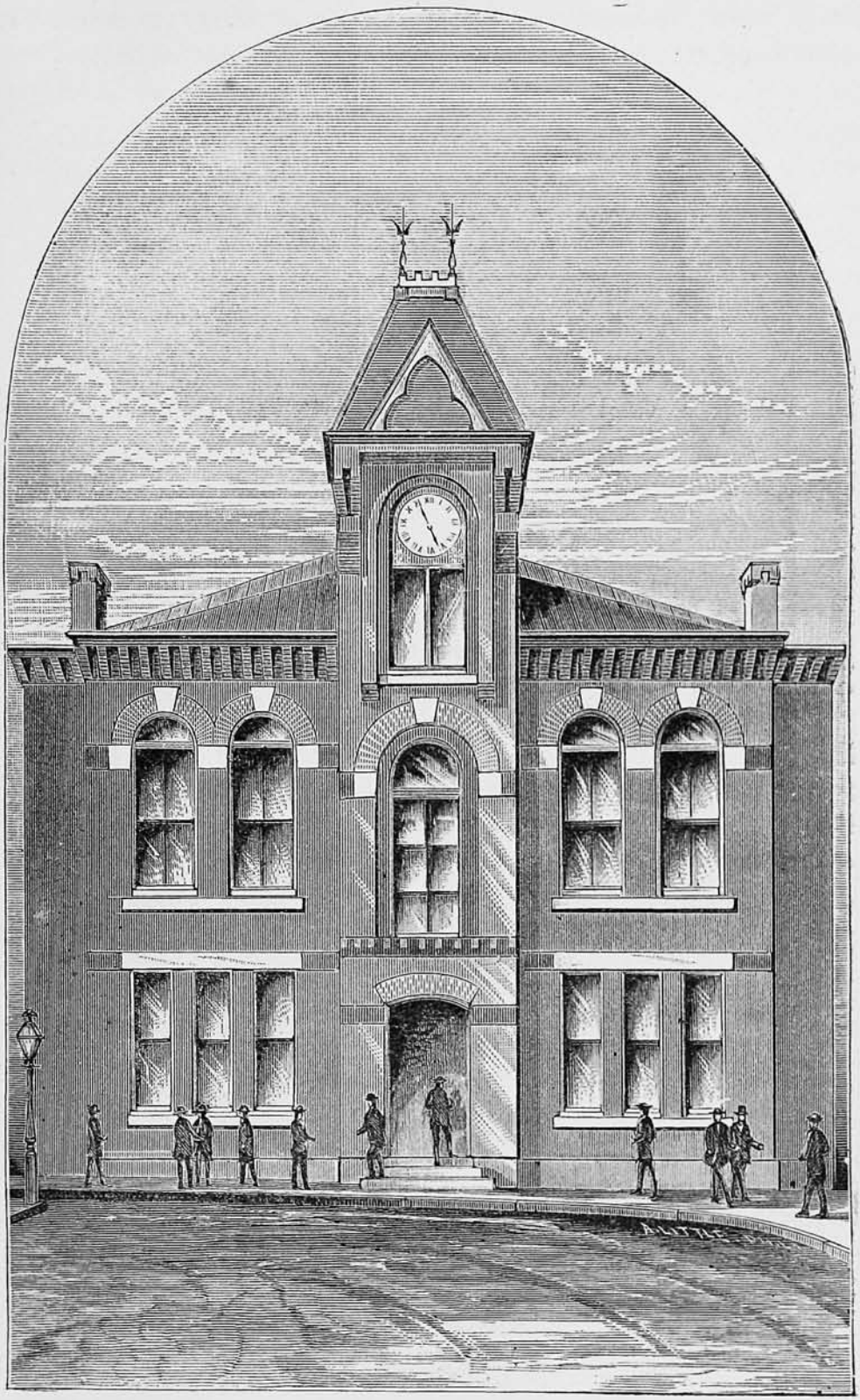
work as exceptional was its success. Accomplished by the workingmen themselves, whose fairly large wages gave them the means with which to fight the liquor interest, it had the active sympathy of the employers and clergy; while its permanence was assured by years of watchfulness and vigorous enforcement.

"The results of this work are now evident. Millville has a fine hotel, managed on strictly temperance principles. The church capacity of the town is exceptionally large. Its building and loan associations show the most successful history of any in the country, and most of the skilled workmen own beautiful homes of their own. A poor fund established some years ago has for years had no call for its income. Its municipal management is without a scandal, and, except an occasional liquor seller, it sends no one to the town jail. The license question has disappeared from city politics, the city council being unanimous against license, while the police consider it their duty to hunt down illicit venders of liquor.

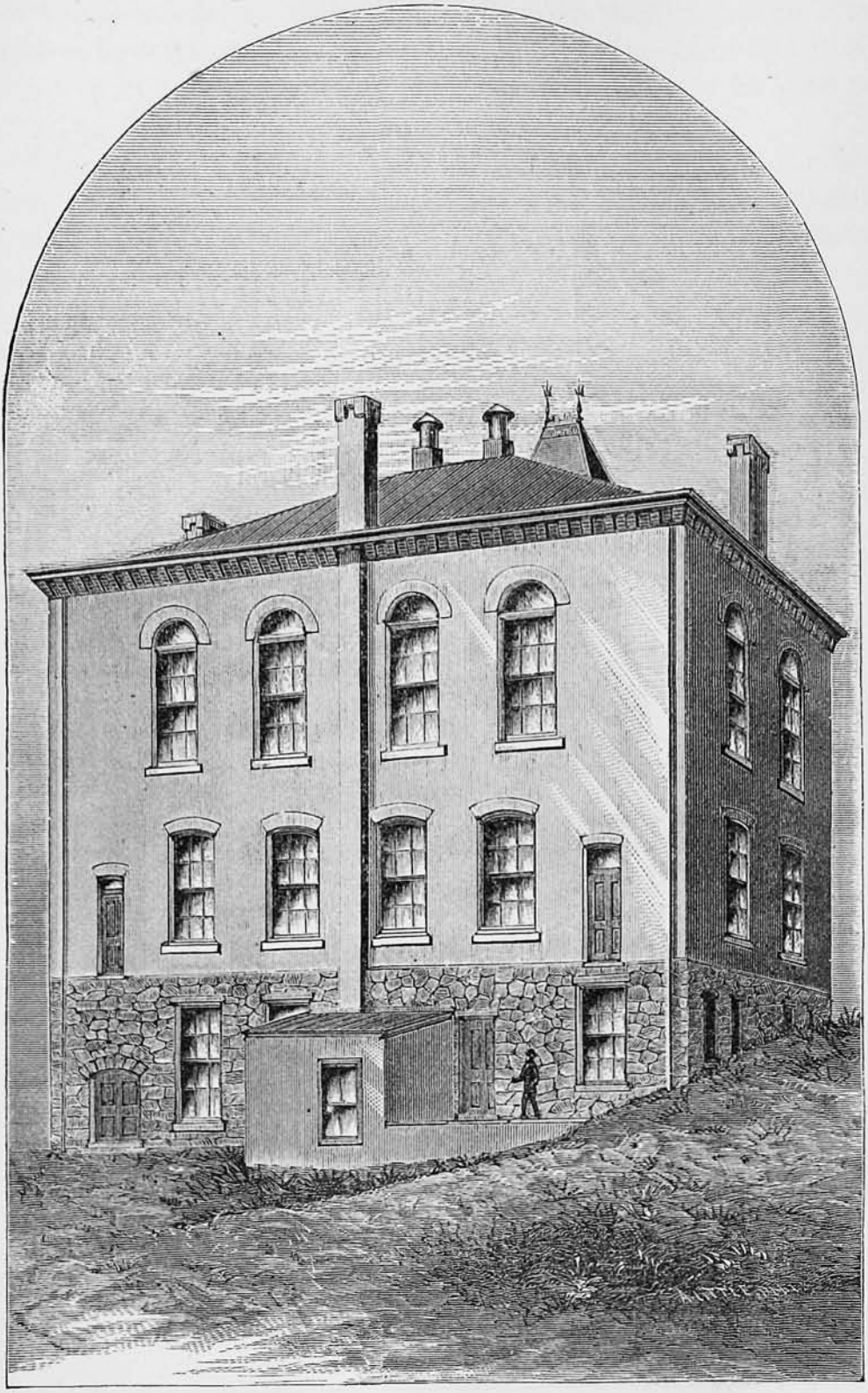
"Ten years of such results can be considered a fair settlement of the temperance question; but to thoughtful minds the victory was not fully assured. The restless mass of artisans, who were abroad upon the streets after their day's toil had been finished, sought for some entertainment as a diversion from labor. If other forms of enjoyment were not provided, they would be certain to demand the attractions which may be found in the drinking saloons.

"The success of the efforts of the women of the Christian Temperance Union in establishing a boys' club in a house, built for the purpose by kind friends, suggested the practicability of a club for adult workingmen. A gentleman of means, one of the manufacturers (Mr. R. Pearsoll Smith,) who thought well of the project, promised to supply the funds for a building if the workingmen would organize a club. This was soon effected, and as a preliminary experiment a hall was hired and furnished, a debating society and a course of familiar lectures opened. A membership of four hundred and a crowded hall every evening during the three months in which the experiment was tried were ample evidence that the movement met with popular favor, while every minister in town gave it his sanction. During the year a more suitable edifice* has been built and is now ready for occupancy. The total cost of this building, including the land and furniture, has been $18,000, of which the sum of $5,000 was a donation from Mr.

* See front and rear views on pages 101 and 102.



FRONT VIEW OF THE CLUB HOUSE.



REAR VIEW OF THE CLUB HOUSE.

R. P. Smith, who also made an advance of $12,000, at five per cent. interest, to be repaid at the convenience of the club; while $1,000 were loaned by some other friends. The statement of expenditures is as follows:

Cost of lot	$2,000 00
Cost of foundation and retaining walls	2,250 00
Cost of brick superstructure	4,250 00
Cost of furnishing building, &c	9,500 00
Total	$18,000 00

"The lot is at the head of the main street of the city, and extends back along the river bank, affording a beautiful view from two sides. In the basement are a gymnasium, forty by fifty feet, with ceiling sixteen feet high, a bath-room with six tubs and full toilet accommodations, and a kitchen, communicating by dumb-waiter with the upper floors. On the main floor, at the street level, is the club-room, forty by fifty feet, with tables and chairs for two hundred people. In this room smoking, conversation, and games of skill are allowed. It is open every night. Vocal and instrumental music are frequently to be rendered here. On the same floor is the library-room, twenty by fifty feet, the library containing two thousand volumes. In the upper story is a hall or audience-room, the main floor and gallery containing five hundred chairs. The ceiling is high, the room is thoroughly ventilated, and is heated by carefully located steam radiators. Twelve burners, exclusive of the stage lights, furnish abundant light. The stage is twenty by sixteen feet, and provided for lectures or plays. The exits are wide and open on easy stairways, so that in case of fire an audience can reach the street in a few seconds. The scenery is fire-proof, and over the borders are a set of automatic fire-sprinklers which will deluge the stage in a few minutes, in case of need. On the same floor are also class and committee-rooms, to accommodate all the wants of the members.

At present there are 600 members belonging to the club, which number, it is expected, will be increased to 1,000 as soon as the club-room is opened. To become a member only requires that the applicant should have a good moral character, be eighteen years of age and be approved by the Board of Directors. The dues are $1 a year. Life membership, entitling one to all the rights and privileges of the institute, costs $50. It is believed that this tax will

pay all the current expenses, while the rent of the hall will probably afford a net income of $1,000, which will be used to pay off the debt on the building, the title to which is now in the name of the principal patron, Mr. Smith.

The object of the institute, as stated in the constitution, "is to offer a counter-attraction to drinking saloons and immoral places of resort, by establishing an institution which shall offer means of social entertainment, of physical culture and of mental training under right direction and on the general principle of entertainment leading up to instruction."

Physical culture is to be advanced by means of the gymnasium and athletic sports in the open air, by baths, and lectures on health and proper living. Mental culture: By means of classes in the elementary branches, book-keeping, drawing, mechanics, &c., the ultimate object being the establishment of a technical school; by debating and choral societies, library and museum. Moral culture: By gentlemanly deportment and intercourse in the club-room, where no vulgarity is allowed; by musical entertainments and lectures and plays of high character; by giving every facility to the temperance work, and through the reading-room. Business culture: By aiding the formation of building and loan associations, and societies and savings banks for small amounts saved by boys; by developing the principles of co-operation, &c.

PART III.

THE BUILDING AND LOAN ASSOCIATIONS OF NEW JERSEY.

The Building and Loan Associations of New Jersey.

Recognizing the importance, in an economical point of view, of co-operative savings fund and loan associations, better known as building and loan societies, one of the most successful forms of co-operation ever attempted, a chapter in the report of 1880 was devoted to this subject. A short sketch of the development of these associations in Great Britain and this Country was presented, and statistical information concerning those in this State, so far as the returns received permitted, was also given, but was remarkable in nothing but incompleteness, as only fifty-one, or less than one-half of the then existing associations reported to this office. The efforts of the Bureau were better rewarded this year, for with few exceptions, the secretaries have made reports, more or less complete, of the condition of their respective associations. The results, presented in detail below, show that where they have been managed in a business-like manner, economically and honestly, the success has been most gratifying, although not to such an extent as in Pennsylvania, Massachusetts, and some other States. So far as we have been able to ascertain, there were in existence in New Jersey during the year, one hundred and twenty-eight building and loan associations, from eight of which no information has been received. Twelve of those reporting were being "wound up."

As the fiscal years of these associations are not uniform, the statistics which have been obtained, being based on the latest annual reports, few of which were dated later than September, will show only approximately their present condition. The aggregate returns from one hundred and eighteen organizations, of which a large proportion are serial or perpetual associations, give the following results:

Shares, 102,075, owned by about 20,000 shareholders, of whom fully 6,000 were borrowers. Assets, $6,748,775.87, of which $600,886.42 were invested in real estate, and $5,782,314.12 on bond and

mortgage. In ninety-three associations the dues paid amounted to $4,168,348; net assets, $5,662,810; gains, $1,484,462.

Progress in the development of these associations in our State has been made only during the past fifteen years; although the first act which authorized their organization was approved on February 28th, 1849, being entitled, "An act to encourage the establishment of mutual loan and building associations," the preamble stating that "the establishment of associations for the purpose of assisting the members to purchase lots and erect dwelling-houses thereon, or to pay for houses and lots already purchased, by furnishing them with loans out of the funds of the association, to be repaid in some easy and convenient mode mutually agreed on, or by the redemption of shares upon equitable terms, has been found to be highly beneficial, enabling persons of limited means to acquire comfortable homes for themselves and families, without the necessity of taking any large amount from their business or earnings."

The act now in force is that of April 9th, 1875, (Revision,) and amendments thereof: "An act to encourage the establishment of mutual loan, homestead and building associations." The first two sections of this act provide:

"1. That any number of persons, not less than five, may associate and form an incorporated company for the purpose of assisting each other and all who may afterwards become associated with them, in acquiring real estate, making improvements thereon, and removing encumbrances therefrom, by the payment of periodical installments; and for the further purpose of accumulating a fund to be returned to its members who do not obtain advances, for purposes above mentioned, when the funds of such association shall amount to a certain sum per share, to be specified in the articles of association.

"2. Any such persons who shall sign a certificate,* setting forth that they have formed such an association under the provisions of this act, and the name adopted for such association, and the city, borough or township where it is to be located and its business transacted, and who shall cause the same to be delivered to the clerk of the county which embraces the place of its location, thereupon, together with all who may afterwards become members, their successors and assigns, shall be a body corporate and politic in law, with all the powers mentioned in the first section of the act entitled, 'An act concerning corporations.'"

* Form of certificate of incorporation:

"This is to certify, that we, the undersigned, have formed an association under the provisions of an act of the Legislature of the State of New Jersey, entitled: 'An act to encourage the establishment of mutual loan, homestead and building associations,' approved April 9th, 1875, and the supplements thereto, for the purposes mentioned in said acts, under the name of ———, to be located and the business thereof transacted at ———, in the county of ———, State of New Jersey.

"Dated ———."

The eighth section of the act provides:

"Every company formed under this act shall adopt a constitution, which shall embrace all the foregoing sections and such articles for their government and the management as they shall deem proper."

The "plan of operation" generally followed in these associations is substantially as follows: Each person pays one dollar per month for each share of stock held by him, until the shares are each worth $200, when they are said to have "matured," or reached their "ultimate value." At maturity, each shareholder is entitled to receive $200 in cash for each of the matured shares held by him. It is plain that if no profits were added it would require 200 months (16⅔ years) to pay up a share; but the profits generally reduce the time to ten years, and this makes a very good investment. In case the shareholder neglects to pay his $1 per month per share, he is subject to a monthly fine per share.

Any shareholder may borrow $200 upon each of his shares, if he can furnish the security required by law.* The funds of the association are put up at auction, and the one bidding the highest premium is entitled to the loan. This premium, which is a bonus over and above the six per cent. rate of interest charged for the use of the money, goes to the general fund and the borrower receives his proportionate part of it. If one bid ten per cent. premium and his security be approved, the premium ($20) is deducted from the $200, and he

* Section 6 of the act of April 9th, 1875, provides:

"6. The funds of every association formed under this act shall be invested in the purchase of lands or building lots, and erecting buildings and improvements thereon, or in the purchase of lots and houses already built; which lands, dwellings and improvements shall be sold to the members of such associations, payable in the shares of the company, or in periodical installments for a period such as shall be agreed upon and designated in their constitution, and which shall not exceed the term of twenty years; at the expiration of which term the lands, dwellings and improvements so sold and conveyed to the members of such associations, shall become the property of the grantees, discharged from all further payment and clear of all encumbrance; or in loans to members on mortgage of real or personal estate, payable in shares of said company, or by such periodical installments; or in the redemption of shares, or in all or any of these modes."

By amendment of February 29th, 1876, it is provided that—

"The investments of every such association shall be made either in loans to or in redemption of the shares of, or in purchasing lots and erecting dwellings for the members, or in all of said modes, or in such other ways as the constitution of the particular association shall provide; and no premium given for priority of loan or acquisition of a building, or discount given on the redemption of shares, shall be deemed to be usurious."

receives $180 in cash, upon executing his bond for $200, and a mortgage on the property offered as security.* The borrower then pays $2 each month ($1 for dues and $1 for interest,) until the share has matured, when being worth $200 it offsets the mortgage; at that time the payments cease, the mortgage is discharged by the corporation and the shares canceled. When an investor becomes a borrower, the investment at once becomes a sinking fund to pay off the loan when the shares shall have matured.

While a most important object of these associations is to enable a member to borrow a sum sufficient to aid him materially in buying his own dwelling-house, this is really incidental to the accomplishment of one grand object, that of saving money by co-operation and by compulsory payment into the treasury. Such an association is simply an organization formed for the purpose of co-operative banking; the depositors constituting the bank and being its sole owners. In ordinary banking, the bank is a corporation separate and distinct from the depositors, the deposits being used solely and exclusively for the benefit of the corporation, the only advantage derived by depositors in the institution being the safe keeping of their funds; but in a building and loan association the bank is the property of the depositors, the officers and directors being chosen by the depositors or stockholders to manage the concern for them.†

It is indispensable to the success of these associations that the managers should be business men. There must be integrity in the administration; the accounts must be carefully kept and properly posted, and the funds must be *safely* invested. Their management is extremely economical, and in the vast majority of cases their affairs are conducted with scrupulous honesty. When trouble occurs, it generally can be traced to carelessness in the investment of funds, and, therefore, the wisdom of the provision in the by-laws of several of the New Jersey associations, that "no money shall be loaned on any property already encumbered," cannot be doubted. In most of our

* Many associations now follow the plan of loaning the full $200, and collecting premiums every month.

† A recent writer sums up the advantages of these societies as follows:

"1. They enable workingmen to have the benefit of their earnings in advance by building houses and paying for them in monthly installments. 2. The monthly payments on mortgages are more easily met. 3. They instruct the industrial classes in the management of property. 4. They yield a larger interest than could otherwise be profitably paid. 5. They do not require payment of the principal until the shares are complete."

societies the only restriction as to security of the investment is, that it must be "satisfactory to the Board of Directors." The auditing of accounts by a committee of stockholders once a year is a duty which should be very thoroughly performed. Each individual account should be examined in order to see if the amount reported to have been received is correctly stated. The best thing to do to make the audit effective is to publish with the annual report a statement of the debts and credits of each individual account as known by its book number.* Thus, each member is made the auditor of his own account, and if it is omitted from the list or incorrectly stated, he will be sure to call the attention of the Directors to the error. The aggregates of these individual accounts furnish the basis of the general account, and if they are correct, it is only a matter of calculation and examination of vouchers to determine whether the Secretary's and Treasurer's books are right.

In many of the associations, where the stock is issued in series, no equitable provision is made for a division of the profits. The only fair way is to divide the earnings on the partnership plan, treating the different series as business partners and dividing the gains accordingly. Then each dollar invested, no matter what the series, receives the same rate of profits for the time it has been invested. The following plan is the one observed in the division of profits of the People's Building and Loan Association of Harrison, Hudson county. (See Constitution, article 3, section 2):

"It shall be the duty of the Secretary to assist the auditors in settling and adjusting the accounts of the association, and determining the value of the shares in each respective series prior to the annual meeting, or at any other time, as occasion may require; and, in order that no series of stock may be given a greater percentage of the earnings of the association than is due thereto, they shall distribute the net earnings of the association and determine the value of the shares in accordance with the following rules: Each series investment to be multiplied by the average time invested, the results to be added together for a sum of results, each result to be multiplied by the total net earnings of the association, the product divided by the sum of results, the quotient in each case showing each series' share of the net earnings. Divide each series' share of the net earnings by the number of shares in that series and the result will be the net gain per share."

*This is the plan followed by the Greenville Building and Loan Association, Jersey City.

The affairs of the associations in this State, with but very few exceptions, seem to have been conducted economically, honestly and successfully. This will be seen, not only from the detailed reports at the close of this chapter, but from the following statements made by the secretaries of a number of these societies:

WOODBURY REAL ESTATE MUTUAL:—"We feel that our association has been very successful, far exceeding all our expectations when organized over eleven years ago, and that we have been the means of promoting the general welfare of many industrious mechanics and laborers. We expect to do still more good in the future and prove a material aid in furthering the rapidly growing improvement of our town.

"Since the organization of the Woodbury Real Estate Mutual Association, up to and including the July payment of this year (1882,) the amount of business transacted will be shown by the following statement:

"RECEIPTS.

"For monthly dues	$146,483 50
interest on loans	33,481 85
fines on arrearages	1,052 03
premiums on new shares	253 59
loans repaid by borrowers	26,900 00
loans collected by foreclosure	4,659 39
rent from properties	464 83
sale of properties	2,007 00
tax returned	9 46
Total	$215,311 65

"DISBURSEMENTS.

"For loans to stockholders	$130,232 88
withdrawal of shares	70,054 80
expenses of all kinds	3,503 78
taxes on securities	3,281 13
return of premiums on repaid loans	1,625 03
interest on advance payments	186 39
purchase of properties and costs	2,172 19
payment of matured shares	4,200 00
balance in treasurer's hands	55 45
Total	$215,311 65

"As may be noticed from the above statement, the association has been very fortunate in its investments, having only been compelled to

purchase three properties to avoid losses, one of which has since been disposed of, while the other two are yet owned by it, their combined value being about $2,500. Less than $1,000 loss has been sustained during the whole time in the general depreciation of real estate which prevailed for several years during its history, and less than $5,000 has been collected by foreclosures in addition to the three properties purchased at sheriff's sale.

"Eleven series of stock have been issued. The first reached matured value of $200 per share in ten years and three months, and the second in ten years and six months."—GEORGE E. PIERSON, *Secretary.*

PATERSON CELTIC MUTUAL:—"Our association is but six months old, [October, 1882.] At our last meeting, held September 26th, each share was valued at $6.20, which was considered a very good showing for six months' business. Total cash receipts, $2,787.95; expenses, $133.22; earnings, $268.95. Number of loans, 5; amount, $3,700. Payments on loans, $1,363.71; balance of loans to be paid as buildings progress."—HUGH SWEENEY, *Secretary.*

At the fifth annual meeting of the Paterson Mutual Building and Loan Association, held in December, 1882, the reports of the officers stated that the association had now at interest about $138,000; the receipts during the year amounted to $65,201.27; while the profits were $9,675.35, which warranted the declaration of a dividend of nine per cent. on the various issues of shares. The net value of shares of the different series was: Of 1878, $60.67; 1879, $57.93; 1880, $41.28; 1881, $26.25; 1882, $12.54. In Paterson there are also two other associations, the Celtic and Union, both outgrowths of this association.

CAMDEN BUILDING AND LOAN ASSOCIATION: "Ours is a serial or perpetual association; one where the association itself does not terminate but the stock matures in series in rotation. We issue a new series every year and have now eleven, of different ages and values; but all share alike in the profits made. We have matured five series; the first, (116 months,) at $200.71; the second, (115,) at $200.63; the third, (117,) at $200.17; the fourth, (120,) at $200; fifth, (127,) at $200.25.

"A great many mechanics never would have obtained a home of

their own if it had not been for the building and loan association. Any one that has from $300 to $400 can borrow the balance and purchase a small but comfortable house, which when occupied will not cost him any more than the rent. We have an example which will illustrate this point: Mr. S. was a tenant in one of the houses owned by the association and was paying $9 per month in rent. He offered to buy the house and it was sold to him for $1,050; but as he only had $250 in cash he paid this and bought four shares of the stock of the last series, which shares (three months' old) cost him $13. He now pays $8 per month ($4 for interest and $4 on account of the house) to the association and about $1 taxes; and at the end of ten or eleven years he will own the house and cease paying. If he had kept on paying rent he would then own no more than what he could have saved, just as he saved the first $250. We have many similar cases. There need be no danger in a serial association of the borrower losing all in case of sickness or disaster, as every one can be helped out by means of an exchange of stock. The only cases of loss happen where the borrower has built with borrowed money and depends on receiving rent to pay the installments; and if the rent is not paid, which occurred frequently during the 'hard times,' the consequence is that the borrower is swamped and loses all. But it would not have been otherwise, if he had borrowed from private parties."—HENRY F. GEITER, *Secretary*.

"It affords me great satisfaction to be able to report to you, that Camden is noted for its well-organized building and loan associations, which are a great benefit to those in poor or moderate circumstances, by affording them opportunity to save small sums monthly and receive interest thereon. In many cases such persons secure homes for themselves through these means, and they keep their houses in better condition, because *owning* them, than they otherwise would do. The result is that the general prosperity is increased."—GEORGE E. FREY, *Secretary Artisans' Association*.

FIELDSBORO:—"Our net assets are $4,835.33; while the amount loaned is $6,275, which is accounted for by the fact that some of our members were in danger of losing their homes and in order to help them we were compelled to borrow money, not having sufficient on hand. About eleven years ago we organized the Fieldsboro Building and Loan Association, and, in October, 1881, 'No. 2.' The first

ran ten years and eleven months, when the shares became worth $200 each. Twenty-three members of the old association were enabled to purchase their own homes; while three have cleared their dwellings of encumbrances. Others have bettered their condition by becoming more industrious and steady, when they found that they were saving something. Some, who formerly spent all their earnings, much of it in intoxicating drinks, are now reputable citizens. Our present association is a small one, but sufficiently large for the place. It is composed entirely of workingmen, who are not encouraged to take so much stock as to become embarrassed."—WM. H. CARTER, *Secretary.*

PEMBERTON LOAN AND BUILDING ASSOCIATION:—"On March 1st, 1873, this association issued a second series of stock, which is that now running. In December, 1878, the shares of the first series matured at $100, having run ten years and ten months. There had been paid on each share $65.50, for which there was returned $100.16, thus yielding ten per cent. interest. There were originally 1,000 shares of the first and 350 of the second series. In the summer of 1876 the association ceased active business and began to wind up its affairs and the process of liquidation has been going on ever since, the stock being cancelled as fast as dues are received to purchase it with."—JAMES B. HAWKINS, *Secretary.*

FLORENCE MECHANICS' BUILDING AND LOAN ASSOCIATION:—"Our third series matured in September, when the stockholders of the fourth also concluded to close up that series, so that we are now settling up as fast as possible. Our association was organized in August, 1868, with 400 shares. We have since issued three other series. Our first series matured ($200) in 131 months; the second, in 129, and the third, in 130. The fourth has run 100 months and the stock is worth $149.58. There are very few stockholders who have not been benefited by the association."—ROBERT PATERSON, *Secretary.*

"THE BUILDING AND LOAN ASSOCIATION OF MT. HOLLY."—"Our association has been in existence for over twenty years. It succeeded (March, 1862,) an older organization which had run out at that time and which had benefited Mount Holly to the extent of $100,000, as it had 1,000 shares of $100 each. Our association has only had two losses in the whole twenty years of existence, one of $300 and one of $50; and but one foreclosure. We have been

remarkably successful. Each series has gained from seven to twelve per cent. each year. The gain of a certain series one year was seventeen per cent., but there were peculiar circumstances governing that case."—HOWARD C. LEVIS, *Secretary.*

BEVERLY:—"The Beverly Building and Loan Association has been of vast benefit to this community. Through it men of limited means have secured homes, which would not have been acquired by them in any other way. The members of our association are without exception persons who desire to save a portion of their earnings with a view to secure their own houses, and not for speculation."—JACOB PERKINS, *Secretary.*

HARRISON, HUDSON COUNTY, PEOPLE'S:—"Our association has had a very prosperous career, particularly during the past four years. After its organization, during the years of financial depression, owing to the numerous failures that then took place and the predjudice which prevailed towards building associations, our membership did not increase much; but with good management we established a widespread reputation, and we now have a membership comprising all classes for fifteen miles around us. At the annual meeting, held on September 19th last, we commenced our tenth series of stock, to which 140 new members have subscribed 913 shares, making the total number of members 454, who hold 2,965¾ shares. We keep our accounts by double entry and distribute only *net* earnings on the partnership plan, placing all unearned premiums under the head of 'liabilities.'"—JOHN W. RIORDAN, *Secretary.*

"CINNAMINSON," RIVERTON:—"Our association, although young, has done more to start improvements than anything thus far undertaken in this section. We embrace one feature which I think differs from any association in the State. All must borrow or submit to have their stock cancelled, before maturity, at withdrawal value, thereby making every member of profit to the association."—H. B. HALL, *Secretary.*

JERSEY CITY, BERGEN MUTUAL:—"This association commenced to receive subscriptions, February, 1881, but did no business to speak of for the first six months, selling only three hundred shares. Then a few of our leading citizens became members; we sold two lots of money and

our success became assured. We have sold the money quite cheap, eight per cent. Yet if we continue in the same way the shares will mature in from seven to nine years.

"The benefit to borrowers can best be explained by this example: Mr. C. occupied a shop and rooms for which he paid a rent of $50 per month. As he owned a lot the association loaned him sufficient to erect a building thereon. He rents one floor for $16 per month and occupies the remainder of the building himself. It is thus worth to him $64 a month, or $768 per year. He pays the association in dues $325 and in interest about $290, or $615 in all per year; leaving him sufficient to pay his taxes, insurance, &c. At the expiration of seven or eight years, if the association prospers, he will receive a cancellation of the mortgage on his building, which he will then own free and clear, at a cost no greater than the rent he would have been compelled to pay if he had kept on paying rent."—F. A. COLE, *Secretary*.

PAULSBORO:—"We organized on March 1st, 1873. At that time Paulsboro was only a straggling village, and its workingmen lived in rented houses, which were not the best. Now our town is the pride of South Jersey, and our workingmen have built, by the aid of this association, nice, comfortable homes for themselves. I send the tenth annual statement of our association; but, in reality, we have only been in existence nine years and eight months. We began in March; but this year we opened our series in October, because in March money is scarce, while in October subscribers can pay in advance. Our first series will mature in ten years and four months, which we consider very good. * * * Building and loan associations are the sure means of enlarging our villages and towns; and they are a blessing to poor men."—WM. J. ADAMSON, *Secretary*.

GLOUCESTER CITY, UNITED MUTUAL:—"Our association has been in existence sixteen years, during which time our receipts have amounted to over $571,000. We have loaned on bond and mortgage, $357,500; paid to stockholders in redemption of stock, $173,000, and paid taxes to the amount of $32,753. We have assisted two hundred and twelve members in their endeavors to obtain homes, and of that number have been compelled to foreclose against only seven, at a total cost of $1,741 (including repairs.) All this business has been done with an office expense of only $4,848, which is less than one per cent.

on the amount received. At the end of eight years and eight months we had our largest assets, $276,430.58."—HUGH J. GORMAN, *Secretary.*

"PHILLIPSBURG, No. 3, ran out more than a year ago. It started with about 185 shareholders and 1,000 shares. The actual time it took to mature the shares was 121 months."—J. EILENBERG, *Secretary.*

OXFORD:—"We have collected no dues from stockholders since May 31st, 1882, except back dues, and are closing up as fast as we can. We have an unfortunate investment, which appears on our report as 'due from Oxford Iron Company, $6,103.60.' The company is in the hands of a receiver, and the amount which we shall ultimately realize from this source is uncertain. We have allowed many of our stockholders to withdraw. They probably received, on an average, $900 to $950 per share."—J. F. WARD, *Secretary.*

JUNCTION (HUNTERDON CO.) MUTUAL:—"No one has been benefited by investing in it, except those who bought property that was sold by the association at a very low price. In almost every instance it has now become worth double what was given for it. Heavy losses during the early part of its existence, resulting from loaning money on bad, and, sometimes, almost worthless property, as well as bad management of the finances, are causes which contributed to make the shares (in 1876, $102; at present, $32) not worth any more than the amount paid on them ($106.)"—*Secretary.*

QUINTON, SALEM COUNTY:—"We had every prospect of paying well until the strike began. Since that time the association has been running behind, and a good many have been compelled to draw out their stock."—WM. PATRICK, *Secretary.*

WOODSTOWN:—"Our first series, which ran out in ten years and seven months, was closed up in July, 1880. There were 382 shares of $100 each ($38,200.)"—I. C. SHINN, *Secretary.*

FRANKLIN BUILDING AND LOAN, SALEM:—"Since our report for 1880 (August) we have paid to holders whose stock had matured, ($200,) $40,600."—D. B. BULLOCK, *Secretary.*

JUNCTION (HUNTERDON CO.) MECHANICS' :—"On April 1st, 1882, the stockholders, by unanimous consent, agreed to divide up all the assets and close up the association, which, from one of the most prosperous, became one of the most unfortunate. Two causes contributed to this result: a dishonest officer and the rapid decline of Junction, because of the closing up of the D., L. & W. R. R. shops, property becoming almost worthless. The moneys of the association had, in many instances, been loaned on worthless securities, and it soon became burdened with a large amount of property, worth only one-half, and, in some instances, only one-sixth, of its nominal value. By strict attention and care the capital has been saved. Had the loan been properly managed it could have closed in eight or nine years, having been very prosperous at the start."—MARTIN WYCKOFF, *Secretary*.

LINWOOD :—"Our association was organized in February, 1869, under the name of the 'Mutual Loan and Building Association,' in Egg Harbor township, it being the first organized here. We have issued five series of stock, two of which have run out. Our experience induces us to believe that these associations are not of so much advantage in country places as in cities and towns. The money will not bring much premium. Our first two series matured in eleven years and one month; and we are trying to close up the others as fast as we can. At one time we had over 900 shares; now we have but 98."—T. E. MORRIS, *Secretary*.

The following letter, kindly written by M. J. Brown, Esq., editor of the *Building Association and Home Journal* of Philadelphia, giving a statement of the condition of these associations in other States, will be interesting in this connection:

PHILADELPHIA, December 14th, 1882.

James Bishop, Esq.:

DEAR SIR: Your kind favor of the 11th instant is at hand. * * * It is no an easy task to collect reports from societies, and what I have to say below in relation to Pennsylvania societies is estimated.

CALIFORNIA.—A statement of the progress of mutual building and loan associations of California, dated August 31st, 1881, shows eleven associations, twenty-nine thousand nine hundred and forty-seven shares, $1,808,304.98 paid in, $787,183 62 earnings, and $2,595,488.48 assets. At the present writing there are nineteen societies in the State of California, nine of which are in San Francisco. The above-mentioned gain is not *net*, as most of the California societies count all their premium as a gain, which is a mistake.

MASSACHUSETTS.—The annual report of the savings bank commissioners for the

year 1881 shows eighteen building societies doing business in the commonwealth, an increase of two over 1880. The assets of these societies have risen during the year from $372,462.31 to $653,142.80, an increase of $280,680.49, which indicates a marked degree of prosperity. The last Legislature amended the general law relative to these associations in several of its sections, so as to make the investments more secure, and the division of the profits more equitable. All the Massachusetts societies loan full $200 on each share, and collect premiums monthly. The eighteen associations show thirty-three thousand five hundred and forty-five shares, six thousand and sixty-five members, seven hundred and thirty-one borrowers, and $653,142.80 assets. Since the commissioners' report for 1881 was issued, seven new societies have been organized, making the present number twenty-five.

Building societies abound in Ohio and Illinois. Delaware has quite a number, and Washington, D. C., also.

PENNSYLVANIA.—Out of a batch of Pennsylvania building society reports, I indiscriminately picked up twelve annual reports, which show the following wonderful results. Their ages are from three to ten years, the assets are from $17,000 to $173,000. These reports show fourteen thousand two hundred and twenty shares, $1,336,800 assets, $909,432 paid in as dues, and $427,368 gain. There are over fifteen hundred active building associations in the State, and if the twelve above mentioned are a fair sample of the balance the result would be as follows: One million seven hundred and seventy-seven thousand five hundred shares, $167,100,000 assets, $113,679,000 paid in, and $53,421,000 gain. As a rule, the country societies are smaller than those in the city, and it would be much safer to cut the above figures in half, and the result would be an estimate in all probability very nearly correct, to wit, eight hundred and eighty-seven thousand seven hundred and fifty shares, $83,550,000 assets, $56,839,500 paid in, and $26,710,500 profits. The estimated number of shareholders is two hundred thousand. An effort will be made the coming year by the *Building Association and Home Journal* to secure a report from every society in the State, so as to make out a correct statistical report.

I am very sorry that I am unable to give you anything positive concerning Pennsylvania. I have some hundreds of reports, but the twelve I mentioned are a fair sample of the others.

Yours truly,

M. J. BROWN.

As the great majority of the annual reports of our associations are far from satisfactory, the following copy of the fifth annual statement (April 3d, 1882,) of the Pioneer Co-operative Saving Fund and Loan Association of Boston, Massachusetts, which began business August 6th, 1877, (authorized capital, $1,000,000,) and of which D. Eldridge, Esq., is Secretary, is recommended as a model to the officers of the New Jersey societies.

MODEL FORM OF REPORT.

SERIES.	Date of issue.	Months.	Members last report.	Members.	Borrowers.	Non-borrowers.	Shares last report.	Shares.	Pledged shares.	Free shares.	Real estate loans.	Amount of same.	Loans on shares.	Amount of same.	Total dues paid, per share.	Total profits, per share.	Value last report, per share.	Dues paid during year.	Gain during year.	Present value, per share.	Withdrawing value, per share.
First	Aug., 1877	56	177	153	31	122	795	697	168	529	6	$5,600	25	$4,800	56	$10 69	$50 65	12	$4 04	$66 69	$64 02
Second	Apr., 1878	48	87	75	11	64	348	304	61	243	7	7,700	4	400	48	7 81	40 49	12	3 32	55 81	53 86
Third	Apr., 1879	36	54	42	7	35	254	179	55	124	4	5,900	3	300	36	4 25	25 97	12	2 28	40 25	39 19
Fourth	Apr., 1880	24	143	115	12	103	727	569	85	484	8	10,300	4	450	24	1 80	12 48	12	1 32	25 80	25 35
Fifth	Oct., 1880	18	138	107	14	93	751	576	67	509	11	10,050	3	150	18	99	6 12	12	87	18 99	18 74
Sixth	Apr., 1881	12	.....	166	23	143	.....	992	146	846	20	23,850	3	200	12	43	.....	12	43	12 43	12 32
Seventh	Oct., 1881	6	.....	161	19	142	.....	861	134	727	19	24,300	.....	.....	6	11	.....	6	11	6 11	6 08
Totals	.....	.....	599	819	117	702	2,875	4,178	716	3,462	75	$87,700	42	$6,300	.....	.....	.....	.....	.....	.....	.....

CASH ACCOUNT.

Balance last report	$12,296 71	Total paid	$96,727 55
Total received	101,641 17	Balance on hand	17,210 33
	$113,937 88		$113,937 88

ASSETS.

Loans on real estate	$87,700 00
Loans on shares	6,300 00
Cash	17,210 33
All other assets	1,218 65
	$112,428 98

LIABILITIES.

Dues capital	$99,665 00
Profits	12,701 63
All other liabilities	3 48
Surplus	58 87
	$112,428 98

BUILDING AND LOAN ASSOCIATIONS OF NEW JERSEY.

NAME AND LOCATION.	Date of organization.	Date of latest report.	Number of shareholders.	Number of shares.	Number of shareholders borrowers.	Number of shares borrowed on.	Total net assets.	ASSETS INVESTED.			
								In real estate.	On bond and mortgage.	Other forms of investment, including cash on hand.	All dues owing to the association.
ATLANTIC COUNTY.											
Hammonton Loan and Building	1871	1882	125	560½	40	.....	$34,501 69	$3,800 00	$31,016 00	$2,366 17	$1,342 57
Workingmen's	1877	1882	214	857	82	.....	35,601 32	.....	36,675 18	1,310 43	1,142 93
Mutual Aid	1874	1882	16	51	14	.....	7,614 05	500 00	6,200 00	104 37	449 55
Pleasantville	1870	1882	125	241	59	.....	26,549 15	.....	21,470 00	5,078 15	.....
Absecom	1871	1882	74	204	.....	.....	41,700 00	.....	32,100 00	9,600 00	.....
Somers Point (closing up)	1871	1881	.....	500	.....	.....	38,372 11	.....	16,725 00	14,754 04	.....
Atlantic City	1869	1882	259	2,018	.....	907	213,216 44	1,481 00	181,400 00	26,717 27	3,618 17
Linwood (closing up)	1869	.....	.....	98	.....	.....	.....	.....	.....	.....	.....
Mays Landing	1871	1882	.....	188	.....	129	37,835 55	.....	23,900 00	13,433 24	592 31
BERGEN COUNTY.											
Rutherford Mutual	1876	1882	83	481	24	.....	25,036 20	.....	23,505 00	941 43	589 77
BURLINGTON COUNTY.											
Mt. Holly—Association of Mt. Holly	1862	1882	178	963	60	.....	31,194 59	750 00	28,900 00	1,405 16	139 43
Mutual Benefit	1872	July, 1882	64	584	.....	.....	49,704 17	300 00	46,190 00	2,431 13	744 39
Industry	1874	April, 1882	.....	1,726	.....	.....	68,955 35	1,300 00	64,250 76	2,686 15	447 44
Beverly—Building and Loan	1868	Oct., 1882	196	954	84	345	76,398 41	5,792 48	60,350 00	10,550 00	561 45
Burlington City—"City of Burlington"	1869	1882	255	765	.....	295	75,614 54	15,918 00	56,400 00	2,050 00	1,246 00
Farmers' and Mechanics'	1871	March, 1882	160	667	.....	271	70,672 93	4,550 00	54,800 00	5,537 00	5,785 93
Riverton	1878	Oct., 1882	183	1,071	.....	263	46,170 81	.....	40,200 00	7,860 00	644 75
Bordentown	1880	March, 1882	198	748	37	.....	26,750 00	.....	25,350 00	1,400 00	.....
Tuckerton	1874	March, 1882	174	644	102	.....	45,047 27	950 00	42,059 37	2,037 90	.....
Fieldsboro	1881	Oct., 1882	108	380	11	.....	4,835 33	.....	6,275 00	.....	55 84
Florence—Savings Fund and Building and Loan	1882	April, 1882	62	323	4	.....	2,620 00	.....	2,600 00	.....	.....
Mechanics' (closing up)	1868	1882	26	138	17	.....	24,272 29	845 00	16,650 00	5,189 27	.....
Pemberton "	1868	March, 1882	24	186	18	.....	14,027 30	.....	14,070 00	600 00	18 80

Moorestown	1869	1882	.....	1,762	.....	.....	‖ 40,506 04	.....	56,100 00	997 76	7,100 28
CAMDEN COUNTY.											
Camden City—People's	1871	1882	309	1,792½	.....	706¾	177,201 17	32,440 00	141,350 00	.....	.....
Franklin	1873	1882	.....	1,613½	.....	587¾	135,229 61	7,470 00	118,712 72	7,018 28	2,352 66
Tradesmen's	1868	1882	.....	863	.....	.....	81,907 83	36,073 00	71,360 00	651 68	2,963 48
Mechanics' and Workingmen's	1871	1882	345	1,547½	.....	408	103,890 00	15,900 00	76,670 00	.....	.....
South Ward	1859	1882	.....	1,202	90	257	90,392 57	22,250 52	71,400 00	372 43	600 62
Newton Township	1869	1882	232	1,794	102	.....	89,898 97	20,850 00	72,950 00	.....	.....
Mutual	1872	1882	122	901	40	639	84,183 66	26,460 00	58,375 00	.....	.....
City	1875	1882	.....	899½	.....	302½	72,052 25	8,600 00	62,500 00	654 05	331 20
Odd Fellows'	1869	1881	.....	907½	.....	192½	57,990 07	10,200 00	56,754 00	.....	4,649 74
North Camden	1879	1882	247	1,305	40	267	54,503 22	.....	53,100 00	.....	.....
Excelsior	1870	1882	151	1,168	50	294½	70,772 92	11,050 00	58,869 76	865 91	310 02
Artisans'	1873	1882	99	341½	28	91	28,095 78	7,122 50	19,200 00	.....	525 37
Economy	1882	.....	169	1,044	12	.....	.....	.....	10,900 00	.....	.....
Camden	1867	1882	286	1,939	92	482	148,482 15	56,653 62	96,400 00	150 00	2,222 95
Gloucester City	1866	1882	189	1,179¾	103	617½	92,314 95	1,145 00	123,500 00	.....	1,182 46
Haddonfield	1874	1882	.....	1,419	.....	360¾	114,232 32	6,600 00	96,400 00	9,547 27	2,005 04
Merchantville	1880	1882	80	815	21	.....	22,598 88	.....	19,900 00	1,857 95	390 93
CAPE MAY COUNTY.											
Cape May City	.....	1882	.....	829	.....	202	43,401 71	.....	40,400 00	3,001 71	.....
Cape May Point	1876	1882	56	294	.....	.....	31,452 99	2,000 00	25,800 00	2,401 54	1,255 70
South Seaville	1872	1882	126	238	41	.....	22,989 85	50 00	19,600 00	2,953 58	412 25
Cape May Court House	2872	1882	105	185	48	.....	20,161 43	225 00	15,678 00	2,650 00	*1,608 43
Tuckahoe	1870	1882	115	330	56	.....	27,007 99	.....	27,000 00	.....	7 91
Dennisville	1881	1882	60	100	3	.....	1,128 71	.....	1,128 00	.....	.....
CUMBERLAND COUNTY.											
Millville—Security Perpetual	.....	1882	.....	710½	.....	97⅞	19,626 28	.....	†19,475 00	32 57	118 71
Stock Building‡	1874	1882	98	1,280	.....	.....	64,000 00	3,000 00	61,000 00	.....	.....
Millville Perpetual	1866	1882	77	110¾	75	95⅓	22,315 99	.....	19,050 00	116 24	3,149 75
Millville Savings Fund	1870	1882	72	184	35	92½	19,664 70	.....	†18,500 00	617 59	547 11
Hope	1880	1882	178	857	34	108¾	21,820 75	.....	21,750 00	.....	80 00
Vineland—Mechanics'	1873	1882	.....	197	.....	.....	10,900 33	1,000 50	8,034 47	1,015 13	.....
Bridgeton—Savings Fund, &c	1865	1882	685	2,376	231	.....	205,992 00	.....	205,992 00	.....	7,167 68
Merchants' and Mechanics'	1870	1882	.....	1,591	.....	.....	101,427 28	11,560 32	86,271 32	1,695 64	.....
ESSEX COUNTY.											
Newark—Excelsior	1879	1882	.....	3,263	.....	490	100,340 82	.....	98,300 00	1,811 72	229 10
People's	1873	1882	60	568	20	212	63,765 12	14,307 90	45,763 00	6,002 12	.....
Mutual	1867	1882	140	821	.....	.....	38,961 27	2,500 00	35,900 00	465 42	95 85
German	1881	.....	.....	1,700	.....	.....	.....	.....	30,000 00	.....	.....
Central	1881	1882	250	1,450	14	.....	18,021 95	.....	14,500 00	3,521 45	.....
Germania	1872	.....	20	50	.....	.....	.....	§20,000 00	.....	.....	.....
Belleville	1873	1882	65	378	16	151	34,817 59	.....	33,150 00	1,120 19	992 40
GLOUCESTER COUNTY.											
Woodbury	1871	1882	282	2,450	110	477½	109,000 00	1,000 00	106,150 00	1,850 00	.....
Swedesboro	1871	1882	57	236	32	138	34,511 54	.....	32,351 31	1,395 91	764 27
Williamstown	1870	1882	135	531	56	143	33,215 79	1,079 58	26,130 00	5,007 30	998 91
Paulsboro	1873	1882	114	352	42	.....	30,142 85	1,900 00	28,242 85	197 50	.....

* Cash on hand. † Form of investment not stated. ‡ Organized under a special act. Money is loaned to all who desire to borrow (though not members), to be paid in ten years in monthly installments. § Unimproved land, for which $20,000 were paid in 1872. ‖ Exclusive of amount due to first series.

BUILDING AND LOAN ASSOCIATIONS OF NEW JERSEY.

NAME AND LOCATION.	Date of organization.	Date of latest report.	Number of shareholders.	Number of shares.	Number of shareholders borrowers.	Number of shares borrowed on.	Total net assets.	ASSETS INVESTED. In real estate.	On bond and mortgage.	Other forms of investment, including cash on hand.	All dues owing to the association.
GLOUCESTER COUNTY—Continued.											
Mullica Hill	1875	1881	103	350	.....	.....	$22,432 26	.....	*$19,641 61	$2,023 94	$766 71
Clayton	1880	1882	90	355	13	.....	9,138 53	.....	9,000 00	138 13	.....
Clarksboro	1877	1882	.....	212	.....	.....	15,776 52	.....	8,800 00	6,949 12	27 40
HUDSON COUNTY.											
Harrison	1873	1882	314	2,052¾	71	431¾	87,812 29	$3,502 66	88,701 85	652 01	780 69
Bayonne	1879	1882	220	1,171	54	281	69,279 78	.....	65,600 00	3,464 00	215 78
Jersey City—Bergen Mutual	1881	1882	140	830	110	50	22,100 00	.....	22,050 00	50 00	100 00
Greenville	1875	1882	592	1,919	58	183	†75,858 24	.....	69,200 28	6,501 70	76 40
HUNTERDON COUNTY.											
Flemington	1877	1882	72	423	20	.....	28,804 34	.....	*22,720 00	4,900 00	.....
White House (closing up)	1871	1881	61	337	38	231	61,424 63	3,000 00	52,057 68	1,923 55	2,206 50
Junction—Building and Loan	1870	1881	.....	245	.....	90	41,934 40	14,300 00	*18,000 00	6,221 00	3,483 85
Mutual	1873	1882	.....	32	15	17	3,723 05	700 00	2,600 00	423 05	.....
Lambertville	1876	1882	.....	1,871	.....	485	99,226 39	1,250 00	95,800 00	1,341 49	834 90
MERCER COUNTY.											
Trenton—Mechanics' Mutual	1862	1882	264	1,403	52	.....	65,505 55	9,823 97	44,259 39	4,599 19	.....
Mercer Mutual	1854	1882	247	1,484	84	.....	122,484 47	7,995 01	89,238 00	6,692 46	.....
MIDDLESEX COUNTY.											
New Brunswick—Union ‡	1869	1881	.....	1,095½	.....	.....	219,101 04	64,400 52	157,071 00	.....	.....
Home§	1871	1882	.....	692	.....	.....	134,257 27	3,000 00	122,882 31	4,716 96	3,658 00
Empire	1872	1882	.....	417	.....	.....	60,673 97	8,500 00	50,050 00	445 27	3,478 70
New Brunswick	1873	1882	93	645	.....	343½	95,733 21	10,000 00	78,503 55	666 81	6,562 85
Citizens'	1873	1882	132	994	74	.....	142,224 37	2,900 00	97,750 00	40,626 97	947 40
Excelsior	1877	1882	247	1,471	159	.....	130,000 00	4,000 00	112,000 00	.....	.....
People's	1880	1882	418	2,909	79	.....	79,182 46	.....	75,000 00	3,786 41	349 30
American	1881	1882	191	1,072	68	.....	14,043 29	.....	13,614 00	68 19	361 10
New Market—Building and Loan	1868	1882	45	159½	40	123	26,891 98	.....	10,970 00	13,950 00	2,160 97
Kingston—Savings and Loan	1877	1882	45	144	.....	.....	5,959 78	.....	5,500 00	51 06	408 77
Building and Loan	1879	1882	74	282½	31	.....	13,254 33	1,250 00	11,800 00	64 11	140 22
Perth Amboy—Raritan Centennial	1876	1882	115	591	70	.....	65,800 00	.....	63,900 00	.....	1,900 00
Raritan City	1880	1882	199	976	42	.....	35,300 00	.....	32,800 00	1,800 00	900 00
Raritan Crescent	1882	.....	141	771	5	.....	5,200 00	.....	2,600 00	2,100 00	470 00

Perth Amboy—Workingmen's	1882			750							
Jamesburg—Mutual	1869	1882	241	1,267		327¾	78,174 20	3,655 00	66,550 00	7,204 25	764 85
South Amboy—Enterprise	1873	1882	123	480	56		42,354 41	5,676 23	30,250 00		
Building and Loan	1882		372	1,630	27		15,819 30		14,200 00	1,500 00	228 00
MONMOUTH COUNTY.											
Asbury Park	1874	1882	224	762	91		61,959 14		61,400 00		1,199 42
Keyport	1880	1881	212	725			9,150 30	1,000 00	8,200 00		184 40
Long Branch	1869	1882	173	723	53		57,564 01	4,505 00	48,600 00	1,725 00	2,733 23
Freehold—Mutual	1869	1882	251	1,354	94	427	126,340 44	30,406 91	93,858 31	1,370 47	1,908 84
Monmouth Mutual	1874	1882	59	251			41,268 58	17,300 00	22,200 00	990 48	
Manasquan	1873	1882		325			40,064 61	100 00	38,200 00	1,638 90	125 71
PASSAIC COUNTY.											
Paterson—Mutual	Nov., 1878	1881	738	3,315	262		137,394 00		137,394 00		
Celtic	April, 1882	1882	120	569	8		5,700 00		4,700 00	1,000 00	
Passaic City—Mutual	April, 1882		130	754	6		5,000 00		4,000 00		
SALEM COUNTY.											
Salem—Franklin	1861	1882	543	2,247	212		202,414 09	10,067 63	175,050 00	14,649 00	2,647 45
Quinton	1870	1882	222	450	56		9,446 96		5,600 00		4,000 00
Woodstown	1870	1882	151	666			21,470 77		21,470 77		
SOMERSET COUNTY.											
Raritan—First‖	March, 1873	1882	41	164½	30		27,915 27	1,773 07	23,523 06		2,419 14
Raritan—Second	April, 1880	1882	139	677½	30		23,875 62		23,000 00		875 62
Pluckamin (closing up)	1871	1882	30	78	25		15,665 31		¶900 00		
UNION COUNTY.											
Elizabethport	1875	1882	200	**803	50		35,304 19		33,600 00	1,385 69	318 50
Elizabeth—Building and Loan	1869	1882	300	1,394	142		145,000 00	20,400 00	81,200 00	42,300 00	
Harmonia	1872	1882	220	1,005	74		60,068 31		57,800 00	2,268 31	
WARREN COUNTY.											
Phillipsburg—No. 3 (ran out)	1871	1881		608			119,291 50	4,900 00	109,000 00	2,013 83	3,577 67
No. 4	1876	1882	204	1,051	71	302	70,304 65	6,530 00	60,414 57	1,200 00	1,494 62
No. 5	1882		184	1,000	5		5,343 00		5,000 00		14 30
Oxford (closing up)	1871	1882	38	198	26	142	42,256 33	2,326 50	28,400 00	6,133 60	5,396 23

* Including notes. † Profits to December, 1881, $22,553.59. Shares borrowed on not counted. ‡ Being closed up. The association owns the Masonic hall ($50,000,) which has not yet been disposed of. § Shares matured after running 125 months. ‖ Gradually closing up. In April it had 336 shares out; in October, 164½. ¶ Balance in notes. ** Distributed among 27 series.

BUILDING AND LOAN ASSOCIATIONS--Continued. VALUE OF SHARES.

		First Series.	Second Series.	Third Series.	Fourth Series.	Fifth Series.	Sixth Series.	Seventh Series.	Eighth Series.	Ninth Series.	Tenth Series.	Eleventh Series.	Twelfth Series.	Thirteenth Series.	Fourteenth Series.	Fifteenth Series.
ATLANTIC COUNTY.																
Hammonton—Building and Loan	Dues paid per share	$105 00	$84 00	$72 00	$60 00	$48 00	$36 00	$24 00	$12 00							
	Present value per share	201 56	148 47	119 49	93 04	69 98	50 94	33 86	14 92							
	Profits per share	96 56	64 47	47 49	33 04	21 98	14 94	9 86	2 92							
Workingmen's	Dues paid per share	72 00	60 00	48 00	36 00	24 00	12 00									
	Present value per share	98 80	79 23	58 78	41 62	26 43	12 81									
	Profits per share	26 80	19 23	10 78	5 62	2 43	81									
Pleasantville	Dues paid per share	108 00	36 00	24 00												
	Present value per share	184 27	40 46	24 72												
	Profits per share	76 27	4 46	72												
Absecom	Dues paid per share	112 00	104 00													
	Present value per share	200 00	154 00													
	Profits per share	88 00	50 00													
Atlantic City	Dues paid per share	108 00	84 00	48 00	24 00	12 00										
	Present value per share	196 36	137 73	63 80	30 44	15 90										
	Profits per share	88 36	43 73	15 80	6 44	3 90										
BERGEN COUNTY.																
Rutherford	Dues paid per share	77 00	71 00	65 00	59 00	53 00	45 00	35 00	29 00	$17 00	$10 00					
	Present value per share	122 52	106 24	92 32	79 85	67 93	54 14	39 68	31 84	17 70	10 12					
	Profits per share	45 52	35 24	27 32	20 85	14 93	9 14	4 68	3 84	70	12					
BURLINGTON COUNTY.																
Mt. Holly—Building and Loan	Dues paid per share	65 50	60 50	54 50	48 50	24 50	18 50	12 50	6 50							
	Present value per share	100 08	89 29	88 29	69 17	31 11	21 88	13 51	6 80							
	Profits per share	34 58	28 99	33 79	20 67	7 21	3 38	1 01	30							
Industry	Dues paid per share	48 50	42 50	36 50	30 50	24 50	18 50	12 50	6 50							
	Present value per share	68 55	57 40	47 12	37 64	28 90	20 84	13 42	6 60							
	Profits per share	20 05	14 90	10 62	7 14	4 40	2 34	92	10							
Beverly	Dues paid per share	120 00	108 88	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00					
	Present value per share	193 68	164 83	137 28	113 57	90 38	72 12	54 41	39 49	25 67	12 71					
	Profits per share	73 68	56 83	41 28	29 57	18 38	12 12	6 41	3 49	1 67	71					
Burlington City—"City of Burlington"	Dues paid per share	112 00	103 00	78 00	66 00	55 00	31 00	19 00	6 00							
	Present value per share	167 36	144 28	101 71	81 90	64 63	35 84	21 64	7 47							
	Profits per share	55 36	41 28	23 71	15 90	9 63	4 84	2 64	1 47							
Farmers' and Mechanics'	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00					
	Present value per share	199 32	172 45	148 15	124 09	100 63	80 69	62 66	46 55	30 96	15 16					
	Profits per share	79 32	64 45	52 15	40 09	28 63	20 69	14 66	10 55	6 96	3 16					
Riverton	Dues paid per share	48 00	36 00	24 00	12 00											
	Present value per share	61 44	45 20	29 64	14 81											
	Profits per share	13 44	9 20	5 64	2 81											

Moorestown	Dues paid per share	39 00	33 00	27 00	21 00	12 00													
	Present value per share	49 24	40 46	31 87	23 86	13 03													
	Profits per share	10 24	7 46	4 87	2 86	1 03													
Florence—Mechanics'	Dues paid per share	130 00	100 00																
	Present value per share	200 00	149 58																
	Profits per share	70 00	49 58																
CAMDEN COUNTY.																			
Camden—People's	Dues paid per share	132 00	120 00	108 00	96 00	84 00	72 00	60 00	48 00	46 00	24 00	$12 00							
	Present value per share	203 20	184 30	165 99	146 77	126 04	105 78	86 39	67 55	51 05	35 45	17 68							
	Profits per share	71 20	64 34	57 99	50 77	42 04	33 78	26 39	19 55	15 05	11 45	5 68							
Franklin	Dues paid per share	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00									
	Present value per share	152 39	133 37	114 62	96 03	79 21	64 47	51 69	35 84	17 35									
	Profits per share	44 39	37 37	60 62	24 03	19 21	16 47	15 69	11 84	5 35									
Tradesmen's	Dues paid per share	132 00	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00								
	Present value per share	184 81	153 46	132 18	111 03	91 29	73 78	61 78	49 78	37 78	25 18								
	Profits per share	52 81	33 46	24 18	15 03	7 29	1 78	1 28	1 78	1 78	1 18								
Newton Township	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00								
	Present value per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00								
Mechanics' & W'k'gmen's	Dues paid per share	132 00	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00							
	Present value per share	191 48	176 18	156 16	137 91	118 87	98 70	79 37	59 67	43 50	29 88	15 18							
	Profits per share	59 48	56 18	48 16	41 91	34 87	26 70	19 37	11 67	7 50	5 88	3 18							
South Ward	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00								
	Present value per share	183 58	161 71	138 93	116 44	94 36	76 61	69 94	46 03	30 88	16 21								
	Profits per share	63 58	53 71	42 93	32 44	22 36	16 61	12 94	10 03	6 88	4 21								
Mutual	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00								
	Present value per share	170 02	153 38	134 76	115 75	97 19	78 45	59 89	47 87	35 86	18 15								
	Profits per share	50 02	45 38	38 76	31 75	25 19	18 45	11 89	11 87	11 86	6 15								
City	Dues paid per share	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00										
	Present value per share	123 67	105 36	86 68	72 23	59 14	46 92	32 48	17 23										
	Profits per share	27 68	21 36	14 68	12 22	11 14	10 92	8 48	5 23										
Odd Fellows'	Dues paid per share	84 00	72 00	60 00	48 00	36 00	24 00	12 00											
	Present value per share	196 00	85 15	65 14	52 14	39 93	26 95	13 38											
	Profits per share	18 00	13 15	5 14	4 14	3 98	2 95	1 38											
North Camden	Dues paid per share	36 00	24 00	12 00															
	Present value per share	44 61	28 78	13 43															
	Profits per share	8 61	4 78	1 43															
Excelsior	Dues paid per share	72 00	66 00	60 00	54 00	48 00	42 00	36 00	30 00	24 00	18 00	12 00	$6 00						
	Present value per share	134 06	124 11	114 90	103 49	90 88	77 63	65 73	51 03	42 53	29 51	16 78	8 94						
	Profits per share	62 06	58 11	54 90	40 49	42 88	35 63	29 73	21 03	18 53	11 51	4 78	2 94						
Artisans'	Dues paid per share	101 00	96 00	84 00	78 00	72 00	66 00	60 00	54 00	42 00	36 00	30 00	24 00	$18 00	$12 00	$6 00			
	Present value per share	147 42	140 36	123 15	113 88	104 61	95 88	87 35	77 66	58 95	49 93	42 07	34 21	25 89	17 57	8 78			
	Profits per share	46 42	44 36	39 15	35 88	32 61	29 88	27 35	23 66	16 95	13 93	12 07	10 21	7 89	5 57	2 78			
Camden	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00								
	Present value per share	186 69	164 51	140 65	116 76	95 74	76 95	58 57	44 66	29 35	14 71								
	Profits per share	66 69	56 51	44 65	32 76	23 74	16 19	10 57	8 66	5 35	2 71								
Gloucester City	Dues paid per share	121 00	109 00	97 00	85 00	61 00	49 00	37 00	25 00	13 00									
	Present value per share	183 54	154 67	127 43	106 17	73 56	57 36	41 35	27 19	14 50									
	Profits per share	62 54	45 67	30 49	21 17	12 56	8 36	4 35	2 19	1 50									
Haddonfield	Dues paid per share	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00										
	Present value per share	140 34	114 03	90 68	72 56	54 36	39 58	25 70	12 50										
	Profits per share	44 34	30 03	18 68	12 56	6 86	3 58	1 70	50										
CAPE MAY COUNTY.																			
South Seaville	Dues paid per share	120 25	108 25	96 25	84 25	60 25	48 25	36 25	24 25	12 25									
	Present value per share	192 35	168 60	141 90	117 57	78 24	60 28	44 46	28 43	14 45									
	Profits per share	72 10	60 35	45 65	33 33	17 99	12 03	8 21	4 18	2 20									

BUILDING AND LOAN ASSOCIATIONS—Continued. VALUE OF SHARES.

		First Series.	Second Series.	Third Series.	Fourth Series.	Fifth Series.	Sixth Series.	Seventh Series.	Eighth Series.	Ninth Series.	Tenth Series.	Eleventh Series.	Twelfth Series.	Thirteenth Series.	Fourteenth Series.	Fifteenth Series.
CAPE MAY COUNTY—Con.																
Cape May Court House	Dues paid per share	$130 00	$108 00	$96 00	$84 00	$72 00	$60 00	$48 00	$36 00	$24 00	$12 00					
	Present value per share	177 24	154 63	132 56	112 77	93 39	74 45	56 87	38 40	25 12	12 36					
	Profits per share	47 24	46 63	36 56	28 77	21 39	14 45	8 87	2 40	1 12	36					
Tuckahoe	Dues paid per share	114 00	102 00	90 00	78 00	66 00	54 00	42 00	30 00	18 00	6 00					
	Present value per share	189 03	149 04	120 09	99 11	81 56	65 52	50 42	35 07	22 12	8 81					
	Profits per share	75 03	47 04	30 09	21 11	15 56	11 52	8 42	5 07	4 12	2 81					
CUMBERLAND COUNTY.																
Millville—Security	Dues paid per share	96 00	72 00	48 00	36 00	24 00	12 00									
	Present value per share	132 08	92 37	57 27	41 20	26 32	12 56									
	Profits per share	36 08	20 37	9 27	5 20	2 32	56									
Perpetual	Dues paid per share	120 00	108 00	96 00	84 00											
	Present value per share	176 30	154 25	132 15	111 81											
	Profits per share	56 30	46 25	36 15	27 81											
Savings Fund	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	24 00								
	Present value per share	175 25	150 80	128 50	107 60	87 88	69 20	27 84								
	Profits per share	55 25	42 80	32 50	23 60	15 88	9 20	3 84								
Vineland	Dues paid per share	108 00	96 00	24 00	12 00											
	Present value per share	159 47	143 64	25 24	12 82											
	Profits per share	51 47	47 64	1 24	82											
Bridgeton—Savings Fund	Dues paid per share	128 00	104 00	80 00	56 00	32 00	7 00									
	Present value per share	182 84	140 70	105 29	68 30	35 58	8 30									
	Profits per share	54 84	36 70	25 29	12 35	3 58	1 30									
Merchants' and Mechanics'	Dues paid per share	120 00	108 00	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00					
	Present value per share	186 77	164 36	136 43	115 59	95 54	75 53	57 23	41 12	26 59	13 55					
	Profits per share	66 77	56 36	40 43	31 59	23 54	15 53	9 23	5 12	2 59	1 55					
ESSEX COUNTY.																
Belleville	Dues paid per share	108 00	102 00	96 00	90 00	84 00	78 00	66 00	48 00	36 00	24 00	$12 00				
	Present value per share	192 66	162 03	149 21	133 92	117 50	110 88	93 66	65 15	55 85	34 61	17 00				
	Profits per share	64 66	60 03	53 21	43 92	33 50	32 88	27 66	17 15	19 85	10 61	5 00				
Newark—Excelsior	Dues paid per share	36 00	12 00													
	Present value per share	41 22	13 88													
	Profits per share	5 22	1 88													
Mutual	Dues paid per share	105 00	102 00	99 00	90 00	84 00	78 00	48 00	42 00	30 00	24 00	12 00				
	Present value per share	136 87	132 96	129 05	117 32	109 50	101 68	62 57	54 75	39 10	31 28	15 64				
	Profits per share	31 87	30 96	30 05	27 32	25 50	23 68	14 57	12 75	9 10	7 28	3 64				
People's	Dues paid per share	108 00	81 00	48 00	24 00											
	Present value per share	179 50	137 80	78 54	32 54											
	Profits per share	71 50	56 80	30 54	8 54											

GLOUCESTER COUNTY.												
Woodbury	Dues paid per share	126 00	114 00	102 00	90 00	78 00	66 00	54 00	42 00	30 00	18 00	6 00
	Present value per share	200 00	171 00	144 86	120 36	98 65	79 09	62 14	46 29	32 25	19 06	6 15
	Profits per share	74 00	57 02	42 06	30 36	20 65	13 09	8 14	4 29	2 25	1 06	15
Swedesboro	Dues paid per share	121 00	109 00	97 00	85 00	73 00	61 00	49 00				
	Present value per share	174 08	157 46	130 70	108 85	89 22	74 95	59 09				
	Profits per share	53 08	48 46	33 70	23 85	16 22	13 95	10 09				
Williamstown	Dues paid per share	120 00	108 00	96 00	72 00	60 00	48 00	36 00	24 00	12 00		
	Present value per share	197 00	164 50	137 25	94 58	74 60	55 33	39 56	25 53	12 44		
	Profits per share	77 00	56 50	41 25	22 58	14 60	7 33	3 56	1 53	44		
Paulsboro	Dues paid per share	116 00	104 00	92 00	80 00	68 00	44 00	8 00				
	Present value per share	180 59	159 79	136 47	114 52	93 04	53 73	10 16				
	Profits per share	64 59	55 79	44 47	34 52	25 04	9 73	2 16				
Mullica Hill	Dues paid per share	72 00	60 00	48 00	36 00	24 00	12 00					
	Present value per share	92 71	73 55	56 31	39 88	26 22	12 05					
	Profits per share	20 71	13 55	8 31	3 88	2 22	05					
HUDSON COUNTY.												
Harrison	Dues paid per share	108 06	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00		
	Present value per share	165 62	141 52	114 86	97 60	77 78	59 38	42 40	26 84	12 71		
	Profits per share	57 62	45 52	30 86	25 60	17 78	11 38	6 40	2 64	71		
Greenville	Dues paid per share	88 00	62 00	36 00	10 00							
	Present value per share	151 76	105 48	53 67	14 52							
	Profits per share	63 76	43 48	19 67	4 52							
HUNTERDON COUNTY.												
Lambertville	Dues paid per share	72 00	60 00	48 00	36 00	24 00	12 00					
	Present value per share	91 36	73 67	54 26	39 21	26 13	13 00					
	Profits per share	19 36	13 67	6 26	3 21	2 13	1 00					
MERCER COUNTY.												
Trenton—Mechanics'	Dues paid per share	125 00	77 00	5 00								
	Present value per share	162 44	91 18	5 18								
	Profits per share	37 44	14 18	18								
Mutual	Dues paid per share	137 00	105 00	33 00								
	Present value per share	181 84	131 07	36 00								
	Profits per share	42 84	26 07	3 00								
MIDDLESEX COUNTY.												
Jamesburg	Dues paid per share	120 00	72 00	36 00	12 00							
	Present value per share	176 09	95 90	44 29	13 95							
	Profits per share	56 09	23 90	8 29	1 95							
South Amboy—Enterprise	Dues paid per share	108 00	36 00									
	Present value per share	152 54	45 97									
	Profits per share	44 54	9 97									
MONMOUTH COUNTY.												
Asbury Park	Dues paid per share	96 00	84 00	72 00	60 00	48 00	36 00	24 00	12 00			
	Present value per share	171 24	149 94	117 57	82 38	64 62	42 61	27 64	13 32			
	Profits per share	75 24	65 94	45 57	23 38	16 62	6 51	3 64	1 32			
Long Branch	Dues paid per share	120 00	84 00	36 00	24 00	12 00						
	Present value per share	183 44	107 33	45 74	27 45	12 27						
	Profits per share	63 44	23 33	9 74	3 45	27						
Freehold—Mutual	Dues paid per share	101 00	24 00									
	Present value per share	159 48½	25 58									
	Profits per share	58 48½	1 58									
Manasquan	Dues paid per share	105 00	36 00									
	Present value per share	167 17	39 79									
	Profits per share	62 17	3 79									

BUILDING AND LOAN ASSOCIATIONS—Continued. VALUE OF SHARES.

		First Series.	Second Series.	Third Series.	Fourth Series.	Fifth Series.	Sixth Series.	Seventh Series.	Eighth Series.	Ninth Series.	Tenth Series.	Eleventh Series.	Twelfth Series.	Thirteenth Series.	Fourteenth Series.	Fifteenth Series.
PASSAIC COUNTY.																
Paterson Mutual	Dues paid per share	$49 00	$47 00	$35 00	$23 00	$11 00										
	Present value per share	60 18	57 46	41 11	26 23	12 54										
	Profits per share	11 18	10 46	6 11	3 23	1 54										
SALEM COUNTY.																
Salem City	Dues paid per share	132 00	120 00	108 00	96 00	84 00	$72 00	$60 00	$48 00	$36 00	$24 00	$12 00				
	Present value per share	187 83	164 26	142 76	121 13	101 16	84 28	67 97	52 96	39 14	25 79	12 41				
	Profits per share	55 83	44 26	34 76	25 13	17 15	12 29	7 97	4 96	8 14	1 79	41				
Woodstown	Dues paid per share	42 00	30 00	18 00	6 00											
	Present value per share	53 47	35 16	19 77	6 30											
	Profits per share	11 47	5 16	1 77	30											
Quinton	Dues paid per share	88 00	12 00													
	Present value per share	104 86	12 58													
	Profits per share	16 86	58													
UNION COUNTY.																
Elizabethport	Dues paid per share	81 00	78 00	72 00	60 00	48 00	36 00	30 00	24 00	12 00						
	Present value per share	119 07	113 23	100 68	78 37	59 82	42 57	35 62	28 44	13 83						
	Profits per share	38 07	35 23	28 68	18 37	11 82	6 67	5 62	4 44	1 83						
WARREN COUNTY.																
Phillipsburg, No. 4	Dues paid per share	72 00	60 00	48 00	36 00	24 00	12 00									
	Present value per share	98 08	79 21	61 29	44 66	29 37	14 50									
	Profits per share	26 08	19 21	13 29	8 66	5 37	2 50									

BUILDING AND LOAN ASSOCIATIONS—Continued.

	Amount paid per share.	Present value.	Profit per share.
ATLANTIC COUNTY.			
Hammonton—Mutual	$96 00	$149 29	$53 29
Somers Point	126 00	200 00	74 00
BURLINGTON COUNTY.			
Bordentown	31 00	35 00	4 00
Tuckerton	48 50	69 94	21 44
Fieldsboro	12 00	12 72	72
Florence—Savings Fund	7 00	7 40	40
Pemberton	54 50	75 41	20 91
CAMDEN COUNTY.			
Merchantville	26 00	27 72	1 72
CAPE MAY COUNTY.			
Dennisville	12 00	11 29	.....
CUMBERLAND COUNTY.			
Millville—Hope	24 00	25 64	1 64
ESSEX COUNTY.			
Newark—Central	12 00	12 45	45
GLOUCESTER COUNTY.			
Clayton	24 00	25 74	1 74
Clarksboro	60 00	74 46	14 46
HUDSON COUNTY.			
Bayonne	41 50	58 92	17 42
Bergen	21 50	23 50	2 00
HUNTERDON COUNTY.			
Flemington	60 00	68 10	8 10
White House	120 00	182 26	62 26
Junction	132 00	171 12	39 12
" Mutual	103 00	120 65	17 65
MIDDLESEX COUNTY.			
New Brunswick—Union	$144 00	$200 00	$66 00
Empire	120 00	145 50	25 50
Home	132 00	194 01	62 01
New Brunswick	108 00	148 42	40 42
Citizens'	108 00	143 08	35 08
Excelsior	65 00	80 00	15 00
People's	24 00	27 22	3 22
American	12 00	13 10	1 10
New Market	120 25	168 66	48 41
Kingston	36 00	46 90	10 90
Savings Fund	30 25	41 38	11 13
Perth Amboy—Raritan City	30 00	36 50	6 50
Centennial	78 00	111 00	33 00
Crescent	6 00	7 00	1 00
Workingmen's	8 00	10 00	2 00
South Amboy	9 00	9 70	70
MONMOUTH COUNTY.			
Keyport	12 00	12 62	62
Freehold—Monmouth	108 00	160 40	52 40
PASSAIC COUNTY.			
Paterson—Celtic	6 00	6 20	20
Passaic	6 00	6 90	90
SOMERSET COUNTY.			
Raritan (1)	115 00	168 81	53 81
" (2)	31 00	34 06	3 06
Pluckamin	141 00	200 83	59 83
WARREN COUNTY.			
Phillipsburg, No. 3	120 00	196 20	76 20
Oxford	600 00	213 42	.....

PART IV.

CARP AND CARP CULTURE.

CARP AND CARP CULTURE.

[The introduction of carp into this country from Germany was begun by the Commissioner of Fish and Fisheries of the United States, in 1876, when Mr. Rudolph Hessel was sent to Europe to make a selection of the best varieties of European carp. In his report for 1879 the Commissioner says: "The importance of securing a fresh supply of the best German carp for distribution throughout the country induced me to attempt the renewal of the stock which had been brought over by Mr. Hessel. I therefore gladly embraced an offer made by Dr. Otto Finsch, an eminent German naturalist, to bring over with him, on an intended visit to the United States, an additional lot." These carp were landed at Hoboken in May, 1879, and were at once transferred to the ponds at Washington. The importance of carp as a food fish, on account of the cheapness and certainty with which they can be propagated, cannot be overestimated; and in view of the fact that a number of applications had been made to the Bureau for information upon the subject, we were led to ask permission of Mr. Milton P. Pierce, one of the Assistant United States Fish Commissioners, who in that capacity supplied many ponds in this State with carp, to reprint a paper, which, at the request of prominent officers of several of the States, he had prepared to be used in connection with their several reports.]

Fish culture being barely a quarter of a century in existence in this country, it will be proper to commence this paper with a brief summary of its rise and progress in foreign countries.

The early foreign writers always alluded to fisheries as the agriculture of waters, apparently considering seas, lakes, rivers, streams, and ponds inexhaustible preserves of food which could never be impoverished by the wants or desires of man. At a comparatively remote epoch, however, the more observing and enlightened minds discovered that fisheries were but harvestings, and that in order to secure repeated satisfactory crops, some system of sowing must be resorted to. This discovery, however, was evidently not made until mankind began to forsake their nomadic habits, and became settled in permanent locations. The first attempts at fish culture, of which we have any history, were made by Chinese and ancient Romans. The methods adopted by the people of those nations were simply the collection of young fish into natural and artificial reservoirs, sometimes supplying them artificial food, but generally permitting them to prey upon each other.

This method is still in vogue to some extent in all parts of the civilized world, and even among half-civilized people. Many of the Northern and Middle States have practically adopted this method, by the introduction of the much-prized black bass into their waters. This valuable variety of food and game fish subsists almost entirely upon other and generally comparatively worthless varieties of fish, and is of all others the best known variety for stocking such waters as are infested with pickerel, pike, catfish, and other predatory varieties. It is, therefore, not only feasible, but desirable, to continue under such conditions the ancient methods. This method, however, is not regarded as scientific fish culture in its modern and restricted sense.

The Chinese were undoubtedly the first to make a radical advance in the methods of fish culture. According to missionaries who penetrated the interior of China at an early day, a multitude of fish, of many varieties, ascend the rivers of Kiang-si, and into the ditches which convey water through the rice fields. In these ditches they deposit their eggs, which are soon hatched. Both the eggs and the young fish are the source of considerable income to the riparian proprietors. One of the French Jesuits, who at an early day traversed several of the Chinese provinces, in a published account of his travels, referred to the fish-cultural industry as follows: "In the great river Yang-tse-kiang, not far from the city of Kieon-king-fou, in the province of Kiang-si, at certain times of the year, are assembled a prodigious number of boats for the purchase there of the eggs of fish. Toward the month of May, the country people bar the river in various places with mats and hurdles for a length of about nine or ten leagues, leaving only sufficient space for the passage of the boats. The eggs of the fish are stopped by these hurdles. They can distinguish them by the eye, where other persons can see nothing in the water. They draw out this water, mixed with eggs, and fill vases with it for sale, which brings at this season numbers of merchants with their boats to buy and transport it into different provinces, taking care to agitate it from time to time. They succeed one another in this operation. The water is sold in measures to all who have fish-preserves and domestic ponds. After some days there are seen in the impregnated water as it were little heaps of fish eggs, without it being yet possible to distinguish the species. It is only with time that this appears. The profit is often a hundred-fold more than the outlay, as the people live in great part upon fish."

To these very simple methods of replenishing their inland waters, the Chinese are said to have joined others, which seem to have been very imperfectly understood and indicated by these travelers.

The Romans had similar customs at a very early epoch. The ancient Romans had a remarkable predilection for fish food, of which the principal luxury of their numerous banquets consisted, and the poets speak of sumptuous tables spread with this food exclusively. In the period between the taking of Carthage and the reign of Vespasian, this taste became a perfect passion, and for its gratification the senators and patricians, enriched by the spoils of Asia and Africa, often incurred the most extravagant outlays. Many of them constructed large and costly reservoirs, which they stocked with the rarest varieties of fish, and one historian states that Lucullus, like a new Xerxes, caused a mountain to be pierced in order to introduce sea water into his fish-ponds. Another refers to Hirrius, whose income from his buildings equaled $675,000 of our money, and that he employed the entire sum in the care of his fishes. The rich patricians, says the same author, were not satisfied with a single pond. Their fish preserves were divided into compartments, where they kept shut up apart from each other fishes of different kinds, and a large number of fishermen were retained solely to take care of them.

During the extended interval between the Roman Empire and the eighteenth century, history does not record any important progress in fish culture. The art, as already practiced, was however extended, and to some extent perfected during the middle ages, and fish-preserves became extremely numerous in France and Italy. Kings and princes all had artificial preserves in their domains. The religious communities gave special attention to the art, and maintained extensive preserves, where enormous quantities of fish were raised. These communities exacted heavy duties upon almost all fisheries, which tended by their practice to deplete the waters of this source of food supply.

So far as we have any historical record, the first important advance made in the art of fish culture and by which, according to the modern acceptation of the term, the art was reduced to a science, was the discovery of a method of artificial fecundation of fish, by a monk named Dom Pinchon, who lived about five centuries ago. The process was described in a manuscript dated 1420, but it was not published, and remained a secret until quite recently, so that practically the discovery had no influence on the real progress of the art, and is principally in-

teresting in a historical point of view. While the discovery of Dom Pinchon remained locked up in a manuscript, other active minds were seeking new methods which might serve to increase the production of food fishes. A Swedish counselor of Linkoeping, named Charles Frederic Lund, observed that many of the most esteemed varieties of fish of that country in casting their spawn attached the same to willows, twigs of pine, &c., which chanced to hang in the water inhabited by the fish. He caused large wooden boxes to be made without covers, but pierced with numerous little holes and furnished with rollers to admit of their easy descent into the water. In these boxes he placed twigs of pine and a few male and female fishes taken in the spawning season. After having left them there for a few days, until the female had deposited her eggs, (which were immediately fertilized by the male,) he removed the fishes with a net, and carefully arranged the boughs so that they would not press together too hard. In due time the eggs brought forth multitudes of small fishes. This simple process included all the conditions necessary to success, and in this manner Lund succeeded in transporting from one lake to another, boughs covered with spawn, keeping them of course under water during the transit. In this manner he transferred millions of young fishes from one lake to others.

About the year 1740, one J. L. Jacobi, a Lieutenant of militia in Westphalia, in watching trout during their spawning season, discovered that the female forced herself through the surface of gravel beds in clear water and thus cast her eggs, upon which the male trout immediately following cast his milt, stirring the eggs with his tail, and thus fertilizing them. Jacobi immediately caught both female and male trout, and over a vase, half filled with water, gently pressed the abdomen of first the female and then the male, letting fall into the water the mature product of both sexes, then stirring the water with his hand, rendered the mixture complete, and thus accomplished artificial fecundation, precisely as Dom Pinchon had done centuries before.

Jacobi did not "hide his light under a bushel," but sent manuscript notes to several prominent officials and literary men, describing his process. These manuscripts, or versions of the same, translated into different languages, were published in Germany, France, England, and probably Austria, and other European States, but the publications were mainly buried in the great libraries and had but a limited circulation. It seems, however, that an occasional savant, attracted

more by the novelty than the utility of the discovery, from time to time tried successful experiments. Descriptions of these experiments have been published, and translations are in the possession of the writer of this essay. Although very interesting, they are too voluminous to reproduce here.

About the years 1842–43, a French fisherman of La Bresse, named Joseph Rémy, made the same discovery which had been previously made by Dom Pinchon and Jacobi, and of which Rémy was entirely ignorant. Rémy associated with him another fisherman named Antoine Géhin, and these two unlettered fishermen made a careful study of the habits of trout, and soon succeeded in artificially fecundating and hatching thousands of eggs. They did not stop here, but systematized their work and commenced stocking ponds and watercourses in their region. The result of their experiments and labors becoming known to the Society of Emulation of the Vosges, that society investigated the matter and granted a premium to the two fishermen. Subsequently the French government recognized the acquirements of these fishermen by employing them to stock numerous waters of the country. In due time official documents, containing reference to these matters, began to be received in the libraries of the United States, and the subject matter came to the notice of medical societies and scientific men.

About the year 1853, Theodatus Garlick, M. D., at the time connected with the Cleveland, Ohio, Medical College, learned of these European developments, and together with his friend and associate, H. A. Ackley, M. D., commenced a series of experiments in the artificial hatching of trout, which resulted in the most gratifying success. The writer, at the time a resident of Cleveland, had the pleasure of studying the process and of examining the first fishes artificially hatched in this country. Two or three years later Drs. Garlick and Ackley published the first work on fish culture ever issued in this country, the writer having the privilege of reading a portion of the "proofs." It will be seen by this that scientific fish culture in this country dates back only about a quarter of a century. A very interesting chapter could be written respecting the experiments, labors, failures, successes, and general trials of several gentlemen who have attained more or less prominence since that time, in their endeavors to build up a new industry.

Other interesting and instructive chapters could be collated from facts

in connection with State and National legislation upon the subject. Most of the States and some of the Territories have fish commissions, and the United States Fish Commission, created by act of Congress, in 1871, is, without doubt, at the present time, the most efficient organization of the kind in any country. Many of the States also have very efficient fish commissions, but in too many instances they are not provided with adequate legislative appropriations. Some of the Legislatures have been reasonably liberal, and their respective commissions have been enabled to take effective measures for re-stocking the sadly depleted waters of their regions. Some of the commissions have been enabled to construct substantial breeding establishments and to prosecute the business with systematic intelligence.

The principal subject of this paper, however, refers to a food fish that requires no such elaborate breeding establishments as have heretofore been necessary for the extensive production of our more valuable varieties of food fishes. With this new acquisition, it is practicable for any farmer or ruralist, having even a limited supply of water, to furnish his own table with delicious fish, and in most cases to supply large quantities for market.

THE FOOD CARP.

This remarkable and valuable food fish, which has for centuries been extensively raised in various countries of Europe and Asia, and has furnished a very large percentage of the food supply of those countries, has, after persistent attempts of the United States Commission of Fish and Fisheries, been introduced into this country, and its culture has been commenced in most of the States. Wherever the simple requirements for its introduction have been complied with, the results have been most satisfactory and gratifying. As some of the more critical readers of this paper will be interested in a brief description of this fish, I will copy the same from a description by Dr. Hessel, one of the most reliable German authorities:

"The carp, *Cyprinus carpio*, of the family *Cyprinidæ*, has a toothless mouth, thick lips, and four barbels on the upper jaw. In place of the usual teeth of the mouth there are a number of stout teeth on the pharyngeal bones, which are arranged in three rows. It has one single dorsal, which is no longer than the anal. Both these fins have at their origin, on the anterior edge, a strong ray, which is serrated in

a downward direction. The caudal is of semi-circular shape, and the natatory bladder is divided into two sections, with connecting air-passage. The scales have an entire edge, and the body is compressed on the sides. The general color of the back and sides is a dark olive-brown, the abdomen often of a whitish-yellow or orange tint. The coloring depends, as with all fishes, partly upon the age and season, partly upon the water, the soil, and also upon the food of the fish."

The carp was in all probability originally introduced into Europe from Central Asia many centuries ago. It is alleged to have been imported into England in the year 1504. In Austria, which possesses the most extensive carp establishments in Europe, its culture can be traced as far back as the year 1227. The Austrian princes of Schwarzenberg are probably the most extensive carp culturists in the world. Their artificial ponds, collectively, cover an area of no less than twenty thousand acres. Many other extensive carp establishments are located in various parts of Europe, notably in Austria, Germany and France.

There are many varieties of carp, the most of which are comparatively worthless as food fish. The common gold-fish is a specimen. The common sucker and numerous other specimens of brook fish are also of the carp family. There are also several varieties of the food carp. Dr. Hessel refers to them as follows:

"It will easily be understood that after such an extensive culture in ponds, continued through centuries, as also an existence in open water, where the *Cyprinidæ* were left more to themselves, a number of varieties or rather genuine species *Cyprinus carpio*, showing striking differences from the races, were developed; these races, though derived directly from the original type, just as with our domestic animals, are divided into three chief groups:

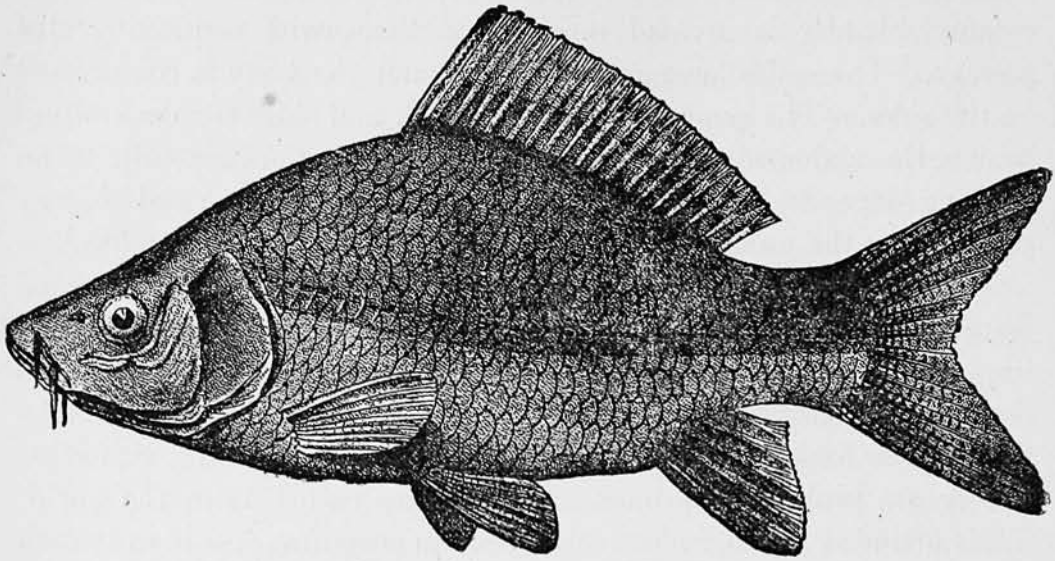
"1. *Cyprinus carpio communis*, the scale carp; with regular, concentrically-arranged scales, being, in fact, the originally species improved. See page 142.

"2. *Cyprinus carpio specularis*, the mirror carp; thus named on account of the extraordinarily large scales, which run along the sides of the body in three or four rows, the rest of the body being bare. See page 143.

"3. *Cyprinus carpio coriaceus, sive nudus*, the leather carp; which has on its back either only a few scales or none at all, and possessing a thick, soft skin, which feels velvety to the touch. See page 144.

"The two last named are distinguished from the original form by a

FIG. 1.



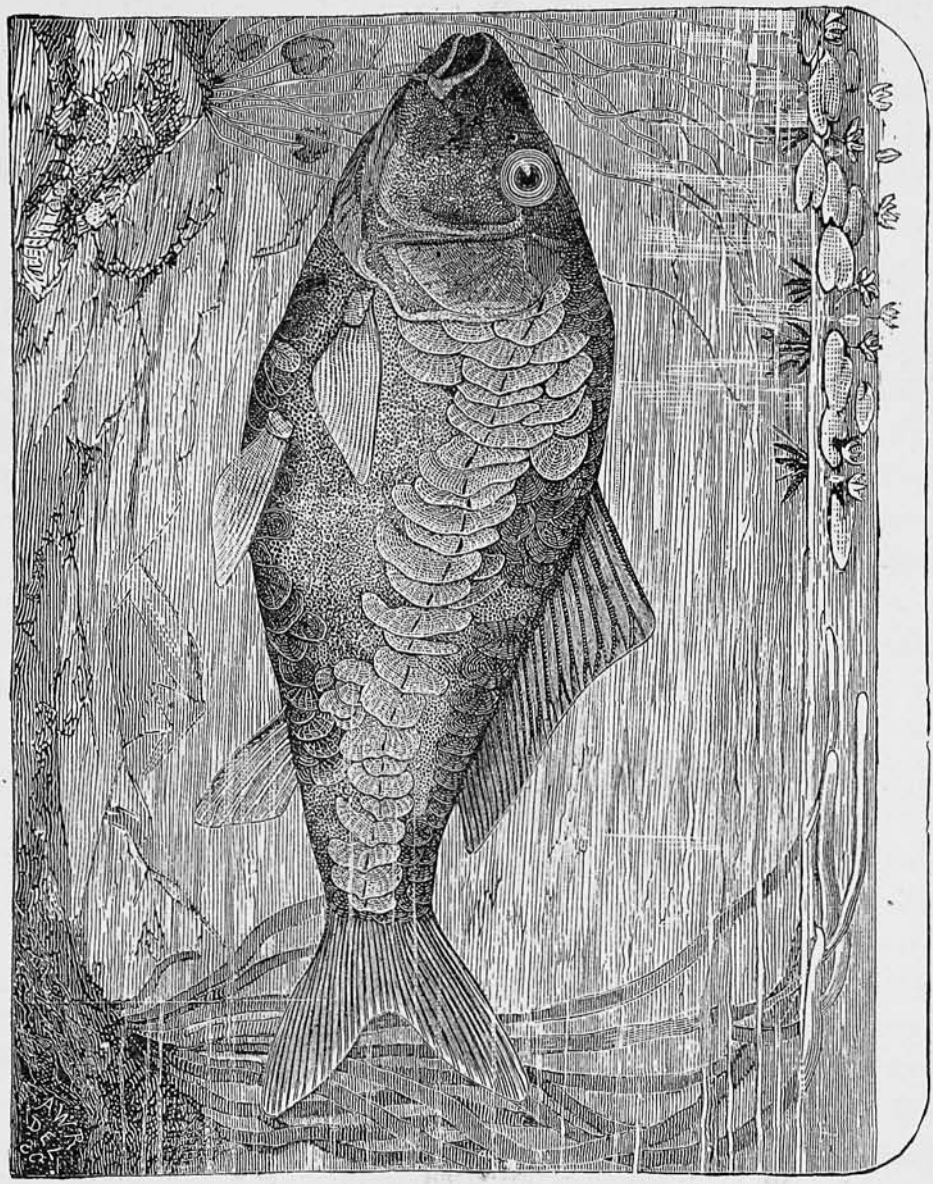
THE SCALE CARP, (*Cyprinus carpio.*) See page 141.

somewhat shorter and stouter, but more fleshy body.* It is rather difficult to decide which of these three species is the most suitable for culture. There are some districts where only scale carp are bred and mirror carp are not valued, as there is no demand for any but the former in the market, as, for instance, in Bohemia, in the domain of Wittingau. Again, in other districts, as in parts of Bavaria and Saxony, &c., for the same reason, mirror carp or leather carp only are bred. There is, in fact, no sufficient reason for making any distinction among these three varieties, for if they are genuine types of their respective species they are indeed excellent and desirable fish."

Each of the three varieties named has been imported by the United States Fish Commission, and has been bred separately now for four or five years. Prof. Baird, the United States Commissioner, assures me that both the scale and mirror varieties are unmistakably developing into the leather carp, which upon the whole is the most esteemed variety.

* I have in my own ponds each of the so-called different varieties, but cannot detect any material difference in shape. Breed either separate, and their progeny will, to some extent, develop into each of the three types, and sometimes other marked variations. See concluding chapter, headed "Miscellaneous Observations."

FIG. 2.

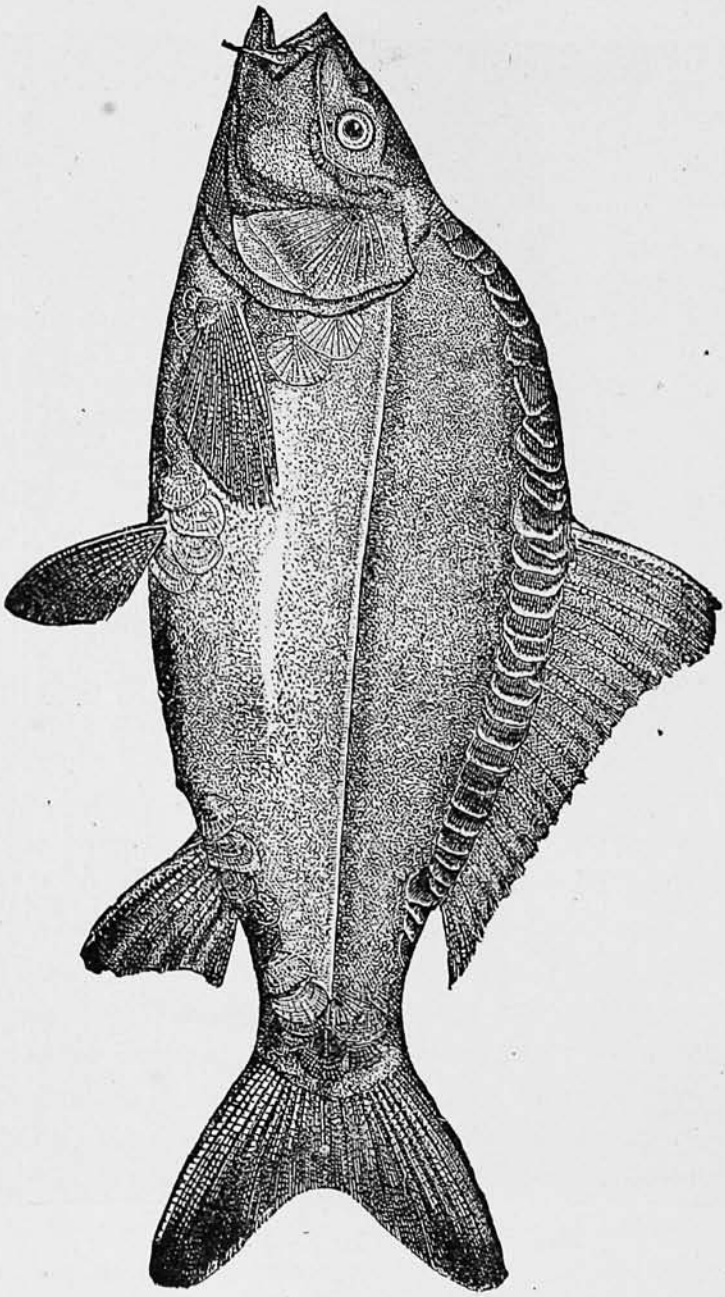


THE MIRROR CARP. See page 141.

The carp is partial to stagnant waters with a loamy or muddy bottom, rich in aquatic plants. They will live and thrive in water where most other fishes could not possibly exist, such as small pools in bog-meadows, or in localities affording no regular outlet. Of course, it must not be expected that such waters will produce as good flavored fish as pure waters.

The carp subsists upon vegetable food, and to some extent upon worms, larvæ of aquatic insects, &c., which it turns up from the mud

FIG. 3.



THE LEATHER CARP. See page 141.

with its head, or gathers from aquatic plants. It will not refuse the offal of the kitchen, slaughter-houses, breweries, &c. It attains a much more rapid growth in warm waters. In a climate where the water freezes or becomes quite cold, they will hibernate by burrowing in the mud. This they generally do in groups of fifty or more. They select a deep place, and force their heads down till nothing but their tails

are visible above the surface of the mud, and sometimes they disappear entirely. They group in concentric circles and remain immovable, scarcely raising their gills for the purpose of breathing. In this position they continue till the water becomes warm again, during which time they do not take a particle of food, and, what is very remarkable, during this hibernation they do not diminish in weight, but upon leaving their winter quarters at once commence feeding and increasing in weight.

The carp is a prolific breeder. A female carp, weighing five pounds, contains five hundred thousand eggs. In the Middle States it will probably commence spawning in May, while in the Southern States it will spawn earlier and continue later, and at the north *vice versa*. Some days before commencing to spawn it shows an increased vivacity, rising frequently to the surface of the water, and swimming rapidly around near the surface, apparently searching for favorable places to cast its spawn. Its movements are much more rapid on warm, sunny mornings than at other times. On these occasions the female is accompanied generally by two or more males, frequently five or six. They follow closely, sometimes closing in on either side of the female. They come close to the water's edge, particularly in shoal places, and seem to lose all timidity to an extent that they might be easily captured. During their movements they twist the posterior portions of their bodies energetically, lashing the water vigorously with short quick movements of the fins and tail. This is the moment when the female has cast her spawn, upon which the males cast their milt, and mix with the eggs by the lashing process described. In this manner most of the eggs are impregnated. This process is frequently repeated, the female dropping four to five hundred eggs each time. These operations continue for weeks, and until the female has cast all her eggs. The spawning continues through the summer, according to the various ages of the spawners, the oldest spawning early and the youngest late. The eggs are adhesive, and readily adhere to aquatic plants, brush or any fibrous material. Most of the impregnated eggs thus suspended in the water will hatch, while those which drop into the mud are, it is believed, thereby destroyed. The eggs hatch in from five to twenty days, depending upon the temperature of the water. If in shallow water and the weather remains warm and pleasant, they will hatch within less than ten days, but if in deep water, or in cold, stormy weather, the development may be retarded, and per-

haps three weeks required to complete the hatching process. The yolk of the egg adheres to and is absorbed by the young fish within from three to five days, after which it begins to seek for food. If the pond be productive of suitable food, the young fish will grow rapidly.

When all the conditions are favorable, the growth of the carp is almost incredible. The age of the oldest carp which I have ever seen, was but three and one-half years, and they weighed fourteen pounds each. They were of the "leather" variety, and had never received a particle of artifical food, but had an ample pond rich in natural food. The growth of carp, of course, depends upon certain conditions. The best results are attained in small ponds of warm water, which of course are more rich in natural food supply than are large, deep, cold bodies of water.

Overstocking of ponds would be attended with the same results as the overstocking of pastures with cattle. Large, deep bodies of cold water, with stony or gravelly bottoms, are not favorable to the successful growth of carp. Their growth will vary from year to year in the same waters, according as the season is a cold or warm one, very much as farm crops will vary according to the season. The season has undoubtedly much to do with the food supply of waters. It has been practically demonstrated that the waters of this country are far richer in fish food than those of Europe.

To what age will carp live? How large will they grow? These are questions frequently asked. Those who may choose to learn by experiment, are advised to commence the propagation of century plants, expecting to see them bloom. There are carp in some of the preserves in Austria, known to be about one hundred and fifty years old. There is an authentic record of a carp being taken, which weighed ninety pounds, and numerous records of their weighing from seventy-five all the way down to thirty-five or forty pounds, the latter weight not being unusual. Carp known to be but fifteen years old have been taken, weighing from forty to fifty pounds each, and even more in some few cases. A fifty-pound carp is said to be about four feet in length by three feet in circumference.

I have not been able to obtain any data showing very accurately the number of pounds of carp which can be raised in a given area of water, but by a careful examination of all obtainable data, I find that their average growth in European ponds, in the latitude of New England, is more than two pounds each annually. We may reasonably

expect better results in this country, particularly in more southerly latitudes. In Europe, hundreds of thousands of acres of the most fertile lands are devoted to carp culture, which is pretty positive proof that these areas are turned to the most profitable account. The propagation of carp in Europe is becoming universal, and is prosecuted on every imaginable scale, from immense artificial lakes down to tanks holding but a few cubic feet. It is said that in China, carp are reared to a great extent in ordinary wash-tubs, and fed with vegetable refuse.

In Germany, the best results are attained by an alternation from carp culture to that of cereals, &c., on the same ground, *i. e.*, after a few years of carp culture, the ponds are drawn off, and the sites farmed, for say two years, when they are again flooded, and stocked with carp, and so on alternately.

PRACTICAL CARP CULTURE.

Believing that the day is not far distant, when carp culture will be as common in this country as poultry culture now is, and believing also that it will be a more profitable industry, I will proceed to give the best known methods for conducting the business. Before taking up details, however, it may be well to remark that carp culture, like any other business, requires a perfect system. A hole dug in the ground, like a brick-yard pond, can be utilized for raising carp, provided it be always supplied with water, but it would not be a very desirable method, though exceedingly simple.

I will first notice the methods in vogue in Europe for carp culture, in what they term natural ponds, *i. e.*, ponds constructed by the simple damming of streams. In this connection, I will quote from Dr. Hessel, one of the best German authorities upon the subject.

In establishing carp in natural ponds, it is first necessary to ascertain the following points:

1. Is there sufficient water for all purposes all the year round?

2. Are the ground, soil, aquatic plants, and water favorable for culture?

3. It is important to examine the soil minutely, in order to ascertain its vegetable and mineral qualities.

If points 1 and 2 have been satisfactorily settled, the ground must be examined as to whether it will allow the collected water to penetrate, and whether the ground is sandy or loamy. Above all

measure the depth of the stratum, and be assured that it is sufficiently impermeable to withstand the pressure of the water, and to hinder its oozing through, and so prevent the drying up of the pond.

A rocky, gravelly ground is not appropriate for carp culture. Sandy ground, with a considerable mixture of loam, clay and humus, is of small use.* I speak here of large ponds of considerable extent. Small ponds, with a sandy bottom, may be improved by supplying them with loam. Loam is a mixture of a small per cent. of sand and a larger quantity of clay. If such ground contains some marl, or better, some elements of humus, it is of the greatest advantage.

Too much humus or dissolved peat is injurious. Water which runs through bog meadows or oak woods is not of much use, because it contains too much humic acid and tannin, which impart a mouldy flavor to the fish. The most favorable water is that which comes from rivers and brooks.

Rain water, particularly during the winter, when frozen over, takes a mouldy taste, which is communicated to the fish, as does the water from bogs also.

Spring water, direct from the ground, ought to be conducted for at least a few hundred yards through wide, shallow ditches, in order to obtain more nourishing components from air as well as earth, and above all to be warmed by the action of the sun.

Ponds must not be too deep, as the water will be too cold, and will harbor fewer insects, larvæ and worms, which form part of the carp's food. A depth of three feet is sufficient for the middle of the pond. Toward the outlet-sluice it may be from six to eight feet. In the depths of this the fish seek their resting place for winter, as also in summer, when the water becomes too warm. The outer part of the pond should not be deeper than a few inches.

Toward the centre of the pond a cavity is dug, two feet deeper than the rest of the pond. This also serves the fishes as a resting place in summer and winter. This cavity is called a "kettle." From the entrance of the pond to the other end, where the collector and the outer sluice are situated, two or three ditches, two feet in depth and four feet in length, must be made. These ditches cut the deeper "kettles" transversely as far as the collector. These ditches are intended to

* This idea will not hold good in this country. Such sites, if other conditions are equal, are excellent for carp ponds, if prepared in accordance with my plans, hereafter described.

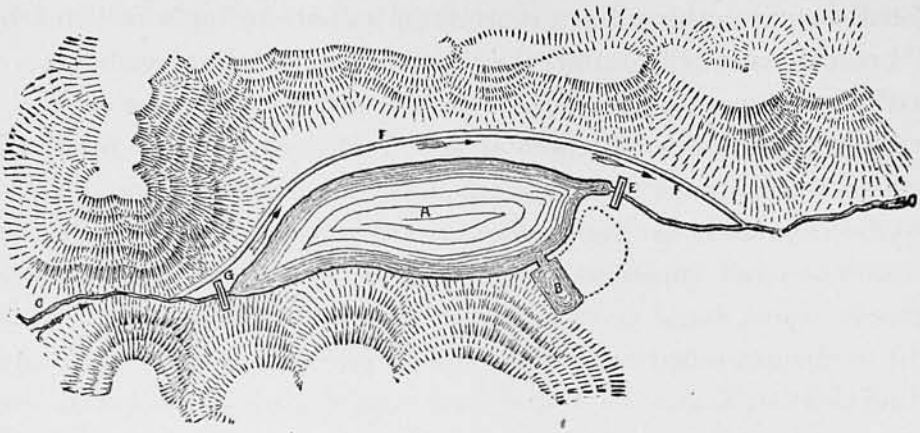
carry all the fish into the collector when the pond is being drained. The collector is nothing but a place from twenty to forty feet in length and breadth, near the outer sluice, and is one foot deeper than the rest of the bottom of the pond. This collector must be cleaned out every year, or the fish will become too much soiled by the mud. The inflow of water into a pond should never be direct, as, for instance, a brook falling into it, as this often causes the water to rise suddenly, carrying into the pond injurious fishes. The inlet sluices from the stream must, of course, be of a strong and practical construction, and they ought to be provided with gratings, to prevent other fish from intruding. It will also be found very useful to construct a hatching place on some flat and sunny spot near the bank—that is, a so-called cut in the land, measuring forty to one hundred feet in length, and from thirty to fifty feet in breadth, and having a depth varying from five to eighteen inches. This cut should be planted with aquatic plants, and ought to be the only place where the carp can ascend from deep water in order to deposit their eggs conveniently on the plants and engage in the spawning process. As soon as this has taken place, the entrance to the cut is closed with a net. See Fig. 4.

The carp also has the disposition to swim toward the inflowing water, by which means it is drawn away from its proper feeding places. The water should be conducted into the pond sideways from the stream, and it should be a small brook only. It may be turned off entirely and carried alongside the pond, from which point the latter can be easily supplied with water.

It is an indispensable condition for the culture in ponds, according to established rules, that they be so constructed as to allow of being thoroughly drained, so that the fishes may be taken out without any difficulty.

For the draining of the pond at the "fishing-out" season, it should have an outlet at the lower end, so made that it can be closed tightly or opened again readily if needed, and must be provided with two or three fold gratings, to prevent the escape of the fishes upon the opening of the sluice. At the same time there should be an outlet channel, several feet in breadth at the side of the pond, to allow the water to run off. This must also be secured by grating, but should be kept open always, so that in case of continued rainy weather or sudden and violent showers of rain or thunderstorms, no overflowing of the banks or dams may be possible through the unexpected rising of the water in the pond.

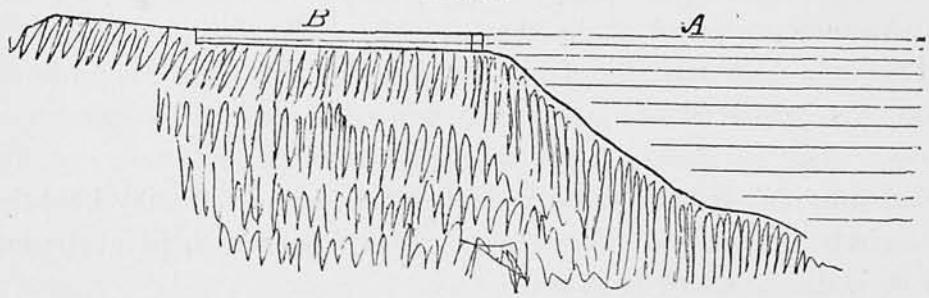
FIG. 4.



PLAN OF NATURAL POND.

Explanation of Fig. 4.—*A* is the pond, *B* is the cut or breeding pond; the dotted line contains the water having a depth of only five inches; *B* is the water of one and a half feet in depth; *FF* is the outer ditch to prevent an overflow of the pond; *G* is the inlet sluice; and *E* is the outlet sluice.

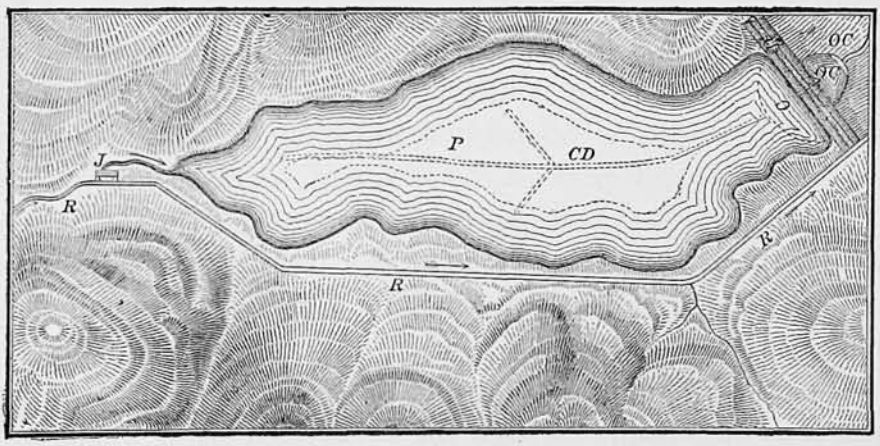
FIG. 5.



B A CROSS-SECTION OF POND THROUGH BREEDING-PLACE IN FIG. 4.

Fig. 6 is a natural pond. It is formed by a dam *D*, crossing a

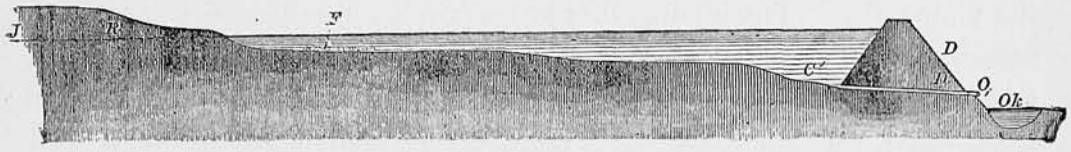
FIG. 6.



PLAN OF NATURAL POND, SHOWING COLLECTOR DITCHES, COLLECTORS, &C.

valley, and thus collecting the water of a run flowing there. The pond gradually deepens from *CD* to C, the collector. In the dam, *D*, there is an outlet leading to another deepening, the so-called outlet collector, *OC*. The purpose of this collector is to retain fish that may have passed through the outlet when opened. It is provided with a screen or netting. Upon the bottom of the pond, *P*, *CD* to *C* is the collector ditch, which conducts the fish to *C*, when the water is let out, and thus prevents them being caught in the mud. *R* is the run of water which, to prevent overflow, has to be conducted around the pond in a separate ditch, leaving an inlet at *J*, protected with screens.

FIG. 7.

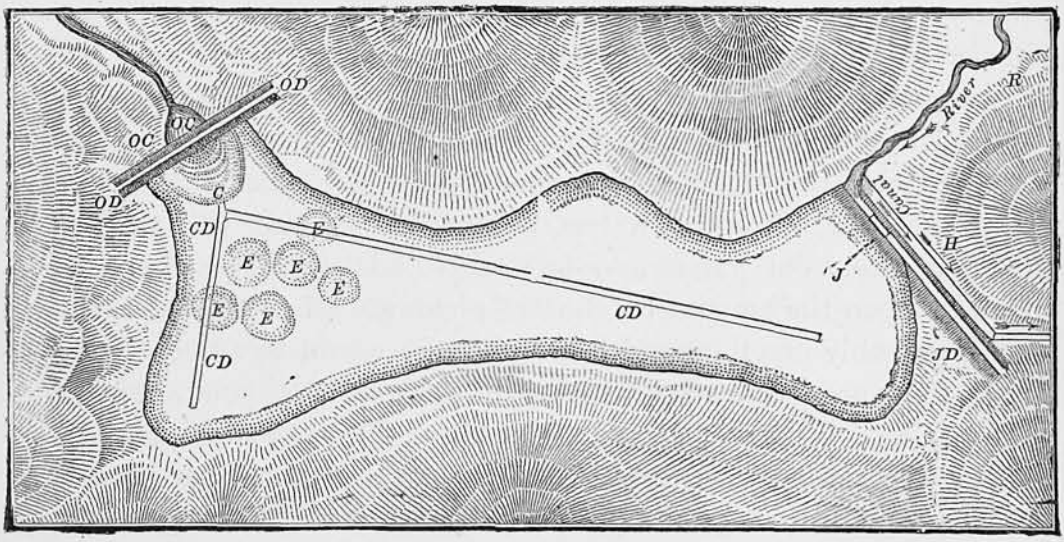


CROSS-SECTION OF CARP POND, FIG. 6.

F, surface of the pond; *C*, collector; *D*, dam; *O*, outlet; *Ok*, outlet collector; *J*, inlet; *R*, stream.

The foregoing illustrated descriptions represent some of the earlier European methods. The next illustration is of a more modern and improved method, much in use in various parts of Europe.

FIG. 8.



PLAN OF ARTIFICIAL CARP POND.

R, stream supplying artificial pond between undulating hills; *J*, inlet; *JD* inlet dam; *CD*, collecting ditches; *C*, collector; *OD*, outlet dam; *O*, outlet; *OC*, outlet collector; *E*, cavities, "kettles," in which the carp collect for the winter; *H*, canal to let off surplus water in case of freshets.

To conduct carp culture according to the latest improved methods, several ponds, three at least, are required:

1. The hatching pond.
2. The nursery pond.
3. The stock pond.

The hatching pond, as its name implies, is for the reception of adult male and female fish during the spawning season. Here the females drop their eggs upon aquatic plants, where they are immediately impregnated by the male. As soon as the spawning season is over, the adult fish should be removed to the stock pond, that they may not consume the natural food in the hatching pond, which is required by the young fry. The young should remain in the hatching pond one season, and then be transferred to the nursery pond. The third season, when the necessary breeders have been selected and removed from the stock pond, the fish from No. 2 pond can be transferred to No. 3, and the young fry from the hatching pond (No. 1) into No. 2. There will also probably be some young fry found in the stock pond, and they should be placed in No. 2 pond with those of the same age. Parties intending to engage extensively in the business should have such additional stock ponds as may be practicable, and keep each year's stock separate.

The hatching pond should be the smallest, the nursery pond considerably larger, and the stock pond much the largest, and so increase in size according to their number if possible. See Fig. 9.

In Europe from four thousand to five thousand young carp are considered a sufficient stock for an acre of water. It has already been demonstrated that the waters of this country are much richer in carp food than the European waters, but experience only will determine to what extent our waters may be stocked. It will depend, of course, mainly upon the amount of aquatic plant growth. If that is abundant, probably one thousand fish to the acre would be ample stock.

If there are too many young fish in the spawning pond, they grow very slowly, as the pond cannot produce the necessary quantity of food. Such fish are scarcely two inches long when they are one year old. Only the head grows a little, whilst the rest of the body remains small. As soon as young fish feel the want of food for any length of time, the gristle and bone of the skeleton harden, thus bringing its development to a close, not allowing nature fair play, and the fish remains a cripple for the rest of its life, even if it be placed in ponds

affording unlimited supply of food. It is, therefore, better either to place a less number of young fish in the ponds or to make the ponds larger; it will be found to pay. The young fish will grow rapidly, their development will be healthy, and even during the first year they will reach the length of five to ten inches in our Northern States, and double that growth in the extreme South. If there are too many young fish for the water-area, it is better to place them in some lake, brook, or river. On no account should they be kept in the pond. Beginners in carp culture usually consider it quite a sacrifice to let so many young fish loose in open waters; they keep them, and later they will bitterly regret their imprudence, by having weak or not fully developed fish.

Great caution is necessary in the selection of the site for a pond or the natural pond which is to be converted into a carp pond.

Overflows not only injure the ponds and fishes, but may result in a still worse disaster, that of carrying away the fishes into strange waters and destroying the ponds.

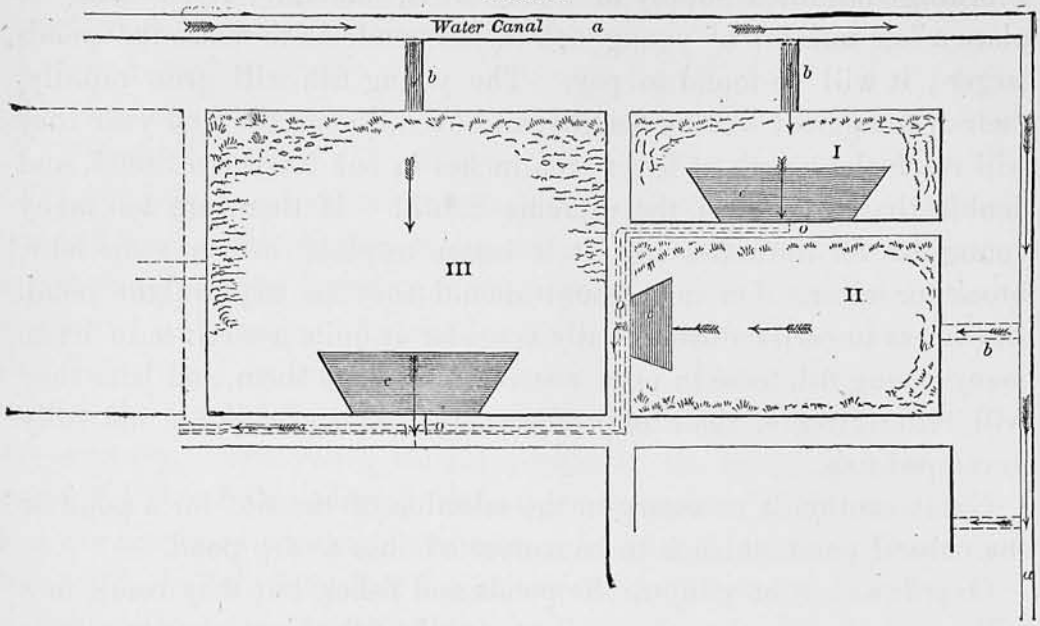
The fundamental rule in carp culture is that the water be of the same depth in summer and winter. If the supply of water is too plentiful, great quantities of mud are carried into the pond, embedding the grass which grows in it and on its banks; this, in consequence, will rot and poison the water. The carp immediately desert such water on account of its offensive odor, and retire from their proper feeding places to depths deficient in the production of food.

The mud, which is being constantly reproduced, consists of decomposed plants. From these, different gaseous compounds develop themselves in midsummer, and the fishes become sickly in consequence. In this case, especially if they rise to the surface seeking for air, more water must be supplied through the inlet-sluice, when they will recover by degrees. A casualty of this description may occur in very large ponds, though no overflow may have taken place.

Pernicious gases develop themselves from the mud even in winter, but they rarely have any bad effects, being injurious only if the water is covered by ice, when the fishes may die of suffocation. For this reason, large apertures should be cut into the ice for the supply of fresh air in ponds thus affected.

In Fig. 9 is presented a plan of ideal carp ponds, purely artificial, which conform to some American methods of fish culture.

FIG. 9.



PLAN FOR ARTIFICIAL CARP PONDS. See pages 152 and 153.

I, breeding pond for spawning fishes and spawn; *II*, pond for small fry; *III*, pond for large fish; *a*, supply of water; *b*, inlet; *c*, collector; *o*, outlet.

The foregoing is Dr. Hessel's plan for the general construction of carp pounds. To carry the plan into execution, a level or slightly sloping situation is required. By this method, all danger from freshets can be avoided, provided the location itself is never over-flowed, or even if the pond embankments are above high water and are kept well sodded, so as to prevent washing away by slight currents. Locations liable to overflow should be avoided, if possible.

PEIRCE'S AMERICAN METHOD.

The matter comprising the foregoing pages is mainly compiled from foreign sources—Austrian, Italian, German and French—the larger portion being from the German. Since 1873 I have collected every available translation upon the subject. In some cases I find much of the matter to be repetitions of previous writers, and frequently it is impossible to determine with whom it originated. I have had considerable correspondence with German fish culturists upon the subject. Although the mass of matter from which the foregoing compilation has been condensed would equal from four to five hundred of these pages, yet I believe that all which is of practical value is herewith collated. For the purpose of perfect connection and harmony, I have

found it necessary to introduce considerable original matter into the foregoing pages.

From their first introduction into this country I have given the food carp every possible attention; have had charge of the government distributions in eastern Pennsylvania and southern New Jersey; have been carefully breeding them myself, and have planned and superintended the construction of a large number of carp ponds for prominent parties in Pennsylvania, New Jersey and Delaware. Based upon the most careful and patient observation and experience stated, I have devised certain methods of culture which I think are in advance of any hitherto practiced. Some of my devices are patentable, and I have been repeatedly advised to patent them. I shall not do so, but in the following pages cheerfully hand them over to the public for whatever they may be worth. I will here refer to my long experience as a general fish culturist for the purpose of saying that I do not consider such experience of much practical value to the carp culturist, for the reason that the food carp is almost wholly unlike any other variety of fish in this country, excepting in its breeding habits, which, of course, are similar to all members of the family *Cyprinidae*, perhaps the most extensive of any in American inland waters, and embracing a large variety of common brook and pond fishes, such as the roach, dace and chub. The Chinese golden carp, of which the aquarium gold-fish is a specimen, is also of the same family, and its breeding habits quite similar. I mention these facts here to show that the requisites in carp culture are unlike any other variety of food fish culture. In this connection I can, however, refer with more satisfaction to my hydraulic engineering experience of over thirty years, trusting that the results, as applied to the construction of carp ponds, and illustrated in the following pages, may be of practical advantage to those engaging in this interesting and important industry.

SYSTEM INDISPENSABLE.

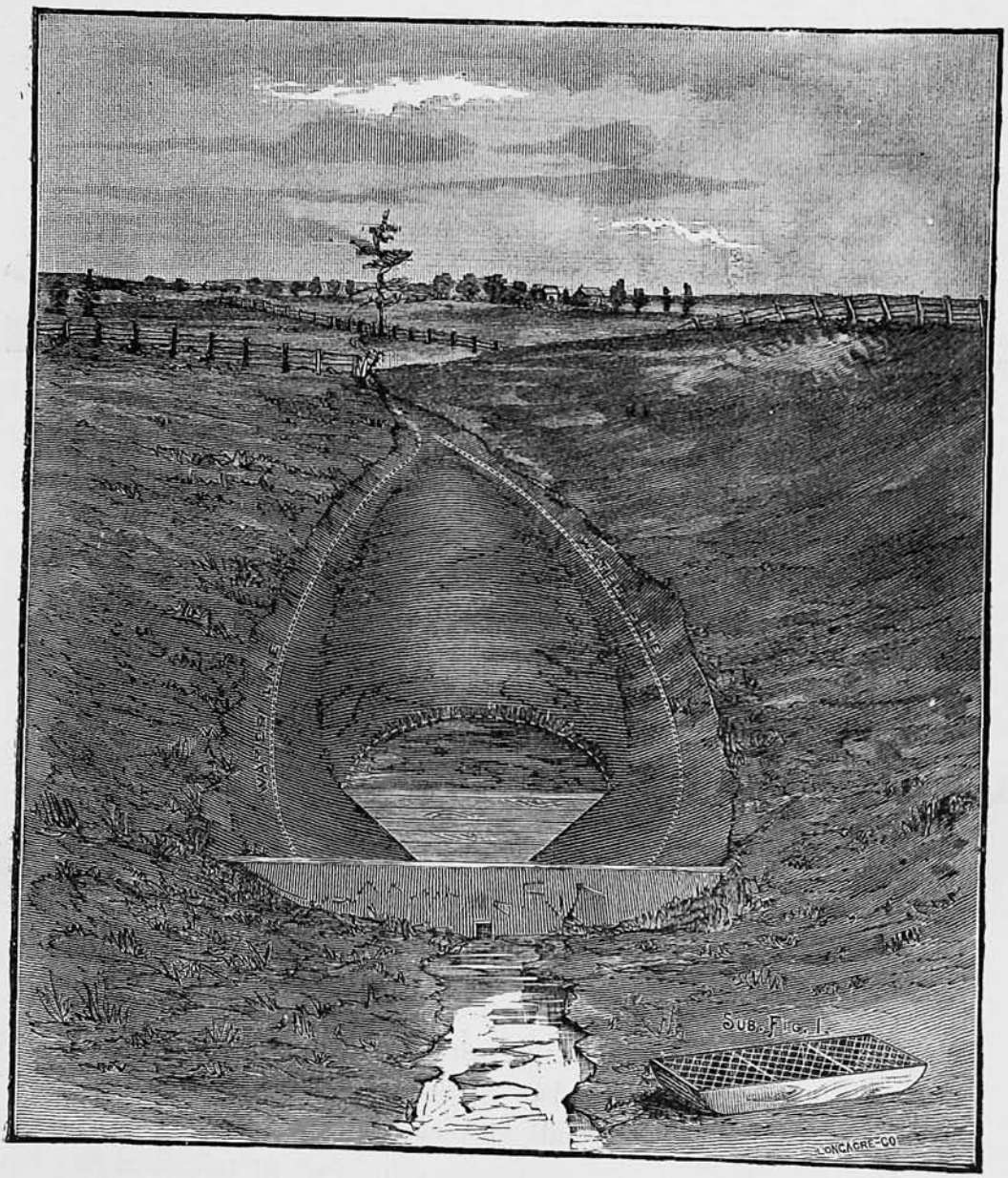
No person should for one moment think of engaging in carp culture, except with the same degree of system which is required to render any other industry a success. Nothing must be done in a haphazard manner; nothing left to chance. Most of those commencing the business, or desiring to, seem to think that if they have a permanent supply of water, no matter in what shape, whether a lake, mill-pond, ice-pond, brick-yard hole, open stream, ditch, or even a permanent

mud-hole, they have only to introduce a few carp, when, after a brief time, they expect to gather a perpetual harvest. Most of those who have already engaged in the business will find their locations briefly described in the foregoing enumeration. Their efforts will prove unsatisfactory in most cases. Such of the waters named as will support fish are almost certain to contain different varieties of the family *Cyprinidæ*, with which the food carp is sure to hybridize, and such offspring is utterly worthless. Quite a number of parties in different States during the past fifty years or more have been engaged in raising the common gold-fish in ice-ponds, or other ponds very simply prepared for the purpose. As the business is of little account, many persons having these ponds have introduced therein the food carp, (the government supplying them free.) The result is that some of these parties are selling the progeny thus bred at enormous prices, while at the same time they are of no value whatever. Some one has sent me a circular issued by one of these parties, with a nicely-engraved specimen of what he terms a German carp. It is unmistakably a hybrid of the food carp and common gold-fish. It will be charitable to suppose that the publisher of that circular is ignorant in regard to the absolute worthlessness of the fish which he is offering for sale at various prices, up to $5 each. Concerning these haphazard methods of culture, one conclusion is inevitable. Within a few years, there will be a "hue and cry" in widely-extended localities that the carp is a fraud, and carp culture a humbug. On the other hand, those who commence and conduct the business according to the most approved methods, maintaining the same degree of system required for any successful business, will find the industry very interesting, simple, requiring little attention, and, withal, exceedingly profitable.

The illustrations upon the following pages are from plans which have been carried out under my personal supervision, and are, therefore, practical instead of ideal. In devising these plans and methods, I have kept constantly in view the fact that the food carp is naturally a vegetable feeder, though also feeding readily upon microscopic and larger animalculæ, which breed or live upon various aquatic plants. Some parties who assume to give information concerning carp culture, write knowingly as to the feeding of carp, the kinds of food required, &c. It is true that hungry carp will eat any vegetable matter that a hungry pig would consume, while the latter would nearly or quite starve if it only had access to the natural food of the carp. I boldly

maintain that in order to succeed in carp culture, these fish should not be fed at all, except when nearly ready for the table, and then in the manner which I shall describe further on. Their ponds should be inexhaustible pastures, where they can feed at will. If artificially fed, they will cease foraging, and hang around the artificial feeding places. Carp cannot be raised by any system of artificial feeding for much, if any, less than fifty cents a pound. It is probable that they will sell at about twenty cents a pound.

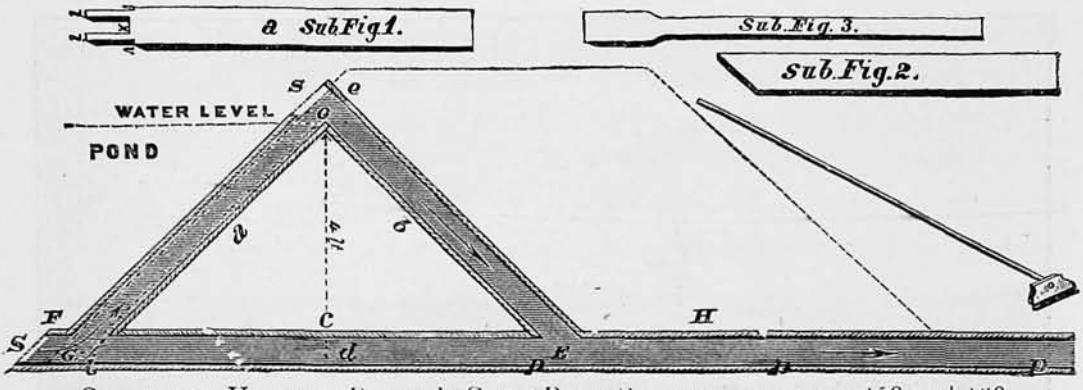
FIG. 10.



CONTOURS FOR CARP POND BOTTOMS. (Peirce's Method.) See pages 158 and 174.

Granting now that my premises are correct, it must be evident that carp ponds should be constructed with especial reference to an ample supply of natural food within constant reach of the fish. To accomplish this, it is necessary that the water should be kept at the highest degree of temperature possible from atmospheric contact. Shallow ponds and sunny locations, then, are important factors. And another equally important requisite is that the surplus water discharges from the bottom instead of the surface of the ponds, thus constantly draw-

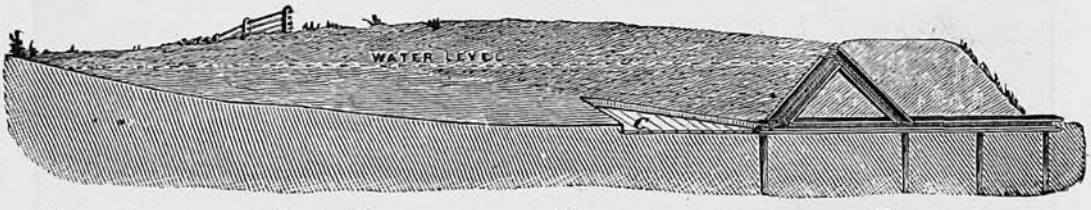
FIG. 11.



SECTIONAL VIEW OF PEIRCE'S CARP POND-SLUICE. See pages 159 and 160.

ing off the coldest water. Warm water is absolutely necessary in order to produce a luxuriant growth of aquatic vegetation, as well as myriads of animalculæ. I have succeeded in accomplishing, as it seems to me, all that can be desired in this direction by my method of contours for pond bottoms, as shown by Figs. 10 and 12, and particularly by means of the pond-sluice, shown at Figs. 11 and 12.

FIG. 12.



CROSS-SECTION OF CARP POND THROUGH COLLECTOR, SLUICE AND EMBANKMENT. See pages 159 and 161.

Simple as is this device, it is the result of many years' experience in the construction of fish-ponds. If anything more simple, cheap or effective can be devised, I shall be pleased to recommend and introduce it.

DIRECTIONS FOR CONSTRUCTION.

These sluices are made of common inch lumber or of thicker material up to two-inch plank. I use inch lumber in most cases. Fig. 11, which is drawn to a scale of one-fourth of an inch to the foot, represents what I term a six-inch sluice. Some hydraulic engineers would term it thirty-six-inch, because its inside diameter is six inches square, and it is capable of discharging thirty-six square inches of water. The one here shown is for a pond four feet deep at the dam, the inner apex at *o* being four feet above the bottom of the sluice at *d*. For the lower section of the sluice, it is advisable to have the side and bottom boards (or planks) run the full length, which, in this case, should be about seventeen feet, it being fifteen feet through the base of the embankment. If this is not practicable, it will, of course, be necessary to splice sides or bottom or both. For a six-inch sluice, the sides (of both upper and lower sections) are six inches wide; the top and bottom being eight inches. The bottom of the lower section is first nailed upon the sides, thus forming an open trough. Next prepare the board shown at *a*, Fig. 11, as it appears at sub-Fig. 1. This board must be eight inches wide and, say, six feet long. The lower end must be cut away as shown at *vv* and *x*, leaving the tongues terminating at *ii*. The cut at *x* should be a little below the shoulder cuts at *vv*, and these shoulders, as well as the ends of the tongues, at *ii* must be cut at an angle of forty-five degrees, so that when the board is placed in position as shown at *a*, Fig. 11, the shoulders will fit the upper edges of the trough, and the ends of the tongues (*ii*) fit the bottom of the trough at *G*. The cuts at *vv* should be just sufficient to allow the tongues to slide down inside the trough at *G*. They should be about five-eighths of an inch thick, and should be firmly nailed to the sides of the trough with small lath nails from the inside. These tongues are continuous bearings for the gate to slide upon and rest against, to which reference will be made further on. When the board is placed in position as shown at *a*, Fig. 11, it must stand at an angle of forty-five degrees with the trough or lower section of the sluice. Before the board *a* is fastened, measure from the extreme lower point of tongues *i* (at *G*, Fig. 11,) along the base joint of the trough to *d*, just four feet. From this point, tack on a "stay-lath" (the right-hand edge of which must be straight) at right angles with and perpendicular to the sluice, extending from the bottom of the side

at *d*, just four feet to the apex point at *o*. The right-hand edge of stay-lath should conform to the dotted line *c*. At the upper edge of the board *a* reached by this stay-lath, mark and cut *square* off. This fixes the length of the board *a*, which will not vary much from five feet between the point thus cut off and the shoulders *vv*, (sub-Fig. 1.) Next prepare the board *b* forming the right angle to *a*, (Fig. 11.) This must be a perfect counterpart to *a* without the tongues, but should be cut one inch shorter. When placed in position as shown in Fig. 11, it will with *a* form a perfect right angle. Before it is fastened in place, its lower resting place should be marked, and then the lower cap-board *c*, each end cut to an angle corresponding to the position of *a* and *b*, should be placed in position as shown in Fig. 11 and nailed. The end of the cap *c*, to which *a* is to be nailed, must be eighteen inches from the end of the trough at *s*. Next, *a* is nailed firmly to the sides of the trough and to cap *c*, and the tongues also nailed as before described. Next, *b* is nailed at the bottom to the trough and to the cap *c*, then the upper end slipped *under a*, which is nailed to it, thus forming the apex at *o*. The next step is to prepare the four side pieces for the upper section. These are, of course, six inches wide and are shaped as per sub-Fig. 2. When in position, their shorter edges rest respectively upon *a* and *b* so as to form continuous sides, the angular ends fitting the upper edges of the trough to which they are nailed by *toeing* from each side. They are then nailed along the whole length through *a* and *b*. The sides for *a* should extend only to the apex at *o*, while the sides for *b* should extend across the ends of the others, and should be *toe-nailed* to them. The next step is to place the cap-boards upon these sides. The cap for *a* should extend about two inches higher than the water-line or apex at *o*. The cap for *b* should extend to within seven inches of the upper apex above *o* as shown at *e*. This leaves a full opening to the *a* section to permit sliding in a gate for closing the lower section at *G*. Before nailing the cap to the *a* section, it will be advisable to make and fit a gate. There should be no cleats or any other device for holding the gate in place. The pressure of the water will do it effectively. By pushing the gate down till it slides away from its bearings, then drawing it back, and pushing down again, repeating the operation two or three times, its proper position can be readily found. When finally closed, two or three shovelfuls of loamy earth should be thrown down the section upon it, and washed in place with a bucket of water. This

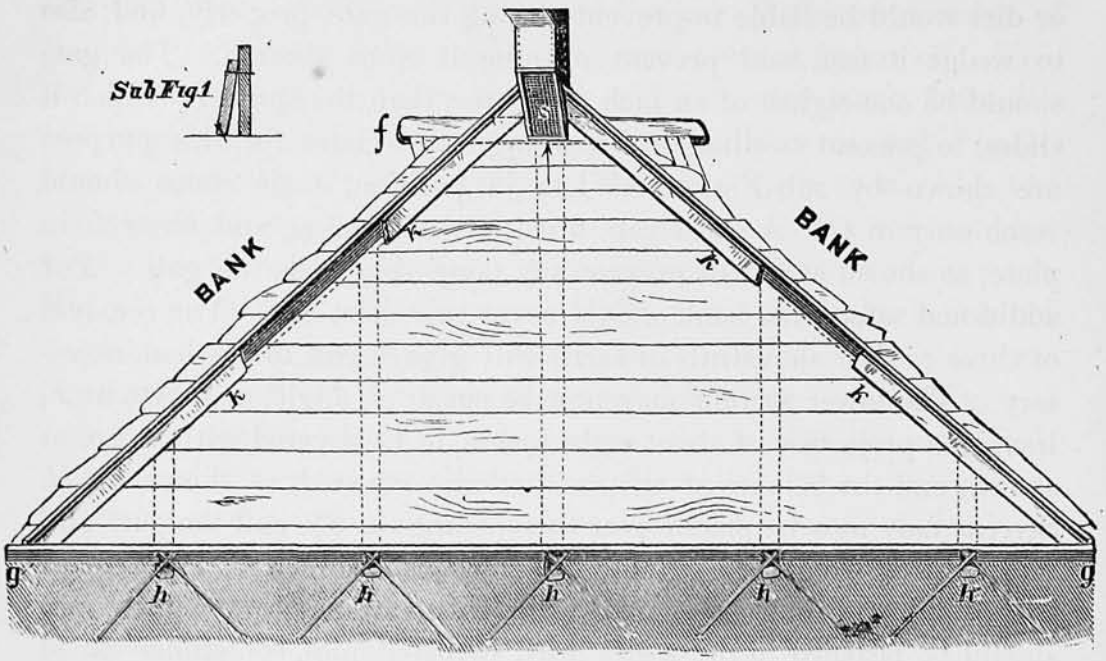
will render it water-tight. If cleats were placed over the gate, pebbles or dirt would be liable to prevent closing the gate properly, and also to wedge it fast, and prevent opening it when desired. The gate should be one-eighth of an inch narrower than the space in which it slides, to prevent swelling and wedging fast. Gates for this purpose are shown by sub-Fig. 3. When in position, their stems should reach only to *O*. A short cap, fitted to the opening, and screwed in place, as shown at *e*, will prevent any tampering with the gate. For additional safety, the bank should cover this short cap. The removal of three or four shovelfuls of earth will give access to it when necessary. The lower section may now be cut at an angle, as shown at *F*, leaving a projection of about eight inches, to be covered with a cap, as shown, and the balance of this section also covered, as shown at *H*. Screens may now be placed over the openings at *SS*, and the gate slid into position from *O* to *G*, and the sluice is complete. The screens should be of strong galvanized wire, three meshes to the inch, and should be fastened to the sluice with carpet-staples, sometimes called double-pointed carpet-tacks. If these cannot be obtained, blind-staples or large-headed tinned carpet-tacks can be used.

The sluice is now ready to be placed in position. We will suppose that the embankments have been completed, except the opening which is to receive the sluice. The bottom of this opening is a ditch, a foot or more in width, and at least three inches deeper than the "collector" excavation, shown at *C*, Fig. 12. The outer end of the ditch should be enough lower than the inner end to draw all the water from the collector excavation. If the nature of the ground will admit of the driving of board or plank piling, there should be three driven to firm foundation across the ditch, so that when the sluice is in position, the points marked *p*, *p*, *p*, Fig. 11, will rest upon them. The upper end, at *S*, should rest on the foundation of the collector, which will be described elsewhere. The piling should be on a true grade, the outer one about one inch lower than the inner one. If pilings cannot be driven, then blocks should be bedded across the ditch on a firm foundation and true grade.

We will now suppose that the excavation has been made for the collector, as shown at *C*, Fig. 12.

It is next in order to place the foundation timbers for the collector, as shown at *C*, Fig. 12. These timbers may be common 3x4-inch stuff. The first one to be laid is at *f*, Fig. 13. It is laid at right

FIG. 13.



CARP POND-COLLECTOR, (PEIRCE'S PLAN,) SHOWING DETAILS OF CONSTRUCTION.

See pages 161 and 163.

angles with the sluice-ditch, and entirely within the pond, at least eight inches away from the bottom slope of the embankment. This timber should be five or six feet long. The point where it is bedded should be the extreme lowest point in the pond, for on this is to rest the upper end of the sluice, (as shown at *S*, Fig. 13,) which is to draw all the water from the pond when desired. It should be bedded perfectly level. Board piling should be driven along its front nearly the whole length to a depth of two or three feet, if practicable, and level with the top of timber, and firmly nailed thereto. An edge view of these pilings is shown at left-hand edge of sluice, in Fig. 12, and nailed to the timber *f*, in Fig. 13. The sluice may now be placed in position, the upper end to extend, say, two-thirds across this foundation timber, and to rest evenly on it and the pilings or blocks across the ditch, the lower end to be one and one-half or two inches lower than the upper end, that the water may pass off readily. When in position, nail through the end into the timber, and also through the edges into the foundations along the ditch, so as to keep in place while being "puddled," (which will be described further on.) Have the sluice square on its foundations, and its upper section plumb. Now fit and bed the wing-timbers, as shown by dotted lines at *g*, *g*, Fig. 13.

The ends next to the sluice must be cut to the proper angle, and firmly nailed to the timber *f*, preferably about six inches away from the end of the sluice, and exactly level with the timber *f*. The other ends should be about one inch higher. For the hatching-pond, these timbers should be about ten feet long, and should be placed at an angle of about forty-five degrees to the line of the sluice in all cases when practicable. The other timbers are to be fitted, placed and nailed, as shown by dotted lines at *h*, *h*, *h*, *h*, *h*, in Fig. 13. They should be about four feet apart, and leveled across from the ends of the wing-timbers. When fastened in position, the earth should be filled around, and level with the top of them. The floor may now be laid and nailed to these timbers, as shown in Fig. 13. Very common inch boards will answer. The ends should project well over the wing-timbers, as shown, in order to receive sufficient earth to hold the platform in place, otherwise the water would float it. The sides of the collector may now be placed in position, as shown, directly over the wing-timbers, fitted and nailed to the sluice, and firmly toe-nailed into the wing-timbers. Most of the nails to be driven from the outside edge. These sides for the hatching-pond should be about four inches high. After these are in place, other pieces, at least half an inch narrower, should be placed in a bracing position on the inside, as shown by broken sections at *k*, *k*, and end view at sub-Fig. 1, and toe-nailed down into the platform, and also nailed through, near the top edge, into the outer side board, as shown in sub-Fig. 1. This prevents the earth forcing in the sides. When the two sides are completed, a similar construction must be placed across the broad end, only it should be about half an inch lower. After this is completed, the ends of the timbers should be staked down as shown at *h*, *h*, *h*, *h*, *h*. These stakes should be similar to fence palings, driven as shown, the first nailed to the collector, and the second nailed to the first, and both sawed off level with top of collector. This arrangement will effectually prevent the collector from floating. The bottom of the pond may now be graded even with the top of the collector. The space in the form of a semi-circle, as shown by the dotted line from corner to corner of the collector, (Fig. 10,) should be level and composed of clear earth, so as to form mud for the carp to hibernate in. For the hatching-pond, this mud should be at least six inches deep. The balance of the central portion of the pond should be oviform, or the shape of a turtle's back, as shown in Fig. 10, sloping from the

upper end gradually to the hibernating ground without any decided ditches, yet with a gentle depression around the turtle-form, and then rising very gradually to the water's edge. The object of this form of bottom is two-fold: First, to render the larger portion of the pond shallow, and second, to prevent the carp from crowding together while the water is being drawn off. Otherwise, a large portion of them would be liable to be lost in the mud. The only way they can all be saved is by means of the "collector," into which they will gradually collect when the water is drawn, as must now be evident.

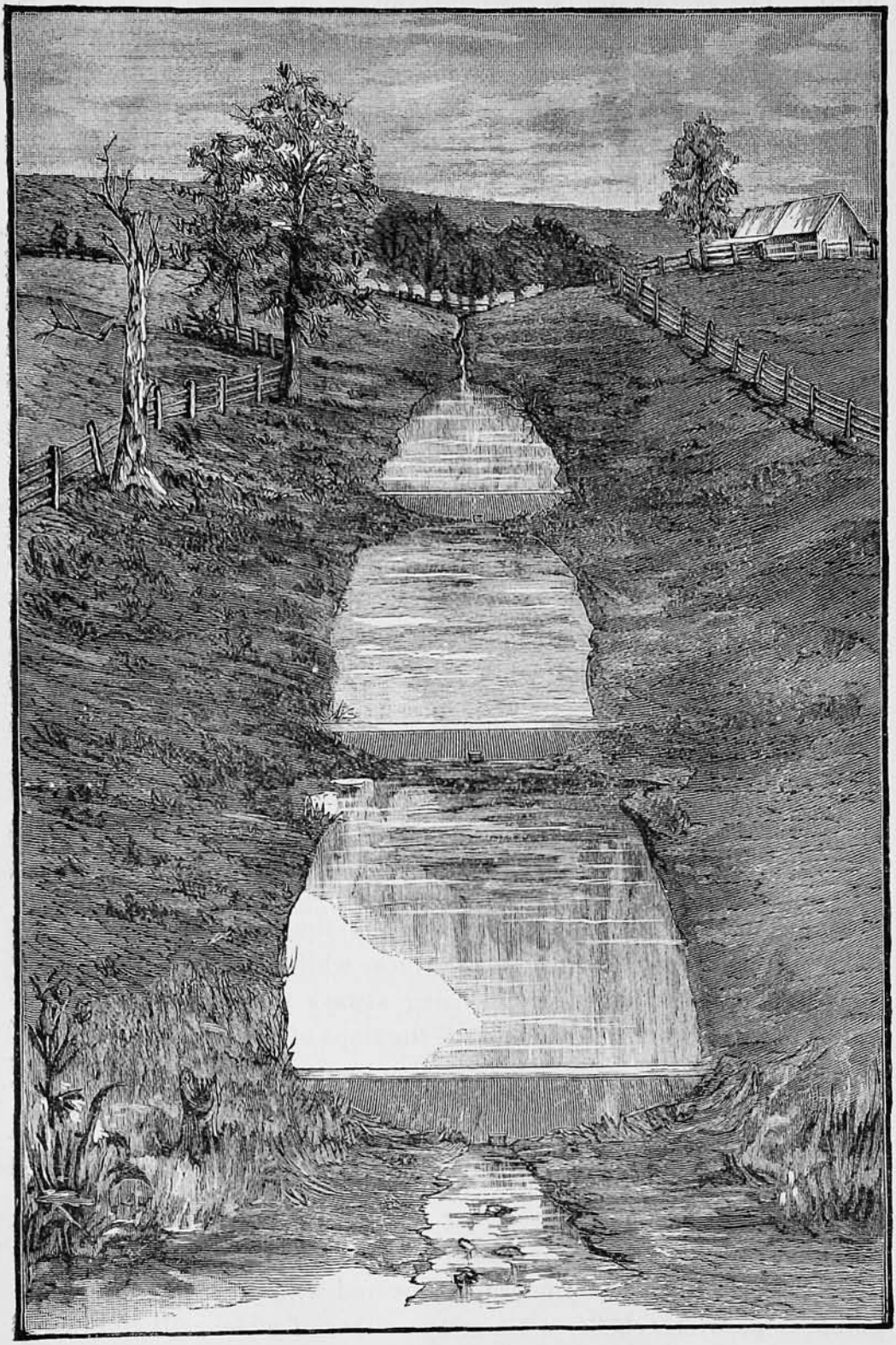
We now come to one of the most important details of carp pond construction, namely, the "puddling" of the sluice. This may be done before or after the construction of the collector, but preferably after, because of the convenience of controlling the water which, perhaps, is already running down the ditch. If, however, the site is a dry one and the water is to be artificially introduced, it should now be turned in and the sluice-gate closed. The first preparation for puddling is to form a dam across the lower end of the ditch, carefully fiillng under and around the end of the sluice and over it at least a foot in height. The water should now be let into the ditch till the sluice is at least half covered with it, and, starting at the lower end and gradually along the entire length, commence throwing in small quantities of clear earth or sand, mixing it thoroughly with the water so as to form a thin puddle. A smooth round pole not over two inches in diameter at the larger end is the best possible implement for this purpose. At first, the filling and puddling should be entirely on one side in order to ascertain on the opposite side when the puddle has worked entirely underneath the sluice. It will now be understood why the sluice should be at least three inches above the bottom of the ditch, and also why the puddle should be very thin, for otherwise it would not fill every crack and crevice, which is absolutely necessary. This portion of the work cannot be done too thoroughly. When the puddle has filled under the entire length of the sluice so that it begins to come up upon the opposite side, the process may continue on both sides until the lower section of the sluice is surrounded and covered at least one foot with thin puddle. The bank across the lower end may now be carried up according to the slope of the dam, and up the ditch to within say a foot of the upper section of the sluice. Good, strong sods should be cut for the pond slope of the upper section of sluice. These sods should be carefully placed on each *side* of

this section, so that the cap only will be in the water of the pond when filled. The sods should be "winged out" each way, so as to hold the puddle *which must be carried up continuously to the top of the upper section.* The sod work can be carried up gradually on the same slope as the upper section of sluice, and at the same time the other end of the ditch can be carried up with dry earth, keeping the same constantly at least a foot away from any part of sluice, the lower slope of which must be entirely surrounded, and the entire space between both slopes kept filled with thin puddle. Of course a bucket will be required to bail water from the collector over the sod bank while the puddling progresses.

EMBANKMENTS.

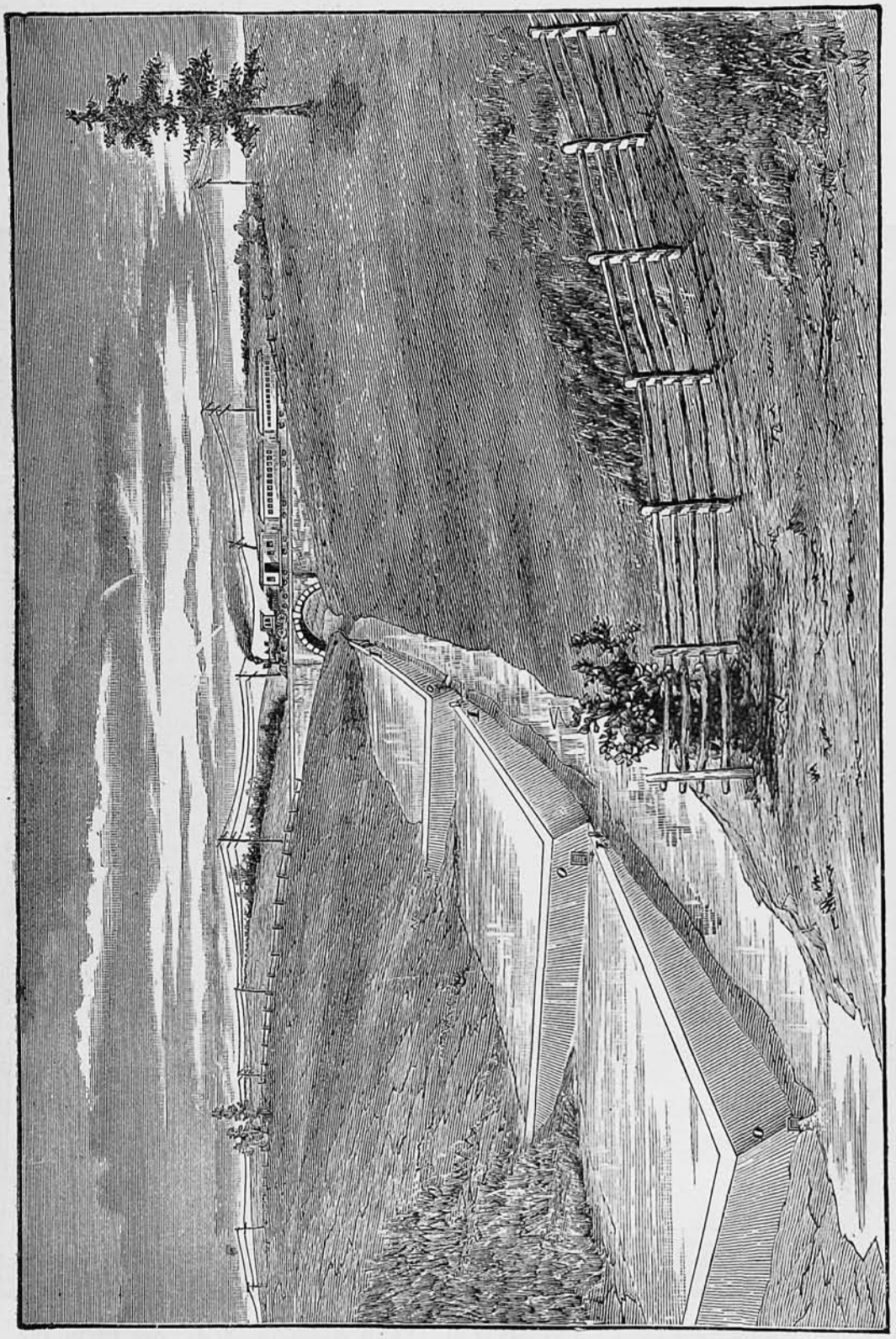
I will now proceed to give general instruction for the construction of hydraulic embankments. When the site for the same has been fixed, a trench three or four feet wide must be excavated the entire length, down to a firm foundation, and all roots and other debris thrown out. This trench must now be filled with clear, pulverized earth, (or soft mud,) and all the water side of the embankment carried up with the same material, while all sods, &c., must be thrown to the outside of the embankment. The foundation trench should be nearest the water slope, so that the fine earth may settle together and thus become impermeable to the passage of water. If the water of a pond is to be four feet deep at the collector, the bank should be carried up five feet high at this point, which establishes the level for the entire bank. At this point, the embankment must be fifteen feet wide at the bottom and five feet wide at the top, and the top width should be maintained the entire length of the work, while the bottom will vary according to its varying height, being always three times as wide as the height. These dimensions leave the slope of the banks at an angle of forty-five degrees, at which angle dry sand and fine, dry earth will cave. No masonry or lumber, beyond that already mentioned, should be used in the construction of carp pond embankments, except in extreme cases when outside waters are liable to wash them. Masonry and wood work afford burrowing and hiding places for muskrats. After the embankments have been constructed, as directed, all those portions below the water-line can be covered with broken stone, small cobble stone, oyster shells, or tin scraps, either of which will effectually prevent the depredations of those pests. Another good plan is to use

FIG. 14.



PONDS CONSTRUCTED AT THE HEAD OF A VALLEY. See pages 169 and 170.

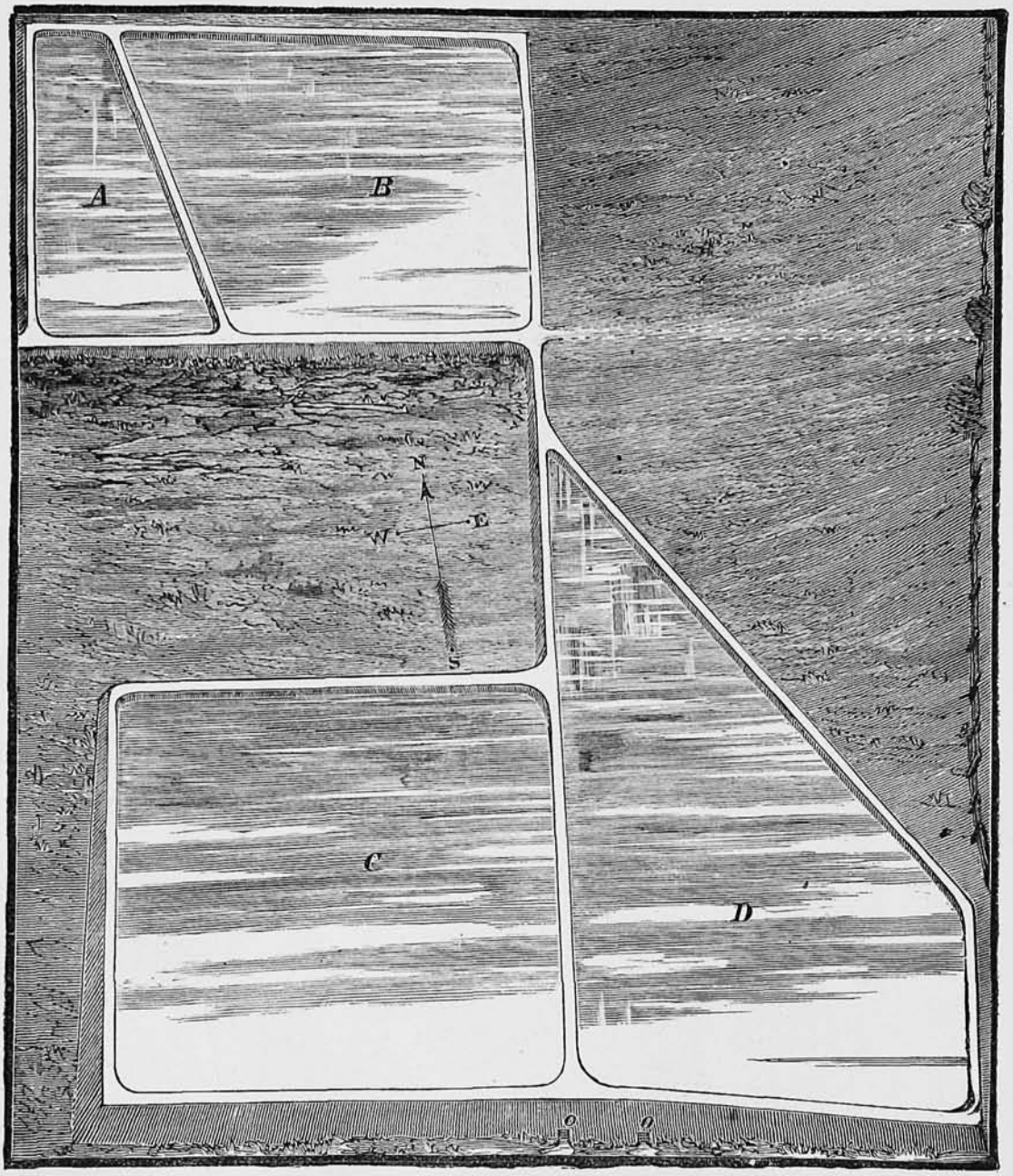
FIG. 15.



PONDS BY THE SIDE OF A STREAM CONTAINING A SURPLUS FLOW OF WATER.
See pages 169 and 170.

slate, or other *thin* stone, setting them up edgewise, *perpendicularly*, and if the edges are not straight, break joints, like the slating or shingling of a roof. This thin barrier should commence at the bottom of the foundation ditch, and be carried up continuously through the embankment above the water level. Thinness and perpendicularity

FIG. 16.



CARP PONDS OF BANNER THOMAS, ESQ., NEAR ABSECOM, N. J. See pages 169 170, 171 and 174.

are absolutely necessary, in order to allow a free settling of the embankment. It is always advisable to sod embankments on the outside.

LOCATIONS.

The location of sites for carp ponds is really one of the most difficult problems in connection with the business. When practicable, the services of a hydraulic engineer should be secured. If necessary to obtain such services from a distance, neighborhoods should join and share in the expense. It will be found to pay. A careful hydraulic survey is always necessary It does not come within the scope of this pamphlet to give instructions in hydraulic engineering. As no two sites are alike, no general instructions can be given that will cover all locations. It is an easy matter to construct on paper an ideal fish-pond, and they can thus be made to look "very pretty." When it comes down to real practice, water is very obstinate; it will either overflow, or else not reach the ideal limit. After an extensive practical experience, I find that a majority of practicable carp ponds may be classed in three principal groups. The first are those which may be formed by the construction of a single embankment, as shown by Fig. 14, page 166. The second are those which may be formed by two embankments, *i. e.*, two sides, as shown by Fig. 15, page 167; and the third, those formed by nearly or quite surrounding embankments, as shown by Fig. 16, page 168. These groups represent actual ponds partly or fully constructed, and generally already stocked with carp. They are, therefore, in nowise ideal. Ponds substantially as represented by Fig. 14 have been planned by the author for Hon. William Parry, Parry P. O., Burlington county, New Jersey; George Hamel, Esq., Weldon, Montgomery county, Pennsylvania; Lorenzo D. Zimmerman, Centre Square, Montgomery county, Pennsylvania; Samuel Wilkins, Esq., 329 Market street, Pniladelphia, Pennsylvania; Hon. William A. Wood, Pittsgrove, Salem county, New Jersey; George W. Hill, Esq., Clayton, Delaware, and a number of other gentlemen in Pennsylvania and New Jersey. Ponds substantially as shown by Fig. 15, have been also planned for Robert U. Jacob, Esq., Lewistown, Mifflin county, Pennsylvania; Edwin Tomlinson, Esq., Byberry, Philadelphia county, Pennsylvania; Charles P. Atkinson, M. D., Palatine, Salem county, New Jersey, and several other gentlemen in both Pennsylvania and New Jersey. Ponds on the plan substantially of those in Fig. 16, have been planned for

Banner Thomas, Esq., 117 Market street, Philadelphia, Pennsylvania; Joseph Pyle, Esq., West Grove, Chester county, Pennsylvania; Joseph C. Hinchman, Esq., Medford, Burlington county, New Jersey, and a number of others in both States named.*

The class of ponds represented by Fig. 14, must be located with much caution, and only at the extreme heads of valleys where the water-shed is very limited, otherwise they are liable to overflow during heavy rains, thereby cutting away the banks and washing out the fish. If there is any danger from such a contingency, it is advisable to adopt the plan represented by Fig. 15, as the flow of water can thereby be fully controlled. The illustration fully explains their construction. The letter *I* indicates inlets, the letter *O* outlets. It will be perceived that the outlets are located in three different ways, viz., at the side, at the end and at the corner. When practicable, I prefer a corner outlet, principally because it admits of the collector (Fig. 13) being built across the corner of the pond. Where the ordinary flow of the water in the stream is all required for a sufficient supply, it is necessary to discharge from one pond to the other as shown by the outlet of the middle pond, but when the supply is ample, it is advisable to have independent inlets and outlets for each pond, in order that either may be emptied or filled at pleasure. In case there is danger of surface water coming into ponds of either class, it must be turned away by means of a ditch and conducted around the ponds. The third class of ponds, and one that will be likely to be extensively constructed in comparatively level regions, is that shown by Fig. 16. But few persons believed it possible to construct ponds upon the site here shown, nor was its feasibility determined until a careful hydraulic survey had been made. In carrying out the details of construction, the levels have been maintained to the fraction of an inch. The site occupied by the ponds was nearly level, with a very gradual slope to the south, there being a decided rise to the northward and eastward from the outer line of embankments as shown. The sites *A* and *B* contain numerous small springs. The southerly and westerly portions of site *D* contain copious springs. All the land shown south of *A* and

*The names and addresses of the foregoing persons are given, for the reason that a reputable (but not well-informed) paper, published in the suburbs of Philadelphia and much quoted, denounces systematic carp culture as a humbug. Persons, desiring information from any of these gentlemen, can probably obtain the same by writing and enclosing stamp for reply. I am not certain that Mr. Jacob has, at this writing, finished his ponds.

B, including *C*, was dry and in wheat stubble. The southerly embankment of *A* and *B* is a farm road. All the embankments, except the northeast and east embankments of pond *D*, were along the line of ditches. Each of the ponds can be filled or emptied independently. The water from *A* and *B* can be run into either *C* or *D*, or divided between them. *A* is the hatching pond; *B* the nursery pond, and *C* and *D* stock ponds. On account of its site being clear, pond *C* was first constructed, and was stocked with a few carp, tiny little fingerlings, on the evening of December 31st, 1881. On the 1st of May, 1882, their growth had just commenced. About the last of October, when barely fifteen months old, they were removed to pond *D*. The smallest were seventeen inches long, the largest twenty-two inches long, and weighed seven pounds each. Such a growth would have been impossible but for the peculiar construction of the sluices which raise the temperature of the water in summer from ten to twenty degrees. *Per contra*, they also lower the temperature in winter, thereby increasing the value of the ponds for ice, without in any wise interfering with the carp, which are then in the mud. The embankments of this set of ponds are extra heavy, being eight feet wide on top, admitting of the driving of a carriage around all the ponds.

Most sites for ponds, like these, will probably be on entirely dry land,often on that which has been cultivated. Ponds prepared in dry locations have the advantage of being free from other fish, lizards, water snakes, &c., all of which are enemies of the fish culturist. Ponds in such locations can be finished and surrounded with fine screen-wire or tight board fences three or four feet high, and thus secured against the intrusion of the enemies named, and such additional ones as eels, (which will scale a bank of dry earth and destroy large quantities of young fish in confined enclosures,) turtles, rats, minks, ducks, and geese, all of which are destructive of fish. Even hens will catch large numbers of them. One of the worst enemies to be found in some States is probably the snapping-turtle. These can be readily caught with large hooks, baited with fresh meat. The hook should be attached to brass or copper wire, as the turtle will bite off an ordinary fishing-line. If ponds are located so as to be infested by kingfishers, herons, &c., they must be shot or trapped. Kingfishers can be killed by anchoring a piece of mud-colored board two or three inches beneath the surface of the water and fastening a fish on top of

the board. The kingfisher, in diving after the fish, will strike the board with sufficient force to kill itself. Muskrats should be vigilantly trapped or otherwise destroyed, as they endanger the embankments by burrowing. A sharp little English rat-terrier is one of the most valuable of fish pond sentinels.

It is advisable to drain off carp ponds every fall and spring, in order to remove the carp of different ages to their proper ponds, to trap within the collector other varieties of fish, which sooner or later, are sure to be found in the ponds, and also to find any carp which may have become diseased. Fish diseases are generally characterized by fungus growths, gelatinous polyp, &c., readily visible. All fish thus affected should be consigned to the compost heap. Only the best specimens should be selected for breeders.

In Europe, two or three pairs of spawners for a hatching pond of one acre is considered sufficient. These will be almost certain to produce more young fry than can be properly maintained in a pond of that size for the season, and enough to stock a nursery pond of several acres. About five hundred (two year-old) fish from the nursery-pond are sufficient for an acre of stock-pond. If this pond is properly supplied with aquatic plants, the five hundred fish introduced in the spring would be fit for market the next October and November, at which time they should weigh fully one ton.

It is believed that carp will command higher prices than shad. The reader now has some tangible data from which to figure the probable profits of carp culture. The profits can probably be materially enhanced by placing the fish a few weeks before marketing in large vats supplied with running water, and feeding them all they will eat, very much as chickens are prepared for market. They can be fed upon various kinds of kitchen refuse, but it is probable that boiled sugar-corn would be unequaled as a fattening food, both for increase and flavor. All food should be cooked, (steamed or boiled.)

Fattening vats should be constructed with false bottoms composed of galvanized wire-screen, sufficiently fine to prevent their food dropping through, but open enough to pass through all filth. A shallow gate should be arranged, opening across the entire end of the vat, to admit of fully "flushing" the same daily, and thereby clearing out all foul matter. Fattening vats should be covered with large, open, mesh, fine wire-netting. A fattening "boat" is shown in Fig. 10, sub. Fig. 1, page 157. The sides of this boat are composed of two-

inch pine plank, or even one-inch boards. The bottom is of fine wire-screen, same as false bottom of fattening vat, and the top of fine wire, open-mesh, galvanized netting, as shown in the illustration. This boat can be anchored in any pond or stream of clean water, convenient for feeding the fish.

All sluice and other screens should be of netting, galvanized *after* weaving. This prevents the wire from moving while being cleaned. A suitable brush for cleaning clogged screens is shown on the right of the embankment in Fig. 11, page 158. If the water is seen running through the upper screen of the sluice, it shows that the lower screen is clogged and should be at once cleaned, that the water may draw from the bottom.

I receive many inquiries as to the table qualities of the carp. Dr. Hessel, referring to this point, says: "If the carp were a fish of inferior quality, like the buffalo fish, for instance, its sales would doubtless be limited to the sea-port towns of Northern Germany and the principal cities of Central Europe, as Vienna, Berlin and Paris. In the latter city, in spite of an abundant supply of salt-water and different kinds of fresh-water fish, the carp is ever preferred to these, and, with the exception of trout and salmon, it frequently commands a price three times as high as that of all the rest."

I maintain my assertion that the carp is one of the most excellent fresh-water fishes, and its introduction will be of great value in point of national economy, especially on account of the facility of its culture and the enormous extent to which this may be carried on.

The carp and its value as a fish of culture will before long be fully appreciated, so that we may be enabled favorably to compare the results of its culture in America, as also the extent attained to, with any other country, to our complete satisfaction.

I have conversed with several gentlemen who have eaten our food carp, and they all prefer it to the universally prized shad.

MISCELLANEOUS OBSERVATIONS.

Carp culture is practicable in all parts of this country, and eminently so in the Middle and Southern States and Territories. When properly conducted, it will pay well anywhere in the north, but it will be necessary to construct the ponds deeper near the outlets, than further south. In the Northern States and Territories the deepest

portions of carp ponds should be from five to seven feet, while in the South they should run from three and a half to four feet. The larger portion of the area of ponds, both North and South, should not exceed two feet in depth.

It is not advisable to stock open streams or large bodies of water with carp, for reasons already given. In a few years there will be millions of surplus *young* carp in this country. Place *them* in streams, &c.

English carp are poor, because when introduced into England they were placed into open streams, where they hybridized. (See page 156.)

Collectors (see pages 161 and 162) for nursery ponds should be five or six inches deep and contain two or three times the area required for hatching ponds. For stock ponds, they should be eight or ten inches deep, even a foot deep will do no harm, and they should contain two or three times the area of nursery ponds.

Referring back to Fig. 10, I will say that the oviform sections of carp ponds here described should be preferably located, so as to run from the hibernating ground to the *extreme* opposite point of the pond. Thus, in pond *C*, Fig. 16, page 168, the ridge is located through the pond from northwest to southeast, while in *D* the oval conforms to the general shape of the pond. On the site of pond *B*, however, there were established two broad ditches, dividing the pond into three sections, running north and south. The bottom of this pond, therefore, is composed of three ovals, while *A* has one, corresponding to its general shape. This shows that the engineer, in laying out carp ponds, must conform his work to circumstances. In this connection I will say that it is impossible to lay out ponds properly, without a hydraulic survey of the sites.

In drawing the water from carp ponds, keep away from the outlets after the water is nearly out, at least keep out of sight of the fish till they are all in the collector, and then approach them gently. Do not frighten them; they may be driven into the mud and suffocated. If carp burrow into the mud deliberately and entirely of their own accord, there is no danger. They will thus live in mud for months after the water has disappeared, providing the mud keeps soft. Deformed fish, some striking monstrosities, are occasionally found when clearing ponds or changing the fish from one pond to the other. All such fish should be thrown out.

PART V.

THE STATE BOUNTY.

CHAPTER 1.—CULTIVATION OF FIBROUS PLANTS.

CHAPTER 2.—SUGAR FROM SORGHUM.

CHAPTER I.

CULTIVATION OF FIBROUS PLANTS.

The constantly increasing demand for fibrous products in this country and the rapid increase of manufacturing in our State induced us, in the first annual report of the Bureau, to direct the attention of our agriculturalists to the question whether other fibres, in addition to flax, which had been grown from the early settlement of the State, could not be successfully grown in New Jersey. A circular was issued, bearing date August 23d, 1878, embodying facts showing the large amount of jute, hemp and flax annually imported; and the co-operation of the public was invited to develop a new industry, either by planting the Indian seed or by the careful cultivation of the American jute, "*abutilon avicennæ*," which was found to be growing spontaneously in every section of the State. The Legislature, at this juncture, impressed with the importance of encouraging, in every possible way, the development of new industries within our territory, and with the view of stimulating individual effort in that direction, passed an act, approved March 3d, 1880, entitled "*An act to promote the production and treatment of fibres in the State*," the preamble of which read as follows:

Whereas, There are ample assurances that the soil and climate of this State are adapted to the cultivation of jute, ramie, flax, hemp and various other fibrous plants and grasses, which are extensively grown in other countries and largely imported into the United States; *and whereas*, the development of new productive industries are of essential benefit to the public welfare; therefore, Be it enacted, etc., etc.

By this act fifteen thousand dollars out of any money in the treasury of the State, not otherwise appropriated, were set apart to be paid in the form of bounties, to be apportioned as follows: "*Five thousand dollars* to the enumerated stalks;" "*five thousand dollars* to the enumerated cleaned fibre," and "*five thousand dollars* to the ramie yarn."

The following rate of bounty * was authorized under the law:

I. JUTE.—For every ton of two thousand pounds of *abutilon avicennæ* stalks, not less than three feet long, five dollars; for every ton of two thousand pounds of rose or marsh-mallow, not less than three feet long and not more than one inch in diameter at the butt, five dollars; for every pound of disintegrated jute, two and a half cents.

II. RAMIE.—For every ton of two thousand pounds of ramie stalk, not less than two and a half feet long, *ten dollars;* for every pound of disintegrated ramie ready for combing, *five cents;* for every pound of ramie yarn ready to weave, *ten cents.*

III. FLAX.—For every ton of two thousand pounds of flax stalks for fibre, of the ordinary lengths, *seven* dollars; for every pound of decorticated or cleaned flax, three and a half cents.

IV. HEMP.—For every ton of hemp stalks of two thousand pounds, of the ordinary length, *six* dollars; for every pound of decorticated or cleaned hemp, *three* cents.

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* New Jersey has always been foremost among her sister States in promoting the development of her agricultural interests, and it is a fact not generally known that, in her colonial days, acts were passed giving a bounty upon flax and hemp and the planting of mulberry trees.

Gordon, in his History of New Jersey, says of Governor William Franklin, the last of the royal Governors: "He seems to have been truly solicitous to promote the welfare of the colony by increasing its agricultural and commercial prosperity."

At his instance, at a session of the General Assembly of the Province of New Jersey, begun at Burlington, May 21st, 1765, the following act was passed:

"*An act for granting a bounty upon the raising of flax and hemp and planting of mulberry trees in this colony for raising of raw silk.*"

The second section reads as follows:

"Be it enacted *by the Governor, Council and General Assembly, and it is hereby enacted by the authority of the same,* That, from and after the first day of *March,* one thousand seven hundred and sixty-six, every person or persons, who shall, upon his, her or their own, or hired lands, cultivate and raise any hemp or flax fit for exportation to *Great Britain,* or shall plant mulberry trees upon his, her or their estates and possessions, shall have and enjoy a reward or premium for such hemp or flax so by him, her or them raised in one year, during the continuance of this act, and for the mulberry trees by him, her or them raised, the following sums, *that is to say:* for every ton of good, clean, bright hemp, raised on any farm or plantation in this colony in one year, the sum of *four pounds;* for five hundred weight of good, bright flax, well dressed from the swingle, raised on any farm or plantation in this colony in one year, the sum of *twenty shillings,* and the further sum of *seven shillings and six pence* for every hundred weight over and above the said *five hundred weight* raised as aforesaid; for every hundred mulberry trees set out at not less than fifteen feet distance and properly secured by any person or persons on his, her or their farms or plantations in any county of this colony, the sum of *forty shillings,* to be paid upon demand to any person or persons, who shall raise and cultivate such hemp and flax, and set out, plant and properly secure such mulberry trees in any county in this colony, by the treasurers of this colony, or either of them, out of the current monies in his or their hands."

Immediately after the passage of the law, (approved March 3d, 1880,) circulars were again issued and extensively distributed, giving the text of the law together with directions in regard to the best method of cultivating the plants as well as the character of soil necessary for their growth. Quite a large number of farmers entered heartily upon the work and a quantity of the seed of the American species of jute, *abutilon avicennæ*, was collected and distributed by this Bureau. Unfortunately, just at this time our State was visited with a severe drought, and much of the seed planted the first year either failed to sprout or did not come to maturity. For these, among other reasons, our farmers seem to have become discouraged and no claim for bounty has been made either for jute stalks or cleaned fibre.

For the cultivation of jute, hemp and ramie† it is doubtless true,

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The remaining sections of the act provide for the filing of proofs of such cultivation and for the adjustment of any disputed questions that might arise under the act.

This act took effect on the 1st day of March, 1766, and continued for "the term of two years and three months and no longer," so far as it related to hemp and flax, but so far as to the planting of mulberry trees, it was continued in force for "the term of seven years and no longer."

At a subsequent session of General Assembly, begun at Perth Amboy April 12th, 1768, an act was passed entitled "*An act to continue an act entitled 'An act for granting a bounty upon the raising of flax and hemp and planting of mulberry trees in this colony for raising raw silk, so far as relates to flax and hemp,'*" which is as follows:

"SEC. 1. WHEREAS, An act, passed in the fifth year of the reign of our Sovereign Lord King George the Third, entitled 'An act for granting a bounty on *flax and hemp*, and *planting of mulberry trees*,' has, by experience, been found to be of publick utility, and that part which relates to flax and hemp will soon expire by its own limitation;

"*Be it therefore enacted by the Governor, Council and General Assembly, and it is hereby enacted by the authority of the same*, That such part of the said act entitled 'An act for granting a bounty on flax and hemp, and planting of mulberry trees in this colony for raising raw silk," as relates to *flax and hemp*, shall be and is hereby continued, and every article and clause therein contained shall be and remain in full force, from the publication hereof to the first day of October, which will be in the year of our Lord one thousand seven hundred and seventy-two, and from thence to the end of the next session of General Assembly, and no longer."

† Jute is a vegetable fibre obtained from two species of *Corchorus* (nat. ord. Tiliacæ), *C. capsularis* and *C. olitorius*, the products of both being so essentially alike that neither in commerce nor agriculture is there any distinction made between them.

The two plants are thus botanically defined:

Corchorus capsularis.—Annual; 5-10 feet; calyx deeply 5-cleft; petals 5; leaves alternate, oblong, acuminate, serrated, two lower serratures terminating in narrow filaments; peduncles short; flowers whitish-yellow, in clusters opposite the leaves; capsules globose, truncated, wrinkled and muricated, 5-celled; seeds few in each

that a deep, rich soil is necessary as well as a humid atmosphere, and as neither the soil nor climate of New Jersey furnishes these conditions, we may conclude that our State is not pre-eminently adapted to their culture. Nevertheless, if there were more enterprise among our farmers, and they were willing to incur even a moderate risk in order to establish in the State the growth of fibrous plants other than flax, we are convinced that both the *abutilon avicennæ* and the *marsh-mallow*, which grow spontaneously in many localities, might be made profitable as fibre-producing plants; especially as the fact is fully established that the fibre can be separated by machinery, as is now the case with flax, at a very small cost. With these convictions we wrote to Professor S. Waterhouse, of the Washington University, St. Louis, Mo., a gentleman who has devoted many years to the study of jute culture, both in the United States and India, whose letter, written in response to our inquiries, fully confirming our statements made in former reports of the Bureau, will be found at the close of this chapter.

With regard to flax,* however, the conditions are different, as that

cell, without transverse partitions; in addition to the 5-partite cells, there are other 5 alternating, smaller and empty.

Corchorus olitorius.—Annual; 5-6 feet; erect; leaves alternate ovate-acuminated, serrated, the two lower serratures terminated by a slender filament; peduncles 1-2 flowered; calyx 5-sepalled; petals 5; capsules nearly cylindrical, 10-ribbed, 5-celled, 5-valved; seeds numerous, with nearly perfect transverse septa; flowers small, yellow.

Ramie is the East Indian name for the plant producing the fibre called *China-grass.* The plant has been used in China and other Eastern countries from time immemorial to make a variety of fabrics, some having the fineness and brilliancy of silk. It has been imported to a considerable extent into England and France, and used as a substitute for, or to mix with silk. The plant needs a rich and well-drained soil, and a climate where there are no hard frosts. A few years ago its cultivation was undertaken by Southern planters, and for a time it bid fair to become extremely profitable; but the labor of preparing the fibre by hand, after the Eastern manner, was found to be too costly, and as machines for separating the fibre had not met with encouraging success, the excitement soon subsided and its cultivation upon an extended scale has been abandoned.

The experiments in growing ramie in New Jersey, on account of the rigorous winter climate, have not been successful, but there would seem to be no reason why in the Southern or Southwestern States the crop could not be cultivated with profit.

* The common flax or lint, (*L. usitatissimum,*) is an annual; a native of Egypt, of some parts of Asia, and of the south of Europe, not truly indigenous to Britain or the United States, although now naturalized and often occurring in corn fields, which is the case also in many parts of the world. The most common variety of the flax plant has a very slender, erect stem, two or three feet high, branching only near the top so as to form a loose corymb of flowers. The leaves are small, distant and

plant has been cultivated in New Jersey from the earliest settlement of the State. One writer says: "Among the Dutch of New Jersey the soil was made to yield half a ton of flax or a ton of hemp to the acre, worth £15, with a profit of six shillings a day to the laborer. As population advanced under the English, the supplies, except from house spinning and weaving, came from England, or from New England, for grain and provisions. Denton, the earliest historian of Long Island, in 1670, says: 'Every one makes their own linen and a great part of their woolen clothing for their own wearing.' The Dutch were called 'Asseronye,' or 'the cloth-makers,' by the Indians. In East Jersey, after the English occupation, inducements were given to settlers, and a number of Scotch immigrants began the culture and manufacture of hemp and flax. In 1684, flax heckled was worth ninepence a pound, wool was cheap, but labor was scarce and dear. In West Jersey the Quakers early introduced the manufacture of cloth at Burlington, and in East Jersey fulling mills were set up at Rahway and Woodbridge." Raum, in his history of New Jersey, remarks: "The cultivation and home consumption of hemp and flax flourished in the early settlement of New Jersey. These were introduced into West Jersey by Scotch immigrants before the year 1684. In 1678, the Quakers from Yorkshire and London, who settled Salem and Burlington, in West Jersey, introduced the manufacture of cloth, serges, druggets and carpets; good plushes with several varieties of linen goods were made at the same time."

The first fulling mill in the Province was built in 1703 by Richard Clarke, and for his encouragement he was granted twenty acres of land. In 1784 there were forty-one fulling mills for household woolens, but no woolen factory. We have now in the State not only a large number of woolen mills, but at Paterson the largest flax manufactory in the United States is in operation. It is owned by Messrs. Barbour & Brothers, who give employment to *five hundred operatives* and consume in their manufactures *twenty thousand pounds* of flax daily. This firm imports largely from Ireland and Russia, but would gladly buy nearer home, and if our farmers would but enter with proper enthusiasm upon flax culture, they might, by a careful selec-

lanceolate; the flowers are of a beautiful blue, rarely white, rather broader than a sixpence; the petals slightly notched along the margin; the sepals ovate, 6-nerved; cilicated, destitute of glands; the capsules scarcely larger than the calyx, not bursting open elastically, but firmly retaining their seeds, which are dark-brown, glossy, oval-oblong, flattened, with acute edges, pointed at one end and about a line in length.

tion of seed and judicious cultivation of the plants, so improve the quality of the fibre that the Irish standard could soon be reached and our manufacturers supplied by the labor of our own agriculturalists.

The cultivation of flax is of such antiquity that evidences, both of its cultivation and preparation, as far back as the stone age, are preserved to the present day. "The use of flax," says Keller, ("Lake Dwellings of Switzerland," translated by J. E. Lee,) "reaches back to the very earliest periods of civilization, and it was most extensively and variously applied in the lake dwellings, even in those of the stone period. But of the mode in which it was planted, steeped, hackled, cleansed and generally prepared for use, we can form no idea more than we can of the mode or tools employed by the settlers in its cultivation. * * * "Rough or unworked flax is found in the lake dwellings made into bundles, or what we technically call heads, and, as much attention was given to this last operaton,i it was perfectly clean and ready for use."

The variety of the flax cultivated by the pre-historic races, according to the opinion of Dr. Herr, was the small head flax (*linium augustifolium*,) a plant native to the Mediterranean coasts from Greece and Dalmatia to the Pyrenees. In the Old Testament we are told that Pharaoh arrayed Joseph "in vestures of fine linen," (*Gen. xli.*, 42); and among the plagues of Egypt, that of hail destroyed the flax and barley crops, "for the barley was in the ear, and the flax was bolled," (*Exod. ix.*, 31.)

That the preparation of the fibre was not materially different from some of the modes pursued at the present day is apparent from the following description given by Pliny, who says: "The stalks themselves are immersed in water, warmed by the heat of the sun, and are kept down by weights placed upon them, for nothing is lighter than flax. The membrane, or rind, becoming loose is a sign of their being sufficiently macerated. They are then taken out and repeatedly turned over in the sun until perfectly dried, and afterwards beaten by mallets on stone slabs. That which is nearest the rind is called *stupa* (tow,) inferior to the inner fibres, and is only fit for the wicks of lamps. It is combed out with iron hooks until the rind is all removed. The inner part is of a white and finer quality. Men are not ashamed to prepare it." (*Pliny N. H., xix.*, 1.)

Is it not wonderful that Pliny, who lived cotemporary with Jesus Christ, should describe the preparation of flax fibre as if he had been writing in the nineteenth century, for even now the use of machinery

for the purpose is exceptional, the iron (or steel) hooks being still in use among our farmers for hackling and combing?

The cultivation of hemp* is also of great antiquity, as it is mentioned by Herodotus, who died B. C. 408, and is spoken of as the wild and cultivated hemp of Scythia. The hempen garments made by the Thracians are described by this writer as "equal to linen in fineness." In the United States, hemp seeds were ordered for the Plymouth Colony as early as 1629, but the greater profit derivable from tobacco opposed the development of hemp-growing at that time. The plant is now chiefly grown in the States of Kentucky, Missouri, Tennessee, Ohio, Indiana and New York. According to the census of 1870, the total production of hemp in the United States was 12,746 tons, and by the census of 1880, it will be seen that the production is less than 10,000 tons. This shows a decided decrease in the cultivation of this important fibre. The imports of hemp into the United States for the year ending June 30th, 1882, were 36,679 tons, valued at $6,110,152.

In our third annual report, page 165, will be found a circular giving directions in detail with regard to the preparation of flax straw for fibre, which can be either pulled or cut, provided the rotting is done thoroughly and the straw carefully handled so as not to become tangled. Many of our farmers have been deterred from raising flax on account of the expense of pulling, but now, if the ground is smooth, the crop can be cut with a machine, and, if carefully handled, the seed can be secured and the straw carried directly to the mill and sold at from ten to twelve dollars per ton without rotting.

At Frenchtown, in Hunterdon county, where the American Fibre Company of Baltimore have established a flax mill, machinery has been introduced which enables that company to purchase even tangled

* *Cannabis sativa*, an annual herb, having angular rough stems and alternate lobed leaves. The bast fibres of *cannabis* are the hemp of commerce, but under the name of hemp fibrous products from many different plants are often included. The hemp plant, like the hop, which is the other member of the same natural order, *cannabinaceæ*, is dicœcious, that is, the male and female flowers are borne on separate plants. The male plant is smaller than the female and dies earlier in the summer. The foliage of the female is darker and more luxuriant than that of the male. The leaves of hemp are constituted of five to seven leaflets, the form of which is lanceolate—acuminate, and sharply serrate. The height of the plant varies greatly with season, soil and manuring; a variety (*C. sativa*, var. *gigantea*) has produced specimens over 17 feet in height, but the average height of the common set is about 8 to 10 feet. There is but one species of hemp known, *cannabis sativa*, the *C. indica*, Lam., and *C. chinensis*, Delile, owing their differences to climate, and losing many of their peculiarities when cultivated in temperate regions.

flax straw, a product which, in the past, has been allowed to go to waste. As this is a new industry in New Jersey, a description of the machine which does this work may not be out of place. We quote from a letter written by T. L. Henley, the manager of the fibre company, to Mr. David Doering, Milford, Nebraska, who applied to this Bureau for information about a machine of which he had heard for working tangled flax:

"You inquire to know my process for steeping and preparing tangled flax straw for market. My process for steeping is Schenck's, which is fully described in a circular issued by the Bureau of Statistics of Labor and Industry of New Jersey, under date of July 8th, 1880. My machinery for scutching consists of a set of heavy fluted rollers, after passing through which the straw is scutched with a machine called Rowan's, originally made in England, but which can now be purchased at Mr. J. W. Todd's warehouse, 10 Barclay street, New York. The price is $150. One of these machines, well handled, ought to turn out *five hundred* pounds of clean fibre per day, worth *six* to *eight* cents per pound, according to quality and cleanness; to make it worth thirteen cents per pound this has then to be hackled; the fibre from which will sell readily for that money, and the tow remaining afterwards is worth about seven cents per pound."

Another mill for converting flax straw into fibre has been established near Flemington, in Hunterdon county, and the very best quality of long line flax has been produced. The following extract from a letter received from Mr. W. E. Rothermel, the proprietor, will show what progress he is making:

"I came here in September, 1882, to improve and experiment on a new flax machine, which has done better work than we anticipated, and which we hope to work next year upon a much larger scale. The flax grown here is good, but the trouble is to get enough straw to keep our machinery working. We have bought about twenty tons of *rotted* straw so far, paying $25 per ton for nearly all of it. We have more engaged, but would like a much larger supply for the mill. Although it is, at this price, one of the best crops the farmer can raise, yet there seems to be a disposition with nearly every farmer in this section to plant a very small plot with flax. We expect to locate at Frenchtown next season, and will try to encourage farmers to raise more flax."

Mr. Rothermel states that while the farmer, by handwork, can only get three hundred pounds of clean flax from a ton of rotted

straw, his machine will produce four hundred pounds of flax of superior quality, and he is thus enabled to pay the farmer a liberal price for his straw.

Mr. P. L. Henly, manager of the Frenchtown mill, issued the following instructions to farmers in the vicinity, upon flax culture:

The failure of flax culture in this country to any degree of amount of consumption is mainly and simply attributed to the trouble the flax crop entails, and just at the commencement of harvest, if an attempt be made to manage it in the ordinary manner. The pulling is a tedious operation, to begin with, and when the farmer sees all his other crops ripening for harvest, he does not care to be put out of the way by a new crop of which he knows but little. Again, the process of taking off the seed is even more tedious, the flail or the threshing-machine never being employed for this purpose. The steeping and scutching of the straw are equally tiresome, and consequently after one or two years the farmers gave the thing up, not finding the profits realized sufficient for their trouble. We now propose laying before our farmers a "rough and ready" way of managing this crop, in which the risk and labor may be reduced to a minimum. As to sowing, get the best and cleanest seed you can; sow in March or the first week in April, not later; let the surfacesoil be as fine as possible; sow broadcast two bushels to the acre, and bury the seed an inch deep, using a very light harrow and finishing with light roller. The land should be as clean as possible, and the flax crop does best after wheat, when no additional manure is needed. Do not trouble about weeding, as it is an expensive process. The time for harvesting, if sown as directed above, will be about a week before the wheat growing in the same neighborhood is fit to cut. At a sacrifice of some quantity of fibre, the flax may be cut cheaper with a mowing-machine set as close to the ground as possible, harvesting it as you would a clover crop, so that it may dry with as little exposure to the sun as possible. Do not attempt to stack it too soon, as no crop will heat quicker if put together in a green state. You cannot make any mistake about this if you do not hurry too much, but when it is dry the sooner it is ricked before the winter commences, the better. And when the time can be spared for the purpose, thresh it out with the machine set as lightly as possible, so as not to break the straw.

Now for the straw; and here the farmer must take a little trouble, but it will consist more in watching the process carefully than in any extra labor it entails. Get a tank of any shape or depth, only it must be perfectly water-tight, and fix it within reach of the softest water you can find on your premises. It should hold at least five hundred gallons, and as much more as you like. Fill it with flax straw, and then lay hurdles on the top with strong cross-pieces over them, which must be bound with a wagon-line very firmly in place, otherwise the straw will expand so soon as the water is applied, and half the contents will rise above the surface. This is especially to be guarded against, and it will be well to fix it so that four inches of water will come over the surface to allow for shrinkage, as it is injurious to add fresh water. Afterwards, having fixed all securely, fill the tank with water and leave it for a week. And now comes the part so hard to describe, unless one be at hand to do so by word of mouth. The flax is fit to come out so soon as fermentation

has ceased and the straw is sufficiently retted or rotted to part easily from the boom or inner portion of the straw, around which the fibre has formed. This can be ascertained by rubbing two or three straws together. And here is one great advantage: if not sufficiently rotted, no matter; a few days longer in the meadow and the dews or rain will set it all right and improve the quality as well. If water is plentiful, draw out the plug from the bottom of the tank, thus letting off the flax-water, and pump fresh in at the top, so as to cleanse the flax as much as possible, and then haul it to the drying meadows and spread it roughly over the ground, which must be grass land, of course. Let it lie here for a few days, turning every evening with a fork as you would clover hay in swath, and then put it away under cover. Before steeping another supply, the tank must be scrubbed well, otherwise the foul matter thrown off by the first will injure the flax of the next lot.

We think no farmer will venture to call the plan we have suggested a troublesome one, and the only extra trouble, over and above the barley crop, is in the after-preparation of the straw, which, however, yields a handsome profit per acre, at $20 per ton, which will be paid by the American Vegetable Fibre Co. (Limited,) at their mill at Frenchtown, New Jersey.

In this connection we must again quote from Prof. Waterhouse, who writes so thoughtfully and intelligently on the subject of fibres:

"The cultivation of flax ought to occupy a leading position among our domestic industries. Its neglect is discreditable to the agricultural enterprise of our countrymen.

"Political economy teaches no more important lesson than that which inculcates a diversity of industries. The wealth of nations depends upon the successful application of this principle. In periods of prosperity, a diversity of employments is a source of greater opulence; in times of depression it alleviates the general distress. A limitation of occupations increases the disaster of a panic. If there are many pursuits, some industries surviving the revulsion and active in the midst of the general stagnation, bring to the impoverished nation the relief of a partial prosperity. Where there are only a few vocations, there is an inevitable tendency to over-production and excessive competition. The glut and rivalry cause a ruinous reduction of prices. But if the callings are numerous, there is less competition in any specific business, and as each class supplies the wants of the rest, markets are ready and exchanges profitable.

"These simple truths are aptly illustrated by the industrial condition of Ireland. In those parts of the country where only a few agricultural supplies are raised, the people are impoverished by a disastrous competition which compels them to sell their own products at the lowest prices, while their necessities force them to buy the productions of other nations at the righest rates. This false policy spreads ruin

over a land whose rich resources would, under a wiser system, bless its inhabitants with every bounty.

"But the industries of northern Ireland have been diversified by the cultivation and manufacture of flax. The district is dotted with linen factories. The cultivator and manufacturer supplying each other's wants, and quickening the interchange of commodities, create values that enrich the whole nation. The beautiful fabrics which, throughout christendom, embellish the abodes of competence and the palaces of wealth, bring golden returns. The distaff is the Midan wand whose magic touch creates riches. The province, smiling with plenty, and busy with lucrative activities, thrives with an American prosperity.

"The example of northern Ireland is full of important suggestions. Our countrymen should imitate the Irish wisdom that has proved so remunerative. The growth of our own flax would not only save a score of millions annually, but it would also promote the industrial independence which the United States ought speedily to achieve. Individual enterprise, encouraged by measures of far-sighted statesmanship, ought to naturalize every industry that our soil and climate will permit. A domestic supply of all our wants is a source of wealth in peace and of safety in war. An industrial self-reliance is the true policy of the United States.

"But the cultivation of flax in this country is not only sanctioned by the general principles of political economy—it is also urged with the more persuasive argument of personal gain. If the inferences derived from the experience of Europe are applicable to American husbandry, then the growth of this staple in the United States would be a very profitable industry. The practice of raising flax for the seed alone, is wasteful. When the movement of our cotton crop annually consumes more than thirty million yards of baling, it is not an act of economy to throw away the stalk of even our coarsest flax. The present system of cultivation is not suited to the development of fine fibre. In consequence of the small quantity of seed sown to the acre, a large area of ground is required and the stalks are short, branching and woody. If twice as much seed were planted to the acre, less land would be needed, the branches would be fewer, and the fibre would be longer and finer. The existing method of cutting and threshing flax by ordinary wheat reapers and threshers is unthrifty. Some of the stalk is wasted by being cut too high from the ground,

while in the process of threshing masses of fibre are lost by inextricable entanglement, or by breaking into lengths too short for available use. It is evident that all these costly appliances, so indispensable to a rapid and economical treatment of the fibre, exceed the means of individual cultivators. Hence the establishment of local factories, where all the flax raised in the neighborhood can be subjected to processes which the farmers have not the facilities to perform, is a condition vital to success. The system, which I recommended many years ago in the case of jute, is equally applicable to flax.

"Americans ought to surpass the rest of the world in the culture and manufacture of flax. With our wide range of latitude, the conditions of soil, temperature and moisture best suited to the growth of this plant can easily be found. But this country ought not to be content to raise flax merely for the sake of the seed—the largest profits are derived from the manufacture of exquisite fabrics. Consequently, the attention of our farmers should be directed to the production of long-line fine fibre. Our countrymen, often victorious over foreign art, need not hesitate to enter the lists of competition. Surely, American ingenuity is not inferior to Irish skill. Our own mills will yet equal the woven miracles of European looms, enrich the nation with the vast values with which the creative power of skilled labor invests raw material, and retain in the United States, the golden treasures which are now exported for foreign fabrics."

The use of jute for manufacturing purposes is comparatively of modern date, as the name seems to have been first used by Dr. Roxburgh, in 1795, when he sent to the directors of the East India Company a bale of fibre which he described as "the jute of the natives."

Some idea of the importance of this manufacture and the increasing demand for the fibre, may be formed from the statement that in 1829, the first year in which it received any notice from the custom-house authorities at the port of Calcutta, the export amounted to only 364 cwt., valued at £62, while for the year 1880, from the same port, the amount exported was 6,316,000 cwt., valued at £4,119,200.

The greater part of these exports found their way to Great Britain, but the trade to the United States is steadily increasing, and from 1,000 cwt. imported in the year 1850–51, the amount was increased in 1872–73 to 307,718 cwt. of jute, and 1,158,895 cwt. of cuttings and rejections.

The following table will show the importations for twelve months, ending June 30th, 1882:

IMPORTS OF FIBRES INTO THE UNITED STATES.

Tables Showing the Quantity and Value of Importations for Twelve Months, Ending June 30th, 1882.

FLAX.	DOLLARS.	HEMP.	DOLLARS.	JUTE AND OTHER GRASSES.	DOLLARS.
Flax, raw, 5,563 tons.....	1,502,645 00	Hemp, raw, 36,679 tons.....	6,110,152 00	Jute, raw, 84,186 tons..	4,710,192 00
Manufacture of, by yard.....	14,725,670 00	Manufacture of, by yard.....	41,390 00	Manufacture of by yard,	
Other manufactures of.....	2,994,878 00	Other manufactures of	140,768 00	1,966,802 yards.....	130,329 00
				Gunny cloth, gunny bags and manufactures of, used in	
				bagging, 2,712,106 pounds.	131,816 00
				Other manufactures of.....	5,400,045 00
	$19,223,193 00		$6,292,310 00		$10,372,382 00

The following tables are compiled for the purpose of showing the steadily increasing importation of fibres into this country:

MANILA HEMP.

Imported.	Prices on 1st January. (Gold.)	Prices on 1st July. (Gold.)	Range of Prices during each month, 1882.	Consumed each year.
Bales.				*Bales.*
1882.....205,763	1883.....11⅜ *a* 11½ c	1882.....11¾ *a* 12 c	January .....11 *a* 10½	1882.....196,885
1881.....223,136	1882.....11¼ *a* — c	1881.....11 *a* 11½ c	February.....10¾ *a* 10¼	1881.....220,685
1880.....159,594	1881 ..... 8¾ *a* 9 c	1880..... 7 *a* — c	March.....10½ *a* 10¾	1880.....176,600
1879.....168,364	1880..... 9⅛ *a* 9¼ c	1879..... 7½ *a* 7¾ c	April.....10½ *a* 11	1879 153,173
1878.....114,783	1879 ..... 6¾ *a* — c	1878..... 6¾ *a* — c	May..... .....11 *a* 11⅞	1878 127,394
1877.....143,382	1878..... 7 *a* — c	1877..... 8 *a* 8¼ c	June..... .....11⅝ *a* 12	1877.....146,715
1876.....105,614	1877..... 8¼ *a* — c	1876..... 7 *a* — c	July.....11¾ *a* 12	1876..... 132,231
1875..... 91,580	1876..... 7½ *a* — c	1875*..... 8 *a* 8⅛ c	August .....11½ *a* 11⅞	1875.....125,904
1874.....200,213	1875*..... 7½ *a* 8½ c	1874*..... 8½ *a* 10 c	September .....11¾ *a* 11⅞	1874.....137,608
1873.....144,079	1874..... 9½ *a* — c	1873.....10½ *a* — c	October.. .....11¾ *a* 11½	1873 150,659
1872 196,256	1873 .....10¾ *a* — c	1872..... .....12 *a* 12¼ c	November .....11½ *a* 11⅝	1872..... 155,173
1871.....144,407	1872.....13¼ *a* — c	1871..... .....11 *a* 11½ c	December.. ..... 11½ *a* 11⅝	1871..... 157,342
1870 142,156	1871.....12 *a* — c	1870 ....13¼ *a* 13½ c		1870..... 130,388
1869.....138,165	1870.....14 *a* 14¼ c	1869.....12½ *a* 12¾ c		1869.....136,483
1868.....153,579	1869..... .11¼ *a* 11½ c	1868 .....10 *a* — c		1868.....141,962
1867.....128,819	1868.....10½ *a* 10¾ c	1867.....11 *a* 11½ c		1867.....134,243
1866.....145,498	1867..... ....11½ *a* 12 c	1866..... 9 *a* — c		1866.....140,330
1865.....154,352	1866..... .... .12 *a* — c	1865.....10 *a* — c		1865.....128,508
1864 114,318	1865..... 8⅛ *a* — c	1864..... 8 *a* — c		1864..... 135,304
1863..... 96,651	1864..... . 8⅜ *a* — c	1863..... 7 *a* 7¼ c		1863.....132,358

* According to quality.

SISAL HEMP.

Imported.	Prices on 1st January. (Gold.)	Prices on 1st July. (Gold.)	Range of Prices during each Month, 1882.	Consumed each Year.
Bales.			January..... .....6 *a* 6¼	*Bales.*
1882.....129,850	1883..... .....5½ *a* — c	1882..... 6½ *a* — c	February.. ..... 6 *a* 5	1882.....107,757
1881.....136,139	1882.....6¼ *a* — c	1881.....6¼ *a* — c	March.....5¼ *a* 5½	1881.....104,633
1880..... 80,254	1881.....6½ *a* 6⅝ c	1880.....4½ *a* — c	April.....5¼ *a* 5⅜	1880..... 75,038
1879. 65,209	1880.....7½ *a* 7¾ c	1879.....5½ *a* 5⅝ c	May.....5½ *a* 6½	1879..... 64,017
1878..... ... 59,631	1879.....5 *a* — c	1878.....5⅛ *a* — c	June.....6¾ *a* 6½	1878..... 49,074
1877..... 50,138	1878.....5½ *a* — c	1877..... 6¼ *a* — c	July.....6¼ *a* 6	1877..... 51,538
1876..... 42,671	1877.....5¾ *a* 6 c	1876.....4⅛ *a* — c	August..... .....6⅛ *a* 6½	1876..... 41,864
1875..... 41,500	1876.....4⅝ *a* 4¾ c	1875.....5⅜ *a* 5½ c	September. .....6½ *a* 6	1875..... 31,313
1874..... 28,683	1875.....5½ *a* — c	1874.....6¼ *a* — c	October.....6 *a* 5⅝	1874..... 30,527
1873. 29,747	1874.....7½ *a* — c	1873.....8⅛ *a* 8¼ c	November. .....5¾ *a* 5⅞	1873..... 22,402
			December.....5¾ *a* 5½	

CALCUTTA JUTE.

Imported.	Prices on 1st January. (Gold.)	Prices on 1st July. (Gold.)	Consumed each year.
Bales.			*Bales.*
1882.....53,815	1883.....3¼ *a* 4¾ c	1882.....3⅜ *a* 4⅞ c	1882.....53,802
1881.....59,855	1882.....3½ *a* 5¼ c	1881.....3¾ *a* 5¼ c	1881.....61,843
1880.....56,606	1881.....4 *a* 5 c	1880.....4½ *a* 5½ c	1880.....54,640
1879.....54,215	1880.....4⅝ *a* 5½ c	1879.....3¾ *a* 4⅞ c	1879.....52,271
1878.....45,181	1879.....3¾ *a* 4½ c	1878.....4¼ *a* 5¼ c	1878.....39,093
1877.....22,629	1878.....4⅜ *a* 5½ c	1877.....4⅜ *a* 6 c	1877.....30,154
1876.....25,284	1877.....4 *a* 5½ c	1876.....3¾ *a* 5¼ c	1876.....35,609
1875.....28,804	1876.....3¾ *a* 5¼ c	1875.....4¼ *a* 5 c	1875.....36,248
1874.....27,496	1875.....4 *a* 5½ c	1874.....3⅜ *a* 6 c	1874.....38,784
1873.....39,404	1874.....3 *a* 5½ c	1873.....2½ *a* 4½ c	1873.....54,930

JUTE BUTTS AND REJECTIONS.

Imported.		Stock 1st January.		Prices on 1st January. (Currency.)	Prices on 1st July. (Currency.)	Consumed each year.	
	Bales.		*Bales.*				*Bales.*
1882	320,306	1883 (Importers)	18,953	1883 $2\frac{1}{4}$ *a* $2\frac{5}{8}$ c	1882 $2\frac{1}{2}$ *a* $2\frac{7}{8}$ c	1882 Delivered	325,298
1881	265,989	1882 "	23,945	1882 $2\frac{5}{8}$ *a* 3 c	1881 $2\frac{3}{4}$ *a* $3\frac{1}{4}$ c	1881 "	285,624
1880	292,889	1881 "	43,578	1881 $2\frac{9}{16}$ *a* $2\frac{3}{4}$ c	1880 $3\frac{3}{8}$ *a* 3 c	1880 "	272,813
1879	297,959	1880 "	22,503	1880 3 *a* $3\frac{1}{4}$ c	1879 $2\frac{5}{16}$ *a* $2\frac{1}{2}$ c	1879 "	295,727
1878	191,227	1879 "	21,257	1879 $2\frac{3}{8}$ *a* $2\frac{5}{8}$ c	1878 $2\frac{1}{16}$ *a* $2\frac{7}{8}$ c	1878 "	183,622
1877	195,630	1878 "	13,667	1878 $2\frac{3}{4}$ *a* $2\frac{7}{8}$ c	1877 $3\frac{1}{2}$ *a* $3\frac{3}{4}$ c	1877 "	183,945
1876	235,068	1877 "	3,979	1877 $3\frac{1}{4}$ *a* — c	1876 $2\frac{5}{8}$ *a* $2\frac{3}{4}$ c	1876 "	234,642
1875	192,504	1876 "	3,556	1876 $3\frac{1}{2}$ *a* — c	1875 $2\frac{7}{8}$ *a* — c	1875 "	233,856
1874	160,500	1875 "	44,904	1875 $2\frac{1}{4}$ *a* $2\frac{3}{8}$ c	1874 $2\frac{3}{4}$ *a* — c	1874 "	193,499
1873	227,418	1874 "	67,850	1874 $2\frac{1}{2}$ *a* — c	1873 $1\frac{3}{4}$ *a* — c	1873 Actual	267,513

JUTE CULTURE.

WASHINGTON UNIVERSITY,
ST. LOUIS, Mo., December 1st, 1882.

James Bishop, Esq., Chief of the N. J. Bureau of Statistics of Labor and Industries:

DEAR SIR—Heartily thanking you for your generous recognition of personal services for the promotion of our textile industries, I proceed to answer your inquiries.

1. Indian jute cannot be profitably cultivated in New Jersey. It is a plant that flourishes only in a warm climate. Your State is too far north for the full development of the stalk or maturity of the seed.

Ramie is indeed grown in Northern China, but great care has to be taken to protect it from the blight of frost and cold. The laborious precautions which the painstaking Chinese adopt would be distasteful and expensive to the American cultivator. But, in suitable localities in the Southern States, this strong and beautiful fibre can be economically produced as soon as an effective machine for the treatment of the stalks has been invented.

In consequence of the costly trouble attending the culture of ramie in northern latitudes, the attempt to naturalize this plant in your State would be an experiment of doubtful success.

But bute can unquestionably be raised in New Jersey. This hardy plant (*abutilon avicennæ*) has a wide range of growth. It grows wild as far north as the British Possessions. Its fibre is strong and white. For coarse fabrics, bute has a commercial utility and value.

2. Thus far, jute has not been profitably cultivated in this country, for the simple reason that till recently, there has been no successful mechanical process for the removal of the fibre. Till effective machinery had been devised, there was no possibility of profit in the proposed industry. The costly manual labor of the United States could not successfully compete with the cheap handwork of India. An observation of the conditions of soil and climate under which Indian jute grew, convinced me, at the outset, that the plant could be easily raised in the Gulf States. Accordingly, for ten years, my principal effort has been to direct the attention of American inventors to a sure means of private wealth and public usefulness. At last a machine sufficiently effective to test the economy of jute-raising in the South has been devised. My townsman, Mr. T. Albee Smith, is the patentee. Other machines and processes have been invented, but their merits are unknown to me. Without the slightest intimation that these devices are failures, it may be safely asserted that Mr. Smith's machine is a success. It is susceptible of improvement, but even in its present form it does its work well enough to determine the profitableness of domestic jute culture. A report of the first test of this machine is subjoined.

3. For several years small quantities of jute seed have been distributed by me, on the condition that the planters report the result of their experiments. Probably one hundred acres of jute have been planted this past season. This aggregate has been scattered in small patches from Texas to North Carolina. It was planted with no expectation of profit, but simply from a desire on the part of the individual planters to determine, by personal experience, whether jute could be naturalized in the Southern States. The numerous reports, extending over a period of five years, concur in their testimony. One correspondent assured me that jute grew with great luxuriance on his plantation; another, that some of the stalks reached a height of 16 feet, and that the average height was from 10 to 13 feet; another, that he could

raise jute just as easily as he could Indian corn; another, that the jute seed not only fully matured, but that some of it was larger and heavier than that brought from India; and another, that the jute, left from the day of planting wholly without cultivation, out-grew every native weed, with the single exception of the indigo weed. To those familiar with the rank luxuriance of semi-tropical weeds, this last statement has great significance. There is no longer a shadow of doubt about the capability of the Southern States to raise jute. From North Carolina to Mexico, there are on the borders of the Gulf hundreds of thousands of acres of land, unsuited to sugar or cotton, but well adapted to the production of jute. A wise diversification of Southern industries will lead to an immediate utilization of these lands. From the start, the profitable cultivation of jute in this country has depended solely upon the invention of an effective machine for the decortication of the stalks. Whether the mechanical problem has been solved, the following report of the first formal trial of Mr. Smith's machine will afford your readers some means of determining.

WASHINGTON UNIVERSITY,
ST. LOUIS, September 18th, 1882.

Messrs. James M. Putnam and C. Menelas:

DEAR SIRS—The jute machine of Mr. T. Albee Smith was tested in this city on the 12th of September. The mechanical conditions under which the experiment was tried were imperfect. The machine was operated by an engine that was at the same time driving all the machinery of a large workshop. Hence it was impossible to determine the amount of power required to actuate the jute machine.

The jute was home-grown. It was raised in Brookhaven, Miss. As the jute was cut before it was matured, the stalks were rather small and short. Their length ranged from five to seven feet.

The stalks were entirely green and untrimmed. They were put into the machine with all their branches and leaves out, just as they came from the plantation. The jute stalks weighed eighty-seven pounds. They were run through the machine in thirty minutes. The available pulleys of the machine shop were so adjusted as to afford insufficient power. It was deemed unwise, for the sake of a single experiment, to incur the expense of alterations. Not more than one-third of the feeding platform was at any time filled. If the power had been adequate, the time consumed in passing the stalks through the machine would not have exceeded ten minutes. After the operation, the blades of the machine were found to be free from gum. An ingenious and effective application of water-jets obviates a difficulty that has heretofore been very embarrassing.

THE SEPARATION OF THE FIBRE

from the ligneous stem was complete. Hardly a sliver of wood remained among the ribbons of fibre, and whenever a piece was found it was wholly detached and easily shaken out. The machine delivered the fibre straight and untangled, while traveling belts carried away the woody fragments and left them in a heap by themselves.

The eighty-seven pounds of stalks yielded twenty-seven pounds of fibre. A pound and one-half of green fibre were found in the refuse, but this waste consisted almost entirely of the fibre of the branches. These branches were so short that the fibre was not long enough to reach from the crushing to the separating rollers, and therefore was carried through and deposited with the refuse.

The machine, of course, only removes the wood from the fibre. The process of retting is still necessary before the fibre is ready for commercial use.

Three experiments in retting were tried. Two of them were conducted in the laboratory of Washington University. Fourteen and one-fourth pounds of green fibre, steeped in a boiling bath of chemicals, yielded two and one-fourth pounds of dry fibre. Ten and one-half pounds of green fibre, treated by the same method, produced one pound and one-half of dry fibre. The time spent in this process was exactly six hours. A specimen of the fibre prepared in this way is herewith inclosed. The fibres are strong and thoroughly separated, but somewhat darker than those retted in water.

Two and one-fourth pounds of green fibre were placed in water, but the process of retting is not yet finished. All of the steps described in these various tests were taken under my personal supervision. These facts will enable you to judge for yourselves of the commercial value of Mr. Smith's machine. It is very gratifying to me, after ten years of urgent appeal to inventors, that one of my own townsmen has devised a machine that is an important advance toward the solution of a great industrial problem. Mr. Smith's invention simplifies the

PROCESSES OF PREPARATION.

Heretofore water-retting required ponds and rivers for the submersion of the unwieldy mass of stalks. But Mr. Smith's machine so greatly reduces the bulk that the fibre separated from the wood can easily be treated in vats. Water seems to be the most economical solvent of the gum which holds the jute fibres together.

But water will do its work as cheaply in the United States as in India. Though chemistry may yet invent more effective methods, at present the cheapest way of separating the fibres is an immersion of the jute in vats of hot water. This process, impracticable when the whole stalks are handled, is readily feasible when only the fibre is treated. Ponds and rivers cannot be heated, but vats can be, and an equable temperature of any required degree can be maintained.

MR. SMITH'S MACHINE

obviates a serious difficulty. In India the entire stalk is placed in water. If the stem is thick, the fibre at the top is thin and delicate, while that at the foot is coarse and dense. As the water has access only to the outside of the stalk, the thicker bark and more compact fibre at the bottom prevent a uniformity of retting. Before the fibre at the butt has been sufficiently dissolved the fibre at the top has become worthless from overretting. But Mr. Smith's machine, by stripping away the woody part of the stalk and freely admitting the water to both sides of the fibre, insures a comparative equality of retting and prevents a material loss of fibre.

Yours, S. WATERHOUSE.

The quantity of fibre extracted in the above test was small. The stalks, whose growth had been retarded by an excess of moisture, were not mature. It was not the fault of the machine that the jute was not rich in fibre. The refuse, even including the short branches, was very small. Indeed, it is one of the excellencies of Mr. Smith's machine that it wastes so little. It removes all the fibre of the main stalks even to the very roots, and saves the fibre of all the branches long enough to reach from the holding to the scraping rollers. There are no "butts" or "rejections." This saving of all the valuable portions is an important economy. The machine will operate equally well upon bute, hemp, or jute. Mr. Smith is confident it will also prove successful in the treatment of ramie and pita. If practical tests show his confidence to be well based, the textile industries of this country will be diversified by the introduction of new and valuable fibres.

Mr. Smith's machine has recently been removed to the plantation of Mr. C. Menelas, Brookhaven, Miss., and tested on several acres of jute. The conditions were more favorable than they were on the occasion of the first trial. The steam-power was ample and the size of the pulleys was proportionate to the required service. Consequently, although the overripe stalks were too dry, hard, and woody, the operation of the machine was even more satisfactory than it was at St. Louis. In a succession of extended trials, no gum was in any instance found upon the blades of the machine.

The jute is treated immediately after it is cut, or as soon as the leaves fall from the gathered stalks. The approximate capacity of Mr. Smith's machine is 15,000 pounds of green stalks a day. Of course, the service of a larger machine would be proportionally greater.

Mr. Smith claims that with the aid of his invention domestic jute can be prepared for the market at two and a half cents a pound. The price of Indian jute is now exceptionally low. In New York the ruling rate of low-grade jute is four cents a pound. But even if the preparation of home-grown jute costs three cents a pound, there is still, notwithstanding the present low price of the foreign fiber, a margin of profit.

In view of these facts, if Southern planters neglect during the coming season to test the possibility of a profitable cultivation of jute in the Gulf States, they will exhibit a considerable indifference to their own interests.

Hoping that an industry which increases the resources of India by scores of millions annually, will not in this country be suffered to fail through want of intelligent enterprise, I am, with personal regard,

Very respectfully yours,

S. WATERHOUSE.

TABLE No. 1.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1880.				
Sept. 20	John P. Phillips	Lawrenceville*	4,240	$14 00
Oct. 13	George S. Johnson	Sergeantsville	2,422	7 00
" 13	Francis Snyder	"	3,210	10 50
" 13	Austin Bray	Locktown	2,398	7 00
" 15	Bartlette Hann	Kingwood	3,572	12 25
" 25	R. V. Megronigle	"	3,445	10 50
" 29	Wm. L. Welsh	"	1,200	3 50
Nov. 7	Emily Heath	"	3,110	10 50
" 8	Joseph C. Reading	Sergeantsville	2,050	7 00
" 11	John W. Hann	Kingwood	2,810	8 75
" 15	Samuel Gano	"	5,590	19 25
" 17	Elias Hoppock	Sergeantsville	1,825	5 25
" 17	Watson Kugler	Kingwood	5,235	17 50
" 17	Henry Cook	"	1,650	5 25
" 17	John Cronce	Locktown	1,605	5 25
" 23	John Cook	Point Pleasant, Pa	1,490	3 50
" 23	Gershom Vanselous	Kingwood	2,300	7 00
" 29	S. D. B. Kise	"	2,145	7 00
" 30	Elisha Alward	Sergeantsville	1,180	3 50
" 30	William Conner	Baptisttown	1,530	5 25
" 30	Mathias Brink	Kingwood	2,843	8 75
Dec. 2	Theodore Holcombe	Quakertown	1,050	3 50
" 2	D. C. Stenner	Sergeantsville	3,840	12 25
" 6	Wilson H. Swallow	Stockton	2,000	7 00
" 11	R. C. Williamson	"	2,510	8 75
" 14	Millard F. Kugler	Tumble	2,010	7 00
" 15	Thomas Burket	Mount Pleasant	3,340	10 50
" 16	Wm. R. Opdyke	Croton	2,932	8 75
" 16	Alpheus Bowlson	Baptisttown	6,400	21 00
" 16	Henry W. Hoppock	Croton	3,610	12 25
" 17	Henry Potts	Locktown	4,182	14 00
" 17	John T. Eick	"	1,219	3 50
" 17	Isaac M. Keyser	Kingwood	985	1 75
" 17	James S. Fisher	"	1,800	5 25
" 18	Oscar Barcroft	"	3,343	10 50
" 20	Snyder Martin	"	2,645	8 75
" 20	John Field	"	2,170	7 00
" 20	Thomas Martin	"	2,715	8 75
" 20	Charles S. Hoyt	Hamden	7,622	26 25
" 20	Isaac N. Farley	"	4,620	15 75
" 21	Jacob F. Myers	Clinton	2,232	7 00
" 21	Oliver Fritts	Hamden	2,174	7 00
" 21	Mrs. James Emery	Clinton	8,372	28 00
" 21	Stanford Butler	Pattenburg	4,015	14 00
" 22	David F. Butler	"	1,010	3 50

* Mercer county. Except where otherwise stated, Hunterdon county.

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1880.				
Dec. 22	Calvin A. Larue	Croton	2,810	$8 75
" 23	E. Custard	"	2,760	8 75
" 23	Aaron B. Hoffman	Sunny Side	5,720	19 25
" 23	Hezekiah Keephart	Hamden	2,396	7 00
" 23	A. B. Chamberlin	Baptisttown	3,939	12 25
" 24	Charles Case	Hamden	2,350	7 00
" 29	Asa B. Hockenbury	Baptisttown	12,097	42 00
1881.				
Jan. 3	Jacob L. Hummer	Milford	1,230	3 50
" 4	J. A. Melick	Stockton	1,655	5 25
" 6	W. W. Ward	Croton	4,434	14 00
" 11	J. B. Sherman	Stockton	1,240	3 50
" 11	Charles Keephart	Mount Pleasant	4,616	15 75
" 13	Sylvester Bloom	Baptisttown	5,170	17 50
" 13	Chester Rupell	Mount Pleasant	4,116	14 00
" 13	Abraham Edmonds	Pattenburg	715	1 75
" 13	Jacob S. Everitt	Lambertville	4,535	15 75
" 17	John G. Greer	Frenchtown	2,470	7 00
" 17	Godfrey Bellis	Holland	1,930	5 25
" 21	Edmund P. Hann	Point Pleasant, Pa	575	1 75
Feb. 1	Ellis Hann	" "	2,010	7 00
" 1	Alpheus Morgan	Stockton	1,705	5 25
" 3	Hiram D. Hoppock	Sergeantsville	2,041	7 00
" 8	Richard Fleming	Pattenburg	1,810	5 25
" 22	Robert Vanderbilt	Everittstown	2,920	8 75
" 28	Thomas Boroe	Point Pleasant, Pa	2,885	8 75
Mar. 21	Wm. H. Martin	Raven Rock	565	1 75
" 30	Zachariah T. Kugler	Quakertown	4,391	14 00
April 11	George W. Niece	Flemington	2,235	7 00
" 15	Nelson Fletcher	Baptisttown	4,400	14 00
" 18	Hazard P. Shaw	Kingwood	1,740	5 25
May 24	George W. Kugler	Tumble	895	3 13
July 7	Edward Housell	Stockton	1,810	6 33
Aug. 10	Jacob S. Everitt	Lambertville	10,680	37 38
" 15	Fritz Peters	"	1,152	4 03
" 25	William R. Opdycke	Croton	4,075	14 00
" 29	William H. Stahler	Frenchtown	24,709	86 00
Sept. 2	David Dilts	Flemington	1,810	6 33
" 3	Asher Reading	Stockton	9,437	33 03
" 3	William S. Hewitt	"	7,041	24 64
" 1	Thomas Lauderdale	Lambertville	2,416	14 92
" 16	William J. Walker	Locktown	2,610	9 14
" 22	John Wilson	Oak Grove	1,780	6 23
" 22	John P. Hampton	Stockton	3,960	13 86
" 22	William W. Robeson	Frenchtown	1,670	5 84

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1881.				
Sept. 26	Ezra M. Allegar	Croton	3,540	$12 25
" 26	Aaron Hinkle	Frenchtown	1,465	5 07
" 28	Jeremiah Case	"	1,300	4 55
" 28	Hugh D. Trout	Croton	1,065	3 73
" 30	George R. Sherman	Kingwood	7,109	24 85
" 30	Samuel D. B. Kise	"	8,000	28 00
" 30	John W. Hann	"	8,000	28 00
" 30	Wm. A. Dalrymple	Mount Pleasant	3,650	12 77
" 30	James Ashcroft	Baptisttown	3,165	11 07
" 27	William Sipes	Frenchtown	1,396	4 88
Oct. 1	J. B. Sherman	Stockton	5,680	19 88
" 3	Asa H. Niece	Frenchtown	7,010	24 50
" 3	Walter W. Ward	Croton	8,260	28 91
" 3	George Opdyke	Kingwood	6,700	22 75
" 5	Daniel B. Case	Baptisttown	8,800	30 80
" 5	Wm. Snyder	"	3,000	10 50
" 5	Daniel B. Hawk	"	5,200	18 20
" 5	Albert J. Arnwine	"	1,232	4 20
" 5	William Hummer	Locktown	2,856	9 80
" 6	Stout O. Heath	Oak Grove	9,702	33 95
" 7	W. E. Kugler	Kingwood	2,600	9 10
" 7	J. W. S. Johnson	"	1,000	3 50
" 7	Sylvester Bloom	Baptisttown	10,250	35 70
" 7	Joseph S. Warne	"	7,400	25 90
" 8	Austin Bray	Kingwood	2,105	7 35
" 8	John Bray	"	5,275	18 46
" 8	H. C. Opdycke	Baptisttown	4,400	15 40
" 8	William Hann	Croton	4,047	14 16
" 10	J. Wilson Kerr	Kingwood	4,000	14 00
" 10	Elwood Lewis	Baptisttown	3,000	10 50
" 10	William H. Snyder	Kingwood	2,500	8 75
" 10	R. K. Niece	Frenchtown	8,000	28 00
" 10	Levi Hann	Tumble	8,167	28 58
" 10	Samuel Gano	Kingwood	3,723	13 03
" 4	Cornelius H. Demott	Everittstown	3,512	12 25
" 6	Sylvester H. Wright	"	1,467	5 13
" 8	Samuel Keephart	Mount Pleasant	1,825	6 38
" 10	Nathan K. Dalrymple	Frenchtown	1,610	5 63
" 11	Hiram Rittenhouse	Kingwood	2,135	7 35
" 11	Hiram Rittenhouse, Jr.	Frenchtown	3,870	13 30
" 12	Jonathan Roberson	Everittstown	3,780	13 23
" 12	James S. Kerr	Frenchtown	2,694	9 43
" 12	James S. Kerr	"	1,925	6 73
" 12	Edward Bidewell	Baptisttown	5,200	18 20
" 12	Catharine Barcroft	Kingwood	7,220	25 20

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1881.				
Oct. 12	A. L. Burd	Barren Rock	3,500	$12 25
" 12	M. F. Kugler	Tumble	17,600	61 60
" 12	Jonathan Hann	"	4,010	14 00
" 13	John J. Snyder	Kingwood	5,292	18 52
" 13	Calvin A. Larue	Croton	4,181	14 63
" 13	George V. Wolverton	"	2,641	9 24
" 13	E. Custard	Locktown	3,384	11 84
" 13	Nelson Thatcher	Baptisttown	6,600	23 10
" 14	Isaac Suydam	Oak Dale	3,802	13 30
" 14	David M. Kise	Kingwood	3,000	10 50
" 14	John Prill	Baptisttown	2,560	8 96
" 14	Henry W. N. Britton	Kingwood	4,200	14 70
" 14	A. B. Wolverton	Tumble	6,600	23 10
" 15	John Cook	Point Pleasant, Pa	3,000	10 50
" 15	Westley Johnson	Raven Rock	6,600	23 10
" 15	Wilson R. Kugler	Frenchtown	4,900	17 15
" 14	Samuel W. Van Syckel	Mount Pleasant	17,907	62 67
" 17	Joseph C. Warner	Kingwood	1,666	5 83
" 17	Samuel Conner	Raven Rock	4,630	16 20
" 17	John W. Wanamaker	Kingwood	6,616	23 16
" 17	Thomas Martin	"	5,000	17 50
" 17	John W. Leffever	"	2,590	9 06
" 17	John Field	"	6,300	22 05
" 17	Lambert Brink	Frenchtown	5,080	17 78
" 18	James Emmons	Kingwood	5,000	17 50
" 18	Joseph Fisher	"	6,370	22 29
" 18	John Ulmer	Holland	3,475	12 16
" 18	Walter Phillips	Woodsville*	2,517	8 81
" 19	Mahlon Rittenhouse	Everittstown	1,655	5 79
" 19	Joseph Wilson	Raven Rock	4,233	14 81
" 19	Joseph White	"	1,000	3 50
" 19	Whitfield H. Kitchen	Croton	2,600	9 10
" 19	Enoch Danberry	Raven Rock	1,200	4 20
" 19	David Cline	Baptisttown	2,057	7 20
" 20	Charles B. Fisher	Kingwood	3,000	10 50
" 20	Hazzard P. Shaw	"	3,000	10 50
" 20	Oscar Barcroft	"	2,012	7 04
" 20	Bartlett Hann	"	6,039	21 14
" 20	Wm. W. Runyon	"	2,017	7 06
" 21	Augustus Cowdrick	Lambertville	2,431	8 50
" 22	William T. Lemond	Flemington	6,500	22 75
" 22	Charles Gibbs	Kingwood	2,500	8 75
" 22	Wesley W. Snyder	" (1880)	2,000	7 00
" 22	Wesley W. Snyder	" (1881)	1,500	5 25
" 18	John J. Lautz	Frenchtown	960	3 36

* Mercer county.

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1881.				
Oct. 21	Jeremiah H. Trimmer	Pittstown	2,240	$7 84
" 21	John Shearman	Kingwood	2,500	8 75
" 22	Samuel T. Trimmer	Flemington	1,716	6 00
" 22	Jeremiah Case	Frenchtown	8,873	31 05
" 24	George Holcombe	Flemington	2,646	9 26
" 25	William Conner	Baptisttown	4,155	14 54
" 25	Jonathan M. Conner	Tumble	2,737	9 56
" 25	Lewis Carver	Kingwood	2,200	7 70
" 25	George W. Bird	Stockton	1,400	4 90
" 25	Charles Keephart	Mount Pleasant	6,600	23 10
" 25	Sarah L. Barcroft	Stockton	4,376	15 31
" 22	George W. Race	Mount Pleasant	4,435	15 52
" 22	Thomas R. Sinclair	Milford	6,900	24 15
" 22	John G. Taylor	Mount Pleasant	9,595	33 58
" 25	Stacy B. Sutton	Baptisttown	3,112	10 89
" 25	John H. B. Opdycke	"	5,000	17 50
" 25	Thomas Holland	Everittstown	4,485	15 69
" 26	John Cronce	Locktown	1,600	5 60
" 26	Robert S. Fisher	"	2,600	9 10
" 26	Holcombe W. Johnson	Baptisttown	5,000	17 50
" 26	Thomas Burket	Croton	1,100	3 85
" 26	John W. Fisher	Sergeantsville	3,005	10 50
" 26	Francis Snyder	Kingwood	2,600	9 10
" 26	Gershom Vanselous	"	10,680	37 38
" 26	Holcombe Bryan	Sergeantsville	5,000	17 50
" 26	Isaac Lake	"	2,850	9 98
" 26	Andrew Rooks	Raven Rock	4,090	14 31
" 26	William B. Sutton	Locktown	4,800	16 80
" 26	Johnson Gary	Pattenburg	14,600	51 10
Nov. 1	Edmund P. Hann	Point Pleasant, Pa	3,500	12 25
" 1	William Phillips	Oak Grove	8,759	30 65
Oct. 28	Stamford Vanderbilt	Baptisttown	5,300	18 55
" 29	James S. Fisher	Kingwood	3,500	12 25
" " 31	Aaron T. Trimmer	"	2,094	7 32
Nov. 2	Patrick Nugent	Flemington	2,800	9 80
" 2	Charles Opdyke	Kingwood	1,800	6 30
" 3	William L. Welsch	Flemington	2,625	9 18
" 3	Opdyke Arnwine	Baptisttown	4,100	14 35
" 3	Alpheus Morgan	Stockton	11,168	39 09
" 3	Hiram W. Cronce	Everittstown	2,714	9 49
" 4	John Van Horn	Frenchtown	3,000	10 50
" 4	John R. Jones	Oak Grove	3,400	11 90
" 4	David Stryker	Milford	6,360	22 26
" 7	William Robinson	Kingwood	5,000	17 50
" 4	Jacob N. Smith	Frenchtown	2,815	9 85

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1881.				
Nov. 5	Abner S. Salter	Frenchtown	1,890	$6 61
" 6	John W. Anderson	Mount Pleasant	2,760	9 66
" 7	Isaac Ulmer	Baptisttown	4,000	14 00
" 7	John Neighbour	Middle Valley*	4,070	14 24
" 10	Charles B. Everitt	Sergeantsville	4,800	16 80
" 14	George M. Potts	Quakertown	2,600	9 10
" 18	William B. Case	Mount Pleasant	4,000	14 00
" 21	John W. Bird	Flemington	1,244	4 35
" 22	Samuel Fauss	Locktown	2,500	8 75
" 28	Elijah Rooks	Point Pleasant, Pa	2,646	9 26
" 23	George Hackett	Norton	865	3 02
" 28	J. F. Hummer	Milford	2,265	7 92
Dec. 6	Asa Walker	Flemington	1,300	4 55
" 6	John Stenabaugh	Oak Grove	4,500	15 75
" 9	Henry Duckworth	Perryville	10,200	35 70
" 9	Dunbar Duckworth	Mount Pleasant	10,400	36 40
" 12	M. L. Stothoff	Flemington	2,920	10 22
" 12	Jernee Hornbaker	Mount Pleasant	2,850	9 97
" 21	William Kugler	Tumble	3,000	10 50
" 21	Bateman Kugler	Kingwood	6,098	21 34
" 23	Wm. H. Martin	Raven Rock	800	2 80
1882.				
Jan. 10	George W. Kugler	Tumble	3,624	12 68
" 11	Lambert B. Hann	Croton	1,200	4 20
" 24	Samuel B. Ketcham	Pennington†	7,745	27 10
" 28	Nelson S. Halsey	Mount Pleasant	5,000	17 50
" 30	Moses Benham	Locktown	1,000	3 50
" 30	John F. Case	Everittstown	8,465	29 62
Feb. 11	James T. Hummer	Locktown	1,000	3 50
" 15	Isaac Smith	"	1,600	5 60
" 15	J. G. Housel	Copper Hill	2,344	8 20
" 3	John Buchanan	Quakertown	4,650	16 27
" 3	George S. Johnson	Sergeantsville	1,800	6 30
Mar. 9	John Hackett	Mount Pleasant	3,800	13 30
" 10	Richard Flemming	Pattenburg	1,180	4 13
" 10	Peter W. Potts	Baptisttown	3,668	12 83
" 15	Joseph C. Reading	Sergeantsville	800	2 80
" 18	Henry Fine	Mount Pleasant	2,400	8 40
" 18	Thomas Bowe	Point Pleasant, Pa	1,500	5 25
" 23	Samuel Case	Mount Pleasant	2,044	7 15
" 24	Jesse Philhower	Fairmount	7,185	25 14
" 30	John H. Holcombe	Ringoes	823	2 88
1881.				
Oct. 8	Samuel J. Opdycke	Frenchtown	397	1 39
1882.				
April 12	C. H. Tunison	Baptisttown	1,000	3 50

* Morris county. † Mercer county.

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1882.				
April 14	Abel Kerr	Stockton	1,000	$3 50
" 27	George S. Woolverton	Titusville*	7,800	27 30
" 29	William Hill	Copper Hill	2,510	8 78
May 9	Henry Cook	Pennington*	2,501	8 75
" 11	George B. Severs	Mount Pleasant	2,285	8 00
" 18	Jonathan Larew	Sergeantsville	900	3 15
Aug. 8	William Rockafellow	Everittstown	2,295	8 03
" 9	W. H. Stahler, Sup't	Frenchtown	26,000	91 00
" 12	De Witt C. Edmonds	Pattenburg	5,815	20 35
" 14	George R. Hank	Frenchtown	2,205	7 71
" 14	Asa M. Anderson	Mount Pleasant	4,900	17 15
" 15	Henry C. Opdycke	Baptisttown	4,000	14 00
" 15	Tunis Hummer	Pattenburg	1,100	3 85
" 15	George Ruth	Everittstown	4,600	16 10
" 16	Hiram Rittenhouse	Kingwood	1,209	4 20
" 16	Gershom Vanselous	"	8,300	29 05
" 16	Daniel B. Hawk	Baptisttown	6,100	21 35
" 17	Joseph Gano	"	1,270	4 44
" 17	Johnson Hummer	Pattenburg	1,920	6 72
" 17	James T. Hummer	Locktown	7,500	26 25
" 17	Edward Housel	Stockton	2,600	9 10
" 18	John J. Cline	Locktown	4,920	17 22
" 18	Nelson Thatcher	Baptisttown	10,680	37 38
" 18	John W. Anderson	Mount Pleasant	12,215	42 75
" 18	Jonathan Hoff	Baptisttown	2,565	8 97
" 19	George W. Bloom	"	4,162	14 56
" 19	Watson E. Kugler	Kingwood	8,000	28 00
" 19	Charles Keephart	Mount Pleasant	4,188	14 65
" 19	Daniel B. Case	Baptisttown	4,800	16 80
" 19	William Snyder	"	3,500	12 25
" 19	Jacob Hager	Milford	3,670	12 84
" 19	Peter Klein	Croton	1,940	6 79
" 19	Miller A. Cline	Baptisttown	980	3 43
" 19	Samuel Keephart	Mount Pleasant	940	3 29
" 21	John W. Hann	Kingwood	10,000	35 00
" 21	David Cline	Baptisttown	2,280	7 98
" 21	Nathan Hann	Kingwood	7,000	24 50
" 21	James Emmons	"	7,200	25 20
" 21	Frederick Keephart	Mount Pleasant	1,275	4 46
" 22	John Shearman	Kingwood	2,112	7 39
" 22	Mathias C. Apgar	Baptisttown	2,620	9 17
" 22	Oliver Godown	Point Pleasant, Pa	3,560	12 46
" 22	Able Kerr	Kingwood	8,500	29 75
" 22	Watson Emmons	"	5,674	19 85
" 22	Wesley W. Snyder	"	4,700	16 45
" 22	Samuel Leffever	"	3,160	11 06

Mercer county.

TABLE No. 1—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Straw, under "An act to Encourage the Production and Treatment of Fibres in this State," Approved March 13th, 1882.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1882.				
Aug. 22	John Field	Kingwood	8,000	$28 00
" 22	Sylvester Bloom	Baptisttown	8,600	30 10
" 22	Joseph S. Warne	"	10,080	35 28
" 23	Jacob W. Bloom	Everittstown	2,150	7 52
" 23	David M. Kise	Kingwood	3,500	12 25
" 23	Jonathan M. Conner	Tumble	2,585	9 04
" 23	Lambert Brink	Frenchtown	7,500	26 25
" 23	Mathias Brink	Point Pleasant, Pa	4,000	14 00
" 24	Nathan R. Dalrymple	Frenchtown	1,105	3 86
" 24	Jonathan Roberson	Everittstown	890	3 11
" 24	Holcomb Bryan	Sergeantsville	2,047	7 16
" 24	Henry Potts	Pattenburg	2,735	9 57
" 24	Hiram W. Cronce	Everittstown	6,996	24 48
" 24	William Hummer	Locktown	5,150	18 02
" 24	Asa Romine	Sergeantsville	2,200	7 70
" 24	George A. Stryker	Baptisttown	2,490	8 71
" 25	Edward H. Matthews	Mount Pleasant	3,525	12 33
" 25	Robert S. Fisher	Locktown	2,496	8 73
" 25	Wm. S. Kerr	Raven Rock	1,804	6 31
" 25	James A. Fisher	Kingwood	4,500	15 75
" 25	William G. Briggs	Locktown	4,000	14 00
" 25	Henry Fisher	Kingwood	4,000	14 00
" 25	Thomas Burket	Croton	3,462	12 11
" 26	William A. Warne	Baptisttown	2,500	8 75
" 26	John Lude	Croton	2,015	7 05
" 26	J. W. S. Johnson	Kingwood	5,600	19 60
" 18	Bartlett Hann	"	11,000	38 50
" 25	E. Custard	Locktown	1,163	4 07
" 25	William A. Dalrymple	Mount Pleasant	2,960	10 36
" 26	John Van Horn	Frenchtown	4,500	15 75
" 26	Judson Case	Everittstown	1,990	6 96
" 26	William Butler	Pattenburg	1,080	3 78
" 28	William R. Opdycke	Croton	12,018	42 06
" 29	Joel Heath	Baptisttown	2,398	8 39
" 28	Dunbar Duckworth	Mount Pleasant	6,600	23 10
" 31	Israel Fisher	Oak Dale	6,535	22 87
" 31	John Little	Perryville	8,400	29 40
Sept. 1	Asa Besson	Croton	1,500	5 25
" 1	Jonathan Hann	Tumble	3,722	13 02
" 2	Augustus A. Ward	Croton	10,180	35 63
" 4	John Cook	Point Pleasant, Pa	4,600	16 10
" 4	James S. Kerr	Frenchtown	919	3 21
" 4	William Sherman	"	7,500	26 25
" 6	Sylvester Dalrymple	Quakertown	4,530	15 85
" 5	Jeremiah Case	Frenchtown	2,809	9 83
Total			1,445,250	$5000 00

TABLE No. 2.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Fibre, &c.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1881.				
Mar. 26	J. G. Taylor	Mount Pleasant	520	$18 20
" 29	Joseph Fisher	Kingwood	100	3 50
" 29	James Emmons	"	75	2 62
April 12	Henry Cook	Pennington*	203	7 10
" 29	John Cronce	Stockton	111	3 88
May 21	Charles Keephart	Mount Pleasant	235	8 22
July 7	Edward Housel	Stockton	61	2 13
" 18	Daniel M. Kise	Kingwood	148	5 18
Sept. 6	Joel Heath	Baptisttown	222	7 77
Oct. 18	W. H. Stahler, Sup't	Frenchtown	5,889	206 11
Nov. 17	Michael Holland	Kingwood	247	8 65
" 28	Henry Cook	"	575	20 12
Dec. 1	David and John Wilson	Lambertville	600	21 00
" 12	Frederick Keephart	Mount Pleasant	319	11 16
" 19	George W. Bloom	Baptisttown	706	24 71
" 27	W. H. Stahler	Frenchtown	10,000	350 00
" 30	J. C. Snyder	Baptisttown	670	23 45
" 31	John Cook	Point Pleasant, Pa	387	13 54
" 31	Lambert Brink	Frenchtown	943	33 00
1882.				
Jan. 5	Austin Bray	Kingwood	407	14 24
" 5	John Bray	"	964	33 74
" 10	Jonathan M. Connor	"	445	15 57
" 12	David M. Kise	"	337	11 79
" 19	Sylvester Bloom	Baptisttown	850	29 75
" 18	Charles Opdycke	Kingwood	208	7 28
" 24	John W. Hann	"	975	34 12
" 25	Westley Johnson	Raven Rock	869	30 41
" 26	David and John Wilson	Lambertville	1,000	35 00
" 27	Walter W. Ward	Croton	900	31 50
" 27	Levi Stull	Oak Grove	1,535	53 72
" 28	Nelson S. Halsey	Mount Pleasant	381½	13 35
Feb. 2	Lewis S. Bloom	Baptisttown	825	28 87
" 2	Holcombe Bryan	Sergeantsville	717	25 09
" 2	Westley P. Snyder	Kingwood	210	7 35
" 4	Lorenzo D. Brewer	Baptisttown	1,500	52 50
" 8	Jonathan Hann	Tumble	691	24 18
" 15	Isaac Smith	Locktown	197	6 89
" 15	J. W. S. Johnson	Kingwood	150	5 25
" 15	J. G. Housel	Copper Hill	164	5 74
" 14	James W. Kerr	Kingwood	572	20 02
" 14	Charles Keephart	Mount Pleasant	906	31 71
" 18	Daniel B. Hawk	Baptisttown	797	27 89
" 18	Johnson Gary	Pattenburg	1,740	60 90
" 18	Gershom Vanselous	Kingwood	1,340	46 90
" 20	Francis Kugler	Point Pleasant, Pa	392	13 72
" 20	Holcombe W. Johnson	Baptisttown	1,200	42 00

* Mercer county.

TABLE No. 2—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Fibre, &c.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1882.				
Feb. 20	Asa B. Hockenberry	Baptisttown	1,300	$45 50
" 20	John J. Snyder	Kingwood	486	17 01
" 20	John W. Leffever	"	266	9 31
" 20	John Field	"	785	27 47
" 22	Catharine Barcroft	"	820	28 70
" 22	William R. Opdycke	Croton	500	17 50
" 23	Samuel B. Ketcham	Pennington*	1,309	45 81
" 23	Elwood Servis	Baptisttown	300	10 50
" 24	William Connor	"	400	14 00
" 24	Edward P. Hann	Point Pleasant, Pa	365	12 77
" 24	James S. Fisher	Kingwood	579	20 26
" 24	Joseph Fisher	"	1,124	39 34
" 25	Walter Phillips	Woodville*	339	11 86
" 25	Henry Fisher	Kingwood	793	27 75
" 25	James Emmons	"	673	23 55
" 25	Hiram W. Cronce	Everittstown	420	14 70
" 27	Asa Besson	Croton	118	4 13
" 27	David Cline	Baptisttown	276	9 66
" 27	Charles Gibbs	Kingwood	300	10 50
" 28	Joseph C. Warner	"	180	6 30
" 28	Levi Hann	Tumble	916	32 06
Mar. 2	A. L. Bird	Raven Rock	445	15 57
" 3	Thomas Burket	Croton	133	4 65
" 3	John Cronce	Locktown	315	11 02
" 3	Charles B. Fisher	Kingwood	951	33 28
" 3	Miller A. Cline	Baptisttown	120	4 20
" 4	Andrew Rooks	Raven Rock	643	22 50
" 4	Enoch Danberry	"	228	7 98
" 6	William Hann	Croton	425	14 87
" 7	Calvin A. Larue	Oak Dale	483	16 90
" 7	George Holcombe	Flemington	278	9 73
" 8	Jonathan Ent	Sergeantsville	125	4 37
" 10	Isaac Lake	"	325	11 37
" 10	Richard Fleming	Pattenburg	142	4 97
" 11	Isaac Lake	Sergeantsville	100	3 50
" 11	Francis Snyder	Kingwood	308	10 78
" 9	Jacob S. Everitt	Lambertville	1,000	35 00
" 15	Dunbar Duckworth	Mount Pleasant	1,280	44 80
" 15	Joseph C. Reading	Sergeantsville	591	20 68
" 16	John Piell	Baptisttown	250	8 75
" 18	Thomas Bowe	Point Pleasant, Pa	146	5 11
" 18	Henry Fine	Mount Pleasant	100	3 50
" 18	Samuel Keephart	"	80	2 80
" 22	William Snyder	Baptisttown	360	12 60
" 22	Daniel B. Case	"	764½	26 78
" 23	I. B. Sherman	Stockton	707	24 74
" 23	Samuel T. Trimmer	Flemington	194	6 79

* Mercer county.

TABLE No. 2—CONTINUED.

Showing the Amount Disbursed, and to Whom Paid, for Bounty upon Flax Fibre, &c.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1882.				
Mar. 25	Elijah Rook	Point Pleasant, Pa	408	$14 28
" 25	Lorenzo D. Brewer	Baptisttown	1,000	35 00
" 25	William Robinson	Kingwood	633	22 15
" 27	John E. Hoagland	Baptisttown	1,800	63 00
" 29	Joseph S. Warne	"	1,159	40 56
" 29	Wm. Phillips	Oak Grove	672	23 52
" 30	Samuel Rauss	Locktown	365	12 77
" 30	William B. Sutton	"	739	25 86
" 30	Walter W. Ward	Croton	1,038	36 33
" 30	Lewis Carver	Kingwood	428	14 98
" 30	John H. Holcombe	Ringoes	107	3 74
" 31	William Kugler	Tumble	563	19 70
" 31	Asa B. Hockenberry	Baptisttown	415	14 52
April 4	Whitfield H. Kitchen	Quakertown	150	5 25
" 7	Charles F. Myres	Sand Brook	254	8 89
" 8	W. H. Stahler, Sup't	Frenchtown	9,489	332 11
" 8	William P. Leonard	Flemington	812	28 42
" 10	John W. Rake	"	159	5 56
" 5	Nathan R. Dalrymple	Frenchtown	70	2 45
" 11	David H. Butler	Mount Pleasant	58	2 03
" 11	Charles B. Everitt	Sergeantsville	628	21 98
" 11	Henry W. N. Butler	Kingwood	698	24 43
" 11	E. Custard	Locktown	508	17 78
" 11	Elwood Servis	Baptisttown	225	7 87
" 12	C. H. Tunison	"	230	8 05
" 12	John W. Bird	Flemington	150	5 25
" 13	Oscar Barcroft	Kingwood	385	13 47
" 13	Jesse Smith	Stockton	447	15 64
" 12	Keziah Gary	Mount Pleasant	1,129	39 51
" 17	Asher B. Wolverton	Tumble	790	27 65
" 19	W. L. Keephart	Mount Pleasant	322	11 27
" 20	John Stenabaugh	Oak Grove	467	16 34
" 21	George V. Wolverton	Croton	400	14 00
" 22	Robert S. Fisher	Locktown	207	7 24
" 27	William P. Leonard	Flemington	550	19 25
" 28	James P. Hummer	Locktown	205	7 14
May 10	H. C. Opdycke	Baptisttown	300	10 50
" 10	Abraham Dilts	Croton	178	6 23
" 11	Stacy B. Sutton	Baptisttown	231	8 08
" 9	Henry Cook	Pennington	384	13 44
" 15	J. E. Hoagland	Baptisttown	1,260	44 10
" 15	M. F. Kugler	Tumble	796	27 86
" 17	Thomas Martin	Kingwood	509	17 81
" 18	Jonathan Larew	Sergeantsville	187	6 49
June 2	H. P. Shaw	Kingwood	320	11 20
" 3	Wm. Phillips	Oak Grove	531	18 58
" 14	J. W. Johnson	Clinton	600	21 00

TABLE No. 2—CONTINUED.

Showing the Amount Disbursed, and to Whom paid, for Bounty upon Flax Fibre, &c.

Date.	Name.	P. O. Address.	Quantity	Amount Paid.
1882.				
July 13	Moses Burham	Locktown	203	$7 11
Aug. 9	W. H. Stahler, Sup't	Frenchtown	4,180	146 30
" 12	De Witt C. Edmonds	Pattenburg	205	7 17
" 15	Henry C. Opdycke	Baptisttown	387	13 54
" 16	Jacob S. Everitt	Lambertville	500	17 50
Oct. 13	W. H. Stahler, Sup't	Frenchtown	10,000	350 00
" 31	W. E. Rothermel & Co	Flemington	1,000	35 00
" 30	Lambert Brink	Frenchtown	1,200	42 00
Nov. 18	John Field	Kingwood	1,523	53 30
" 27	David and John Wilson	Lambertville	1,800	35 00
" 30	W. H. Stahler, Sup't	Frenchtown	10,000	350 00
" 28	Frederick Keephart	Mount Pleasant	342	11 97
Dec. 2	W. E. Rothermel & Co	Flemington	1,000	35 00
" 5	Henry Fisher	Kingwood	575	20 12
" 9	George N. Bloom	Baptisttown	715	25 02
" 12	David and John Wilson	Lambertville	1,100	38 50
" 16	W. E. Rothermel & Co	Flemington	675	23 62
" 21	Gershom Vanselous	Kingwood	700	24 50
" 21	John J. Cline	Locktown	294	10 29
" 22	W. E. Rothermel & Co	Flemington	400	14 00
" 26	Sylvester Bloom	Baptisttown	1,500	52 50
" 30	W. E. Rothermel & Co	Flemington	600	21 00
" 30	Elmer E. Dalrymple	Baptisttown	226	7 91
Total			136,307	$4770 74

CHAPTER II.

SUGAR FROM SORGHUM.

The progress made in the development of the sugar industry of the United States has been remarkably slow when compared with that of other countries, where the manufacture of sugar from beets has long been carried on. In view of the fact that the conditions of our soil and climate are so favorable for the growth of sorghum and that the sugar in this cane is nearly or quite double that in beets, it is astonishing that, instead of importing one hundred million dollars' worth annually, we do not produce even a larger quantity of sugar than in those countries where the beet alone is used in its manufacture. That this is possible, is unquestionable.

The report on the "foreign commerce of the United States," by the Chief of the U. S. Bureau of Statistics, shows the imports of sugar for the years 1881 and 1882, ending June 30th, were as follows:

IMPORTS—FISCAL YEAR ENDING JUNE 30TH, 1881.

	Quantity.	*Value.*
Brown sugar	1,857,654,221 lbs.	$81,352,570
Refined sugar	20,489 "	1,739
Molasses	28,509,234 gals.	6,669,047
Melado and syrup of sugar cane	12,163,248 lbs.	378,647
Candy and confectionery	58,996 "	10,227
Total value		$88,412,230
Value of imports, free of duty, (Pacific coast)*		4,962,058
Grand total value		$93,374,288

*IMPORTS HAWAIIAN SUGAR (RECIPROCITY TREATY), PACIFIC SLOPE.

	1880-81		1881-82	
	Quantity.	Value.	Quantity.	Value.
Brown sugar, lbs.	76,907,247	$4,927,021	106,181,858	$6,918,083
Molasses, gals.	198,987	35,037	152,708	25,257
Total value		$4,962,058		$6,943,340

IMPORTS—FISCAL YEAR ENDING JUNE 30TH, 1882.

	Quantity.	*Value.*
Brown sugar	1,873,546,056 lbs.	$83,147,135
Refined sugar	79,286 "	6,830
Molasses	37,116,122 gals.	10,015,254
Melado and syrup of sugar cane	10,345,174 lbs.	344,755
Candy and confectionery	82,151 "	11,708
Total value		$93,525,682
Value of imports, free of duty, (Pacific coast)		6,943,340
Grand total value		$100,469,022

A large part of the molasses imported was converted into sugar in this country. For this sugar and molasses more than one hundred million dollars were paid to foreign countries.

New Jersey has been the first State to solve the problem whether the manufacture of sugar could be profitably carried on 40 degrees north of the equator; and this has been chiefly brought about by the liberal policy adopted by the Legislature of the State in the offer of bounties, both for the growth of the sorghum and the manufacture of sugar. Under its influence capital was invested from other States, and the business bids fair to become permanently established in our midst. With the exception of the State of Louisiana, where the manufacture of sugar from cane has been carried on for more than sixty years, and where the crop of 1882 only amounted to two hundred and twenty-five thousand hogsheads, there had been no attempt at sugar-making on a large scale in the United States until the year 1881, when a factory for the purpose was established at Rio Grande, Cape May county, in this State, and the result of the work at the end of the first season settled the question affirmatively that the manufacture of sugar from sorghum could be made a profitable business here.

Simultaneously with the work in New Jersey, a series of experiments in sugar-making was being carried on at the Illinois Industrial University, at Champaign, Ill., under the direction of H. A. Weber, Professor of Chemistry, and M. A. Scovell, Professor of Agricultural Chemistry. These experiments, although carried on in connection with the chemical laboratory and necessarily under many disadvantages, nevertheless were so encouraging, that steam sugar works were subsequently erected at Champaign by the Champaign Sugar Company, furnished with all the modern appliances for sugar-making. During the season of 1882, this company has been engaged in the manufacture

of sugar, and, although the weather was exceptionally cold and wet, the results as reported by Prof. Scovell, were very gratifying.

"The company have manufactured the sorghum from 244.59 acres, yielding 2,282.75 tons of stripped and topped cane. The average yield per acre was 9.33 tons. The number of acres worked for sugar was 185.8, yielding 1,723.99 tons of cane. From this amount we have manufactured to date, the sum of 86,603 pounds of sugar, and 25,137 gallons of molasses. This gives 465½ pounds of sugar per acre. * * * With a suitable crystallizing room, kept at a proper temperature, the sugar product would have amounted to 114,402 pounds. This would have made the yield 615.7 pounds per acre. * * * The best result obtained was upon a plot of 12½ acres of orange cane, grown by a farmer named Clark. The yield per acre was 12½ tons, an analysis of which at the time of working showed 10.17 per cent. of cane sugar. From this was produced per acre, sugar, 768 pounds; molasses, 116 gallons. The net profit per acre, after paying all the expenses, cost of cane and manufacture, was $59.46."

THE RIO GRANDE SUGAR COMPANY.

The plant which had been established by Charles M. Hilgert, of Philadelphia, at Rio Grande, New Jersey, for the manufacture of sugar from sorghum, to which reference was made in the last annual report, was at the close of the year 1881 turned over to the Rio Grande Sugar Company, a corporation which had been organized under the law of this State, entitled "An act concerning corporations," (approved April 7th, 1875,) with a capital of $250,000, for the purpose of manufacturing sugar by virtue of the provisions of the law passed by the Legislature of New Jersey, entitled "An act to encourage the manufacture of sugar in the State of New Jersey," approved February 6th, 1881.

The unfortunate defalcation and flight of the general manager of this company, on the 1st of August, 1882, a few weeks before the ripening of the cane, together with the belief which had been expressed by sugar experts, that it was impossible to make sugar in paying quantities out of sorghum, seemed to paralyze for a time the board of directors, and grave doubts were entertained of continuing the work in the face of so many chances of failure. After a full discussion of the matter, it was decided that, in view of the great liberality which the State of New Jersey had shown in the offer of liberal bounties, and

believing that the stockholders would be saved from loss by the amount which would come from the State in the way of bounty money, the factory should be opened and the work carried on for another season. Mr. Henry A. Hughes, a gentleman who had been connected with the factory the previous year, and who had superintended the making of sugar, was selected as general manager.

In order to secure a supply of cane for the season of 1882, proposals were issued to farmers in the fall of 1881, asking them to agree to plant a certain number of acres of sorghum for this purpose. The farmers were offered $2 per ton of two thousand pounds for the cane after the seed tops had been cut off, the cane to be harvested and transported to the factory at the expense of the company; thus the farmer would receive, including the State bounty of $1 per ton, $3 per ton for his cane, in addition to whatever seed it might yield. To this proposition very few farmers responded. Consequently the sugar company were obliged to make arrangements whereby a part of their own tract of land, which amounted to about two thousand acres, could be put under cultivation. By actual survey nine hundred and sixty-four acres were planted with Early Amber and Early Orange seed. About three hundred acres of this land, however, had just been cleared, and on account of the stumps and briers the yield was small, being only three tons to the acre. This land will be put in good condition for the next crop. Fields in good culture yielded remarkably well; one of eight acres yielded one hundred and thirty-six tons, and upon one acre, where a heavy clover sod had been plowed under and seven hundred pounds of guano applied, twenty-two tons of cane were given. Another experimental acre yielded twenty-one tons. A plot of two acres, to which salt hay and sea-weed had been applied, the latter being found in abundance in the neighborhood, not only yielded largely but the sugar test was remarkable, being 12.70° Baume. A field of twenty acres in orange cane gave over two hundred and fifty-two tons of cane, from which 24,060 pounds of sugar and 1,400 gallons of molasses of best quality were obtained.

The season was not a favorable one for the cultivation of sorghum. A severe drought in August was followed by heavy rains in September, which seriously diminished the sugar production of the cane; for, while moderate showers tend to increase the yield of sugar, a continuous rain of two or three days has the effect of diluting the sugar in the cane to such an extent as to make it scarcely worth crushing. A sugar planter from Cuba, who was on a visit to the Rio Grande works

upon a very rainy day, when asked by the superintendent what effect continuous rains had upon the cane in that island, replied: "We are often obliged to stop work and do not resume again until by testing our cane we find its saccharine strength restored."

From the careful experiments which have been carried on by the "New Jersey Agricultural Experimental Station," during the past season, it is quite evident that by the application of proper fertilizing material a large increase in the quantity of extractable sugar per ton could be secured from the cane, and if our farmers would take advantage of these experiments, they would secure a far better price from the manufacturer for their cane than is now paid them.

At the factory of the Rio Grande company the cane as it was taken into the factory was carefully tested several times each day. The average for the season was 11.11° Baume, being a better one than was obtained the previous year. The juice was tested at regular intervals four times each day, and while in some instances the co-efficient of purity was as high as 92, the average for the whole season was 84.16.

The following table will show the results of work done at the factory of the Rio Grande Company for the season of 1882:

TIME OF WORKING.	Tons Cane Crushed.	Bbls. Sugar.	Bbls. Molasses.
1st week ending Sept. 9th, 1882	335	30	61
2d " " " 16th, "	612	82	120
3d " " " 23d, "	656	113	89
4th " " " 30th, "	710	130	110
5th " " Oct. 7th, "	747	114	126
6th " " " 14th, "	783	113	126
7th " " " 21st, "	670	100	104
8th " " " 28th, "	663	97	95
9th " " Nov. 4th, "	344	50	60
10th " " " 10th, "	686	106	131
	6,206	935	1,022

Pounds of sugar made.....319,944
Gallons of molasses.....51,100

Experiments have been carried on at this factory with the view of converting the begasse or crushed cane into pulp for the manufacture of paper, and such has been the success attending these experiments that the president of the company, (Geo. C. Potts, Esq.,) in his report to the stockholders, recommends the erection of a paper-pulp mill, with suitable machinery for that purpose, making the following reference to the subject: "I find it will make a superior white pulp, at a cost that should insure a handsome profit."

The successful work which has been carried on, both at Champaign, Illinois, and at Rio Grande, N. J., establishes the fact that the experimental period in the manufacture of sugar from sorghum has been passed, and that the business now awaits only expert management and sufficient capital to secure as profitable results as can be found in the manufacture of any other staple commodity.

The progress which has been made in Europe in the manufacture of sugar from beets has been so remarkable, that we are fully of the opinion, in view of the much greater economy in the manufacture of sugar from sorghum, that the large balance of trade now against the United States in sugar may be turned, in a very few years, in our favor by the extension of this industry. The European countries produced of beet sugar, in the year 1882, 1,920,000 tons of sugar, an increase of 137,500 tons over the previous year; of this amount, Germany produced 675,000 tons*; Austrio-Hungary, 450,000 tons; France, 410,000 tons, and Polish Russia, 275,000 tons.

The certainty and regularity in extracting sugar from the cane at Rio Grande during the past season affords great encouragement. It has been clearly proved that one hundred pounds of sugar can be obtained from a ton of cane, and when the additional mill which it is proposed to place behind the present large crushing-mill, shall have been put in position, so that the bagasse or crushed cane can be subjected to steam and again put under pressure, the yield of juice will be largely increased and a much greater quantity of sugar obtained.

Mr. H. B. Blackwell, who was connected with the Maine Beet Sugar Factory, in writing to the "Boston Journal of Chemistry," on the subject of sorghum, says: "I have made some interesting and important experiments this fall in the manufacture of sugar from sorghum, of the Early Amber and White Siberian varieties, raised in my garden at Dorchester, Mass., from seed obtained from the United

* More than is produced in Cuba. See page 217.

States Department of Agriculture. I found no difficulty in making *thirteen per cent.* of crystalized sugar on the weight of the canes, and six per cent. of excellent syrup in addition, by the diffusion process. For three years my company (the Maine Beet Sugar Company), with the best machinery, averaged only seven per cent. of sugar and three per cent of syrup from beets raised in New England. So that I have made, over the open fire and with no proper appliances, twice as much sugar from the same weight of sorghum."

The amount of bounty paid during the year under an act entitled "An act to encourage the manufacture of sugar in the State of New Jersey," approved February 16th, 1881, was as follows:

For 5638 tons of sorghum cane, stripped and topped, at $1 per ton	$5638 00
For 319,944 pounds of merchantable sugar, at 1 cent per pound	3199 44
Total	$8837 44

PRODUCTION OF SUGAR IN CUBA.

Quantity of Sugar Produced on the Island of Cuba During Each Year from 1871 *to* 1880, *inclusive.*

Year.	Production. Tons.	On Hand January 1st. Tons.	Local Consumption. Tons.	EXPORTED.		
				To the United States. Tons.	For other Foreign Countries. Tons.	Total. Tons.
1880.	530,000	22,900	50,000	405,000	55,000	460,000
1879.	670,000	27,200	50,000	481,972	141,963	723,935
1878.	533,000	19,200	50,000	430,521	43,998	474,427
1877.	520,000	11,003	50,000	419,000	41,810	400,810
1876.	590,000	14,150	55,000	436,903	100,845	537,543
1875.	718,000	12,500	55,000	469,018	192,039	661,057
1874.	681,000	9,450	60,000	481,841	135,815	617,656
1873.	775,000	9,500	60,000	479,372	235,588	714,960
1872.	690,000	9,450	65,000	401,964	223,100	624,464
1871.	536,000	9,500	65,000	337,428	133,513	470,941

PART VI.

THE OYSTER INTERESTS OF NEW JERSEY.

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CHAPTER I

INTRODUCTORY.

[New Jersey having such an extensive shore line, with facilities for ostraculture surpassed by no other State, and ranking already as the third State in the oyster industry, we have concluded to give in this report the latest and most approved methods of cultivating this bivalve, in order to stimulate an industry which can be made, by a comparatively small outlay of money, largely more productive and profitable. Very fortunately we have been able to secure the invaluable services of Samuel Lockwood, Ph. D., in the prosecution of this work, and the history, physiology, anatomy and habits of this wonderful bivalve, so graphically described by that gentleman, cannot fail to be of permanent benefit to those disposed to investigate this subject. Acknowledgment is cheerfully made of great indebtedness to Mr. Ernest Ingersoll, Census Report of 1880. Many thanks are tendered to Major T. B. Ferguson, Commissioner of Fisheries of Maryland, for the use of plates from the Maryland reports of 1880 and 1881; also to Professor S. F. Baird, Secretary of the Smithsonian Institute, we are under great obligation for his great interest in the work of electrotyping the plates that they might be finished in time for use in this report.

To Dr. John A. Ryder, Professor Lockwood tenders sincere regards for kind communications in writing and otherwise.]

Wherever nature is lavish of her gifts man is wasteful and improvident. The word "inexhaustible" is false and misleading. But a few years ago our rivers teemed with fish. We recall an incident, not uncommon then, which we had from the person concerned. It was stipulated in his indentures, as an apprentice in Maine, "that he should not have salmon oftener than twice a week." It is in the memory of some, that, when the dam was built across the Schuylkill to supply the Fairmount water works, the shad coming up to spawn, being stopped by the obstruction, were almost in solid mass, so that men filled their boats simply with a scoop-net. Perhaps this opulence of nature has in nothing suffered worse from man's prodigality than in the harvest of the rivers and the sea.

The time was when, in New Amsterdam, real "natives," of such size and quality as would probably to-day sell for from $5 to $10 per

100, were so plentiful that they found no market, and, in fact, were regarded as plebian food. And, in despite of protective laws, originating in New Jersey and almost copied in New York, the time came when the oyster was a luxury for the well-to-do and too costly for the poor. More skillful methods set in; for the danger of exhaustion began to be dreaded, and the oyster again fell to moderate prices. It goes for the saying, that still the oyster industry of New Jersey has in it none of the economics of scientific methods. Though in certain lines oystering is conducted with energy, system and skill, yet, in the vital matter of seed-supply, nothing has been well and profitably done. Where would now the silk industry of France be, if the getting of the eggs were precarious, or if the worms must be imported? Yet, it is thus with oyster-culture in our State. Getting native seed has become almost a matter of "good luck"—and even the plants are bought in the South, being taken from beds which were long regarded as "inexhaustible," but which are now fast giving out. Yet, it seems but as yesterday when Governor Wise, in his message to the Legislature of Virginia, said the State possessed an area of oyster-beds equal to 1,680,000 acres, containing 784,000,000 of bushels. The Governor proposed to confine oystering to the citizens of Virginia, and to charge three cents a bushel for all taken, which, he estimated, would yield a State revenue of $480,000. It may not be irrelevant here to add that a statesman of Rhode Island suggested that the rental of the oyster-waters of that State, at $10 an acre, should yield a revenue sufficient for all expenses of the State. This last statement is one indicator of the great quantity of "plants" needed by Northern oystermen, and helps explain the fact, which Governor Wise did not foresee, that the seemingly inexhaustible beds of his wonderful State would not sustain the draft forever.

Nor should it be overlooked that these Southern plants seem to be sterilized when transplanted North. Although much improved in eating quality by a few months, or, maybe, a year or two's growth in our waters, they can never be made to equal our native Shrewsburys, Blue Points, Prince's Bays, Maurice Coves, &c. So far, they have not been acclimated sufficiently to make them reliable as spawners. Hence, we have reached a point already from which the outlook is serious. The culture of our exquisite natives is lessening rapidly. And from all points, whether raising from home seed or growing Southern plants, oyster culture is set for a decline, unless scientific

methods soon be applied. But these methods must first be discovered and made practicable, and their application enforced or directed by some fostering legislation. Though, as nothing succeeds like success, a few examples of enterprise would start the industry on the new lines with new life and even more than the old prosperity. As a promise of this new potency in ostraculture, the State of Maryland, in the labors of her fish commission, deserves general gratitude.

New Jersey has natural features which should make her pre-eminent as the oyster-garden of the States. In amount of water-area, she is not equal to Connecticut, Maryland or Virginia, but in kind of water-bed, she is not excelled. Looking at a map of the State, one sees how wonderfully her coast line is fretted with the mouths of rivers, bays, inlets and coves, fertile spots for oyster culture, and yielding better flavored mollusks than those raised in the deeper waters of the larger areas. The salt-water line of the State extends from Newark to Cape May, then for some fifty miles along the oyster region of Maurice Cove, in Delaware Bay, and thence some little way up the Delaware River. Though not always sufficiently careful in statement, the local paper is, in the main, a true indicator of the local industry. Says one: "In Pleasantville Bay, Atlantic county, 90,000 bushels of oysters are annually fattened for market." Speaking of a small portion of the Shrewsbury, the *Long Branch News* said a few days ago: "The annual revenue of this river, from Branchport to Sea Bright, is difficult to obtain, even from those who gather in its thousands. It is probably no exaggeration to say that from $75,000 to $100,000 worth of oysters are alone taken from its waters yearly. Of soft crabs, the figures are placed all the way from $5,000 to $20,000 in a season, many of those who make a business of it asserting they exceed the oyster trade, to say nothing of the fish, eels, &c., that aid in affording a livelihood to the residents." These may be overstatements, and yet have great significance, if we but regard the water-beds concerned in their relation to the whole. Moreover, it should be observed that these coves, and even the very little streams often afford the high flavored "natives" or "naturals," for which two reasons may suffice—the shelter given the fry, so that it sets, and spat is secured; and the better food which the mollusk gets in these quieter waters. It really would seem that nature, in this singular distribution of the oyster-waters in New Jersey, intended that the harvest-field should be owned by the many, not the few.

To understand the importance of this industry to the State, many details need to be considered, but for a crude guess at its rank among our other industries the following statistics from Ingersoll are expressive. They relate to New Jersey, and were tabulated in 1880:

Number of persons employed	2,917
Number of vessels employed	575
Value of vessels	$530,000
Bushels of oysters produced	1,975,000
Capital invested in the industry	$1,057,000
Value of oysters as sold	$2,080,625

But from the fresher figures which have been obtained for the year 1882, it will be seen that, while a larger number of persons have been employed and the amount of capital invested increased, the total amount received for oysters sold has fallen off over $250,000. This is doubtless to be attributed largely to the heavy loss entailed by the severe storm and heavy freshet in Raritan Bay in the fall of 1882, as well as to the depletion of the natural beds which is constantly going on, as will be seen in Chapter VIII.

Our task, then, is to narrate in a succinct manner, the oyster industry of the State of New Jersey; and this narration must have regard to the early notices of the bivalve—its natural history, its anatomy, its rank as food—ostraculture—its embryology—and the statistics of the business. In a word, such a sketch must be attempted as shall clothe the industry with dignity and interest, and may lead to its pursuit with enlarged profit to the State.

CHAPTER II.

HISTORICAL.

In the wonderful stories of the early chronicles, both in prose and verse, the prodigality of the waters of "the delightsome land" is a fruitful theme. As cited by Ingersoll in his exhaustive census report on the oyster industries of the United States, oysters "then grew abundantly all over the edges of New York Bay, and the entering streams—Shrewsbury, Raritan, Passaic, Hackensack, Hudson, and East Rivers. * * * The Indians were in the habit of gathering clams and oysters at all practicable seasons, and depended upon them largely for their food. In a poem by an early Dutch settler and poet, this very thing is celebrated, with seemingly strict attention to truthful details:

> Crabs, lobsters, mussels, oysters, too, there be,
> So large that one does overbalance three
> Of those of Europe; and in quantity,
> No one can reckon.

Then, as now, it appears that all the hard work of obtaining the delicacies fell upon the Indian women. A quaint old book, written by William Wood, and published in London in 1634, entitled *New England's Prospects, etc.*, contains a poem upon the kinds of shellfish, in which the following verse occurs:

> The luscious lobster, with the crab-fish raw,
> The brinish oyster, mussel, perriwigge,
> And tortoise sought by the Indian Squaw,
> Which to the flatts dance many a winter's jigge,
> To dive for cockles and to dig for clams,
> Whereby her lazy husband's guts she cramms.

How greatly this molluscan abundance was valued by the first colonists, is plainly shown by frequent allusions in the early descrip-

tions of the country. In 1621, 'very large oifters' were too common at Nieuw Amsterdam to find a market, everybody being able to supply themselves without charge. A few years later (1671) Arnoldus Montanus speaks of 'oysters, some a foot long, containing pearls, but few of a brown color,' as one of the common advantages of the young settlement. Sir George Carteret, as one of the inducements in advertising the region about the mouth of the Raritan, where he wished to establish colonies, tells intending emigrants that 'the bay [*i. e.*, of New York] and Hudson's river are plentifully stored with sturgeon, great bass, and other scale-fish, eels, and shellfish, as oysters, etc., in great plenty, and easy to take.' This was in 1681. Three or four years later letters were written home to England from what is now Perth Amboy, which are preserved in Smith's *History of New Jersey*, which bear out the truth of Carteret's assertions handsomely, as proved by these extracts:

> And at Amboy point and feveral other places there is abundance of brave oyfters. Oyfters, I think, would ferve all England.
>
> We have one thing more particular to us, which the others want alfo, which is vaft oyfter-banks, which is the conftant frefh victuals, during the winter, to Englifh, as well as Indians; of thefe there are many all along our coafts, from the fea as high as against New York, whence they come to fetch them.
>
> Oyfter fhells upon the point, to make lime withal, which will wonderfully accomodate us in building good houfes [of stone] cheap, warm for winter and cool for summer.
>
> We have ftore of clams, esteemed much better than oysters; on feftivals the Indians feaft with them; there are fhallops [scallops], but in no great plenty.

Near Conasconck Point, on the shore of Raritan Bay, about a mile and a half south of Keyport, was once a famous bed of oyster shells, covering many acres. So long ago as 1855, we examined it carefully, and pronounced it a kitchen-midden, or Indian refuse-heap, accumulated through many generations. In 1862, we communicated our discovery to Dr. Chas. Rau, the archæologist, and took him to the spot, freely giving him what we had gathered in the observations of years. The Professor made it the subject of a paper in the Smithsonian Report for 1864, which was probably the pioneer of that class of investigations on our continent. That shell-heap has well-nigh disappeared. Some of it was used for making roads—but the stranger fact is that it was used up as ballast in Keyport oyster vessels going for southern plants, and being thrown out in Chesapeake Bay, furnished cultch of

an excellent sort, being cleaner than fresh oyster shells could possibly be. These Indian leavings attest the abundance of native oysters in Raritan Bay. They "fished" on the bed of "naturals," which was afterwards famous as the "Chingarora bed." Even so recent as sixty years ago, the shore for some distance on these parts presented a lively scene every fall. From far and near came the farmers with their wagons, to lay up the winter store of "Chingaroras."

We here quote, as we shall occasionally, our own articles in *Popular Science Monthly*, 1874. In former times all the suitable waters of New York and New Jersey abounded in native oysters. There is a curious map which is dedicated to Governor Moore, of the Province of New York, by its author, who signs himself "B. Ratzer, Siuv'r in His Majestie's 60th American Reg't." It is a map of the city of New York, and it gives the waters of the entire harbor, with their soundings. Its date is 1767. A large tract of water is marked "THE OYSTER BANKS." In that area of what was then fine native oysters is now the vast patch of "made-land," laid down by the filling in of the city's refuse, by the New Jersey Central Railroad. The time was when the entire waters west of the channel, beginning south of Jersey City, and surrounding Ellis and Bedloe's Islands and Robbin's Reef, and a little way beyond Constable's Point, up the Kill Von Kull, altogether some six miles in a straight line, was a rich bank of native oysters, and supposed to be inexhaustible. This bivalve once flourished as high up the Hudson as five or six miles above Teller's Point, and with some allowance for variation of locality, an oyster-bed extended between this spot and Sandy Hook, being a distance of quite fifty miles. Now, taking this stretch with Raritan Bay, the "inside" of Staten Island and Newark Bay, there would be an expanse of waters of not less than three hundred and fifty square miles, of which, probably, the half at least would constitute oyster grounds of varying richness. It can hardly be questioned that when the European settled here, that which is now the eastern coast-line of the United States contained several times more of these bivalves than did all the rest of the world. As stated in the Coast Survey Report: "In Tangier Sound, Maryland, alone, there are twenty-eight beds, whose united area is 17,976 square nautical miles, with twice as much additional bottom where oysters are occasionally caught." And this wealth was of old. The very shells left inland in many places by the aboriginal oyster-eaters, make mounds of vast extent, in some instances

thirty feet high. At Damariscotta, Maine, is a deposit of these shell leavings of the Indians which amounts to some 8,000,000 cubic feet, according to Ingersoll. These red men left this oyster-bed practically extinct. At Fernandina, and other places in Florida, they were used as forts in the late war.

New York and New Jersey soon saw the necessity of legislation to protect the oysters, for not only were they taken up wastefully for food, but also to make lime and even to manure the land. New York, in 1715, and New Jersey, in 1719, enacted stringent statutes, making close-time, &c. But for all this the beds began giving out, and the necessity of planting set in. We again cite Ingersoll:

In 1775, New Jersey, finding that to have her beds and markets open till May 10th, when New York stopped work May 1st, did not work well, changed her close-day to May 1st, also; and in addition, a new provision was enacted, in view of the fact that "a Practice hath prevailed of raking and gathering great Quantities of Oysters with Intent to burn the same for Lime only, whereby great waste is made, and the Oyster-Beds thereby in danger of being entirely destroyed." The penalties against an offender under this new law were very severe. Both States made their laws somewhat in a spirit of mischief and retaliation, for Jerseymen then, as ever since, came in contact with Staten Island planters, often to the extent of mutual belligerency.

It is seventy years, I was told by Capt. Benjamin Decker, since any young oysters have "struck" along the southern shore of the island in quantities worth getting. The great natural beds there and in the mouth of the Raritan, and the beds off Shrewsbury, were exhausted years and years ago, and although now and then small deposits of young oysters are found in various parts of these waters, no reliance is placed upon such a source of seed. Sixty years ago old oystermen remember working upon the "Chingarora" bed, two miles below Keyport, and upon the then famous "State beds," just at the Raritan River light-house. Now artificial planting covers both these banks.

In spite of the above protection, however, all the natural beds gradually gave out, and it was long ago found necessary to supplement them by artificial means. The precise date when oyster-planting began here it has been difficult to fix. Captain Cornelius Britton, of Keyport, New Jersey, tells me that his father was the first man to plant in York Bay, about 1810. This was at Bergen Point. Opposite his place, just below Bedloe's Island, was "Oyster Island," a flat covered by high water, where previously some natural oysters used to be got, but hardly within Captain Britton's remembrance. Captain Benj. Decker, of Keyport, places the first bringing of Virginia oysters to Prince's Bay at "fifty-five years ago," that is, in 1825. Long before this, certainly as early as 1816, as I learn from a newspaper advertisement at that time, cargoes were brought to New York from the Chesapeake; at first, though, none were laid down to wait for growth.

As to native oysters at Staten Island, I was told that they were certainly cultivated in Prince's Bay at least sixty years ago. In some localities on the opposite shore the industry is probably older, since a suit was brought about seventy-five

years ago, in old Shrewsbury township, New Jersey, originating in the question whether or not a man had exclusive right to the oysters he had planted. At Keyport, planting of native oysters is probably not more than forty or fifty years old; and at Amboy, according to report, it was not until fifty years ago that any beds were staked off.

Ingersoll correctly observes:

That on the New Jersey shore much oyster-spawn "catches" every year in all the creeks, and a certain portion of it survives. A common experience is to find it attached to the sedges. By autumn such will become so heavy as to fall in the water, and the main part of it will die. What survives, however, will be as big as half a dollar, and are caught for seed. Enough remains, nevertheless, to tempt a few fishermen to return the very day the summer close-time expires and rake again. What they get are "yellow as gold," and of extraordinary quality. These oysters are called "naturals," and are only enough to supply the home-tables for a few days, at extravagant prices. I see no reason why the judicious throwing of shells or other cultch in these creek-mouths would not save large quantities of this fine seed. It would be objected to by the populace, however, no doubt, on the plea that it was "natural ground"—an argument that might serve for any part of all these shores, which have occasionally been covered with the spawn along their whole extent.

By the end of May all work upon the beds ceases, beyond taking up an occasional boat-load to supply the weak summer demand. The condition of the beds is watched closely, however, by the anxious owners, since it is the midsummer months that determine whether the oysters will report themselves "good" in the fall, or the reverse; which means a profitable business, or the reverse. If the season is hot, equable, and reasonably calm, all is expected to go well. Heavy storms and great freshets in July and August, on the other hand, produce thin and poor oysters, which will not bring a good price. The ill-success of the beds along the Keyport and Raritan shores last year (1880) is attributed to this cause.

Early in September the business of taking up the oysters for market begins. This is done by tonging, from small boats, near which a sloop anchors upon the bed, in which the men are quickly carried out and home again, and easily transport their load. Thus the larger part of the harvest is gathered, until the oysters become scarce upon the ground. Then a dredge is thrown over from the sloop, which cruises back and forth across the ground, until it is wholly cleaned up. Tonging over the side of a skiff is hard enough work, and requires sturdy, broad-chested men; but dredging is a still more terrible strain upon the muscles, when it comes to dragging the heavy iron frame and bag up from the rough bottom, and lifting it and its load over the rail on to the deck of the vessel. Many of the newer and larger sloops are now provided with a windless, specially adapted to dredging, which relieves the crews to a great extent of the old hand-over-hand back-breaking labor. Drag-rakes are also used very frequently on these grounds, having very long, limber handles.

The above applies to Keyport and vicinity, and is pretty correct for the State. The planting begins in March, generally. A vessel with its cargo of plants is taken to the chosen ground. With shovels and

six-tined forks the men throw the oysters overboard, giving the shovel a flirting motion, which spreads the plants, so that they fall thinly on the bed. As the round or under shell is much the heavier of the two, the bivalve is pretty sure to gravitate right side up. There are two kinds of planting—one that of small natives or Northerns, known as hard oysters, the other that of Southern, or soft oysters. The former are called naturals, and being usually smaller when planted than the Southerns, are known as seed. They grow faster than the Virginians, and command better prices. These naturals may lie two years, though they are often taken up sooner. The Southern oysters are variously known as "Virginia seed," "Chesapeakes," "soft," and "fresh" oysters. The word "seed" is now restricted to the small "naturals," which are used for bedding, and the word "planted" is applied to the southern when bedded. Generally a few months suffice to get them ready for market, being improved in quality by their new home. When harvest-time comes they are taken up, first by tongs, and then the bed is gone over with the dredge, this being hauled by a vessel under sail.

After the harvest is finished, not a few oysters will yet remain on the beds. The grounds are then given up to the laborers who have worked them on hire. Under a new impulse these men go over the grounds again with tongs and dredge. In some cases they work on shares, paying to the owner of the beds one-half or one-third of the results, which makes a really handsome thing for the gleaners, whose work in this way lasts from two to three weeks, making three or four days a week, each man often clearing as his portion from four to five dollars a day. At any rate, such generally is the practice with its results at Keyport, N. J., where for many years the principle of the good old biblical rule, of not forgetting the gleaners, is almost religiously observed in the last gathering of this harvest of the sea. My informants, two veteran oystermen, Capt. T. S. R. Brown and Capt. Cornelius Britton, have always, at the end of the season, given up their grounds to their laborers, allowing them the entire results of their work. They say that this custom is general in New Jersey, but not universal, some bosses, as mentioned above, requiring one-half, others one-third the product.

Formerly, in the industry of raising oysters, an industry limited to Northern waters and Northern energy, sowing native seed was its chief part. Now, owing to the scarcity of natural seed, it forms a small part of the business. Says Mr. Shanks, in *Lippincott's Maga-*

zine, May, 1881: "It is common among oystermen to speak of this operation of putting Southern plants in Northern waters as 'fattening.'" He gives some rather high figures of the business about New York, which involves some of the New Jersey industry. He says: "The fattening-beds are all within fifty miles of the city, but nine-tenths of the oysters used come from Virginia and Maryland. Of these fattening-beds, Newark Bay conducted a business, in 1874, of about 3,000,000 bushels, sending 7,000 bushels to stock a private farm in France." As will appear farther on, the term "fattening" is liable to confusion, being sometimes used for the freshening process of putting the oysters into fresh water a few hours before taking them to market.

Do our oyster-growers know how ancient their calling is? When imperial Rome had her many million populace and her almost fabulous wealth, the oyster figured prominently in the more than lavish luxury of that extravagant city. The "boss oysters" were raised by a millionaire. About 2,400 years ago, one Sergius Orata, a man of a practical mind, turned Lake Avernus into an oyster-bed; and through his culture of this bivalve, the Lucrin oysters, as they were called, became, in reputation, the Shrewsburies of Rome. And what a splendid market he had! His practical genius carried the new industry of oyster-planting to great perfection; and such was his reputation in that line that the Romans had a saying that, should the oysters stop growing in Lucrin Lake, Sergius would make them grow on the tops of the houses. But Sergius died, and Lucrin Lake gave out. In fact, the home supply failed, and oysters had to be brought to Rome from her colony, Albion, far away.

Even though we forestall something, it should be said here that, probably, oyster-planting has reached as high a skill as it ever will do. The skill of the future must deal with the question of reproduction, that is, the artificial raising of the "seed." To this purpose, the U. S. Fish Commission is devoting much energy; also, Maryland, the great oyster State, and Connecticut, are falling into line.

One need begets another, hence, the creation of special lines to a general industry. The oyster must be enjoyed away from its home. One of the early efforts to supply the bivalve to regions far remote was by filling small wooden kegs, holding from one to two gallons of the mollusks taken from the shell. The first thing to be done was to freeze the mass solid. This was done simply by exposing it to the cold weather. It was then shipped in that condition, the precaution

being given not to allow it to thaw. Of course, this was a business entirely confined to winter, and was somewhat precarious in its nature. Now, opening oysters, or "shucking," as it is called, has become an immense business.

In his interesting article on "oyster culture," in *Lippincott* for May, 1881, W. F. G. Shanks says: "The railways have, in the last twenty years, multiplied the demand for oysters many times over; it is impossible to say how many times. * * * It was once advanced by an Eastern gentleman as an argument in a discussion with the late Daniel Drake, of Cincinnati, that the West could never become a great section of the country, because it produced no oysters. But, since that time, the railways have taken the oyster-beds to the West. Their extension has opened a market for fresh oysters in all the large cities, even as far as San Francisco; and the trade in canned oysters has penetrated to the remotest interior villages."

A venture, recently made by a Maryland company in the southern waters of our State, has not met with very flattering results, the crop not answering to expectations. But this is only one of the natural hazards of such an enterprise, though, at home, the above is hardly a domestic venture.

Except at Perth Amboy oyster-opening or "shucking" is not carried on to any great extent in New Jersey, compared with other States. In this respect Baltimore bears the palm. This work is very hard, requiring strong hands, and is especially straining to the wrists. Says Shanks: "The shucking of oysters is almost an art in itself, and an expert hand will open fifteen to seventeen in a minute, which is faster than they can be eaten." As an illustration of rapid work, the following is given, omitting names, from the New York *Sun*, October 22d, 1881:

THE OYSTER CHAMPIONSHIP.

To the Editor of the Sun—*Sir:* My attention has been called to a controversy carried on in *The Sun* between several oystermen. I am not disposed to brag, but I think, judging from the accounts of several of your correspondents, that they are mere novices.

On the 26th of last October I, for a wager of $100, opened 11,368 oysters, and fell senseless in the arms of a bystander; besides I had been ill some time previous, and was not in good training. I mean business, and if any of your correspondents wish to try to establish their claim to the championship, I will place from $100 to $2,500 in ———'s hands as my side of the stakes.

——— *Veteran Oysterman.*

The above is surely an instance of wonderful skill in a legitimate line of industry. Supposing that he worked ten hours, less thirty-five minutes taken up by dinner and interruptions, that would make him open *twenty and one-tenth oysters per minute, or two hundred and one oysters in ten minutes*, and that continuously for nearly ten hours! Nor should it be overlooked that the work must be daintily done, each oyster must be removed from its shell in a clean and unmutilated condition.

Said a gentleman to me: Everybody's asleep on the oyster question; and we shall soon wake up to find this grand industry in a state of incurable decline. My friend did not speak from the book. As a class, American oystermen are asleep, with a very few commendable exceptions. But in government and scientific quarters there is a painstaking at work on the subject, such as the world has not seen. Says Dr. Ryder, in *Forest and Field:* "The host of French, German, Dutch, [English and American] investigators are not idle. * * * The present generation of workers in biological investigation are on the alert, provided with capacity, appliances and knowledge, such as was never before known." The American leaders of the attack on this great problem, are Professors Dr. W. K. Brooks, Dr. John A. Ryder, Dr. Henry J. Rice, also Lieutenant Francis Winslow and Colonel Marshall McDonald, of whose labors high hopes may be entertained. It is the fate of every large staple industry that neglects to utilize those methods which are the practical outcome of scientific discoveries, that such must decay until it becomes unable to pay its workers, when it virtually dies; while it is the glory of science that it has restored to a brilliant and profitable activity industries that had well-nigh perished; and it must be conceded that if the oyster supply is to keep pace with the already enormous and rapidly-increasing demand, it must be infused with capacities which if stated in figures would appear visionary.

CHAPTER III.

THE LIFE HISTORY OF THE OYSTER.

1. THE SPECIE, SEX AND EGGS.

Authors are not all agreed whether the oyster of the Southern States and that of the Northern States are the same species. Tryon, in American Marine Conchology, figures and describes both, the one as *Ostrea Virginiana*, Lister, and the other as *Ostrea borealis*, Lamarck. He says the first is the common edible oyster of Chesapeake Bay, and is native as far north as New York, where it is replaced by *O. borealis*, which he regards as "very distinct from the preceding. It is smaller, wider, has not the lengthened beaks of the other, and the surface is much rougher. It is *very* closely allied to the *O. edulis* of Europe." If external forms were sufficient, Tryon might be right. After an examination of a large series of oyster shells in the fish department of the South Kensington Museum, I could not detect any prime difference between the European oyster and ours. There was a difference in size, and the muscle-scar in the English oyster was invariably of a pale salmon color, while ours is usually of a deep purple or chestnut, the pale scar being the exception. But this evidence is light. Far weightier is the testimony of physiology. By an ingenious double-staining for the microcsope, Dr. John A. Ryder has, in January, 1883, as I learn from a letter, settled a long-mooted point, viz., that the English oyster is hermaphroditic, that is, bisexual, and the foreign naturalists long ago proved that it is viviparous, that is, it brings forth the fry alive. In 1879 Dr. Brooks proved that the American oyster is unisexual, that is, one individual is male and another is female, and the eggs are fertilized and hatched in the water much as is the spawn of fish. Prof. Möbius, a high European authority in these matters, having shown, as he thought that their oysters were distinct in sex during spawning, held that they underwent a change of sex when propagation was over. Lucaize Duthier thought

that all young oysters were males, but became females when older. Says Brooks: "At the breeding season each individual oyster is exclusively a male or exclusively a female. * * * Although there is reason for the belief that an oyster may give rise to eggs one season and to male cells another year." The sexes, however, cannot be distinguished by any external or internal form of the animal, as anatomy cannot detect any sexual organs, in the popular sense. Some oystermen say that the male may be distinguished from the female by certain characteristics, such as the presence of black pigment in the mantle, but microscopic examination shows that these marks have no such meaning, and that there are no differences between the sexes, except microscopic ones. It is not necessary, however, to use the microscope in every case, for a little experience will enable a sharp observer to recognize a ripe female. If a little of the milky fluid from the ovary of a female with ripe, or nearly ripe, eggs be taken upon the point of a clean, bright knife blade, and allowed to flow over it in a thin film, a sharp eye can barely detect the eggs as white dots, while the male fluid appears perfectly homogeneous under the same circumstances, as do the contents of the ovary of an immature female, or one which has finished spawning." This same gentleman in his labors with the Maryland Fish Commission, has made the grand discovery that the American oyster is not viviparous, that the female literally spawns, that is, evicts her eggs, and that these are fertilized in the water by the male fluid, precisely as in the case of true fishes; and as with them, artificial fecundation is quite practicable. This last, especially, is a grand discovery, and promises much for the future of oyster culture.

If the reader has followed these statements he must see that the so-called European and the American oyster each constitutes a distinct species. He may also dismiss Tryon's distinction of the Northern and the Southern American species. The general verdict of naturalists is that they are but one, viz., *Ostrea Virginiana*, and it, as Brooks has proven, is unisexual. The ordinary European oyster is the *Ostrea edulis*, and it is bisexual. But the Old World has one species more, which may yet be played off against importations from the New World.

Dr. Ryder, in a recent article in *Forest and Stream*, cites Mr. Bouchon Brandely's work on the Portuguese species, *Ostrea angulata*, as reported from the *Comptes Rendus* of the French Academy of Sciences in the *Annals and Magazine of Natural History* for October,

1882: "Twenty or twenty-five years ago the Portuguese oyster indigenous to the Tagus, did not exist on the coasts of France. A damaged vessel discharged its cargo into the Gironde, upon the old Banc de Richard. Here they have since so multiplied, that they cover an extent of from twenty-five to thirty kilometers, (about 18 miles), a vast bed which will soon be limited only by the banks of the river. *Ostrea edulis* is undoubtedly hermophrodite. * * * The Portuguese oyster is, on the other hand, incontestably unisexual. Like the American oyster, as shown by Dr. Brooks, its ova and milt are expelled from the shell. Neither ova nor embryos are ever found in its mantle. The young of the common oyster cannot live outside of the shell. According to M. Berthelot's investigations, the fluids in the mantle cavity of *O. edulis* contain albumen in a notable proportion, upon which the young are supposed to be nourished. M. Brandely found that the young of *O. edulis*, whether in the form of white or gray spot, could not be developed in sea water external to the parent; the white embryos died in three days, the gray after twelve or fifteen days after their removal from the parent, although within reach of collectors. These facts, he thinks, preclude the possibility of the crossing of the species. With respect to this point however, our author made direct experiments, or attempts to hybridize the two species, which gave only negative results. Mixtures of the eggs of *O. edulis* with the milt of *O. angulata*, and *vice versa*, never resulted in fertilization, although the experiments were repeated at different times for the last two years.

In an article on "Deterioration of American Oyster Beds," in *Popular Science Monthly*, November and December, 1881, Lieut. Francis Winslow says: "At least one variety of the European oyster is reproduced in a manner similar to our own. During the Summer of 1880, I successfully impregnated the eggs of several female oysters, taken from the Bay of Cadiz, Spain. The embryos were maintained alive for eight days, and their development was entirely similar to that of the American variety." The Lieutenant in this instance experimented on the *O. angulata*, and his methods were those of Dr. Brooks, which will be described farther on.

While engaged upon the United States Coast Survey in Chesapeake Bay, in 1879, Lieut. Winslow conducted a series of careful observations on the oyster beds. In the above article he adduces the better chance for survival of the European embryo over the American, due

to the fact that it is protected at the outset in the parent shell; also the fact that an immense portion of our oyster eggs fail even to get fertilized, having to take their chances for this in the water. To make some amends, the American oyster yields many more eggs than the European. Prof. Möbius puts the spawn of an European oyster at 1,800,000. Prof. Brooks estimates the eggs of an American adult oyster at an average of 10,000,000. The young, at from one to two years old will spawn, the European yielding one-third as many as the adult. Probably this is about true of the American species. Says Winslow: "From observations made during the summer of 1879, I find, that on a natural, unworked bed, the ratio of young oysters, or those over one, and under two years of age, to those mature, and over that age, is as one to two, or in a community of fifteen hundred, there would be one thousand mature and five hundred young oysters. The five hundred young would spawn 1,600,000,000 eggs, or the total number in the community would spawn 11,600,000,000 eggs, from which would result five hundred oysters, or about twenty millions of eggs or oysters would perish where one oyster was preserved." Möbius puts the ratio for the European at a loss of 1,185,000 eggs or oysters, for one adult raised.

2. THE BABY OYSTER.

The egg, when spawned, at once gravitates to the bottom of the water. Should it there, or on its way, fall in with one or more male cells, they adhere to it, and it is instantly fertilized. If the temperature and other matters are favorable, it will hatch in from two to four hours. The oyster egg, however, does not answer the popular notion of an egg, which is a body with a shell, so that the object hatched comes out of the shell. The oyster egg is a tiny globular thing, which is developed into the fry, the whole egg being concerned. Says Dr. Brooks, in Maryland Report, 1880: "The segmentation of the oyster egg is remarkable for its great rapidity, for its bilateral symmetry, and for the very well-marked alternation of periods of activity with periods of rest." "The two valves of the shell of the oyster originate separately," and not from the splitting or dividing of a single embyonic shell. Almost immediately it is endowed with a circular fringe or pad of cilia, or lashes, long enough to serve it as locomotive or swimming organs. Only in its tiniest larval life, or babyhood, can

it travel. Literally, it must go while it is very young, for in a week, at most, an oyster loses its capacity for travel. This going is accomplished by lashing the little rowers in the water. In this way it ascends from the bottom, where it has fallen. "As soon as the young oyster finds a solid body, rough and clean, it fastens one valve of its shell to it by secreting a cement of shell matter around the growing edge." If the surface be clean, it needs not be rough. Specimens of spat on fragments of glass are common. I have specimens attached to a broken decanter, and a real whiskey bottle still containing some of the ardent, is hermetically sealed by a cluster of young oysters. Some one has recorded his belief that glass makes the best cultch. I do not think the opinion that the spat attaches itself by a larval byssus, or by the locomotive cilia is tenable. It seems to me that this ciliate pad is needed for another purpose, as may appear further on.

"When the young oyster ceases its wanderings and 'sets,' we have yet to find out how old it is at that time. When we learn this, we will know how long it will be necessary to keep the young in the incubating apparatus." "The dimensions of the fry of the American oyster at the time of setting is about one-eightieth of an inch, at which time the valves are characterized by a remarkable symmetry, which is departed from as soon as the growth of the shell begins in its new fixed position."—*Dr. J. A. Ryder, in Maj. Ferguson's Maryland Report*, 1881.

I fear experience must modify, to some extent, the above statement. The oyster fry in these respects is so capricious, and the questions of temperature and other matters will show differences of ages at the time of attachment.

The tiny fry is still but a larval thing. It is so rudimentary that it can hardly be regarded as an oyster at all. It has ceased to be a free-swimming embryo, and now begins the development of those organs which shall fit it for adult life. Except in the most rudimentary way, it is even destitute of gills. Perhaps in its swimming stage the cilia pad or ring, had functionally a branchial significance. So far as known to me, the work of Dr. Brooks did not go further than the swimming stage. Taking advantage of the American discovery, it would seem that a foreigner has gone beyond us all. The *Bulletin of the United States Fish Commission* for October, 1882, gives a brief report on the recent Edinburg Fisheries Exhibition, by United States Consul J. A. Leonard, from which the following is taken:

"Mr. Byram Littlenow, of Huddersfield, England, exhibited oysters produced by artificial contact of the sperm and ova in artificial sea-water by a process of his own invention. He claims that while an American experimenter has succeeded in hatching the oyster, no one but himself has succeeded, as yet, in growing it beyond one of the earliest stages of development. He showed living specimens, which he had kept in continuous growth from three to five months, which is as long as he has been experimenting in that direction, and expressed full confidence in the practicability of hatching and rearing oysters abundantly and profitably."—*Report of Edinburgh Fisheries Exhibition.*

There is so much left unsaid in the above that entire confidence is hardly possible. We, then, must confine ourselves to more open achievements. Last summer, Dr. John A. Ryder advanced a little beyond Dr. Brooks in artificial propagation. With Col. McDonald, in an apparatus devised by the Colonel, the fixation of the fry to the sides of the glass hatching-vessel was obtained in twenty-four hours from the impregnation of the eggs. Each of the young fry was attached by one side, having already got its larval shell. The shells were round and symmetrical, becoming unsymmetrical as the spat grew, although, for the time observed, there was no *apparent* growth in these three-days-old spat. They seemed cemented to their holding-place by a deposit of concholine, that horn-like substance observed on the edge of oyster shells. At first, there was no nib or beak extending beyond the hinge. It seemed as if these points were cut squarely off. When the shells begin to grow, these points appear and are extended, which seems about the earliest external change in form. Conchologists call these points of the shells, in all bivalves, the *umbones*, hence Dr. Ryder names this early period in the life of the fry the "umbo stage." In his "Summary," published in *Forest and Stream*, he further says: "Sections of the soft parts of spat, from a sixteenth to a quarter of an inch in diameter, show that the intestine and stomach are arranged pretty much as in the adult, the main difference being that the intestinal folds are not so pronounced and the liver follicles comprise the bulk of the body mass."

Though there may seem a little want of agreement, it would hardly serve the present purpose well to omit the following: From his paper in *The Microscope*, October, 1882, it seems that Dr. H. J. Rice had already carried the study of the attached fry to a point beyond all others. The article being long and rather technical, I must quote this

interesting young biologist with some freedom of language: The gill-flaps of the larval oyster, which is several days old, now begin to appear. (To this we will add, as our belief, that the cilia are meanwhile being absorbed as nutriment.) The rudimentary gills, which are fluted or grooved, soon take on innumerable and almost infinitely small cilia, which, lashing along the grooves, cause the minute food in the water to pass up them. Here is a singular provision to manipulate the food. Dr. Rice says that, in 1878, he discovered an organ or adaptation, which he calls the proboscis, hence he names this period of the little thing's life the "proboscis stage." Speaking of this rudimentary organ, the Doctor says: "The protrusive œsophagus grows out into a slender and quite flexible proboscis, which is only slightly, if at all, extensible, and is provided at its extremity with a spreading and very mobile lip or rim, which surrounds the mouth orifice."

"In pushing this waving bit of tissue to one side with the end of a pencil, it spread out at the end and closed about the point of the pencil, clasping it quite firmly, and upon closer inspection I found that the bit of tissue represented the end of the alimentary canal, and that the portion clasping the point of the pencil was in reality a lip-like flap surrounding the mouth orifice of the canal. The proboscis was endowed with a certain responsive action, since, whenever the point of the pencil was brought in contact with it, the proboscis would move about and the lip be directed towards the point of contact, when the pencil would be clasped as in the first instance. If left to itself the proboscis would move slowly about in the water, waving from side to side, as when first noticed, spreading and closing its lip extremity as if feeling for something in the surrounding fluid."

The oyster should indeed be a dainty, for in the matter of its living few things are more squeamish. There are so many nice points essential to its well-being—proper depth of water, suitable bed to lie on, and suitable depth of ooze or mud, that it may not get smothered; the temperature and saltness of the water, the kind and quantity of its food. It is even affected by drought and excess of rain, and the force of the winds. With all things favorable, its babyhood is very brief, its growth becomes rapid, and its condition good. Dr. Rice found oysters in the proboscis stage in sizes from one-eighth of an inch to one and three-eighths inches, and has found them having passed the embryonic stage when but three-eighths of an inch diameter. At this stage the oystermen call them "spat," or "blisters," and the spawn so attached is said

to have "set." In less than a year it becomes about as large as a dollar, and is then known as "seed," since it is of proper size for planting. Lieut. Winslow, speaking of the oysters in Chesapeake Bay, in 1879, says:

"In the first three months the oyster increased in size from a hardly visible speck to an average length of one and a quarter inches, and a few were over two inches long. The lower and attached side grows most rapidly, and during this period the growth is mainly in length. After the first year the increase in size is not so rapid; and oysters of two or three years of age are about two inches broad and three inches long, though these dimensions will vary in different localities. In three years at the most the American oyster is considered mature, and will present all the characteristics of those found in the markets," size only excepted.

Having traced the oyster from the egg to the swimming stage, thence to its earliest fixed state, the umbo stage, thence through a part of its organic development, or proboscis stage, and lastly to its full spat or seed condition, we are now to consider it in its adult stage and form.

3. SHELL—STRUCTURE AND CARDINAL PARTS OF THE MOLLUSK.

An oyster shell is in two parts, as the word bivalve implies. The upper part is the smaller of the two, and is the part from which the oyster is eaten, when taken on the half-shell. The under, or lower side is larger, much more rounded, and is deeply dished, and heavier. It is on this side the animal lies when normally positioned in the water. The thin part, where the knife enters, when opening the oyster, the oystermen call the nib; and the extreme opposite end at the hinge, they call the bill or beak. Between the upper and the lower beak is the ligament, a black, tough substance looking not unlike gutta percha. Though very brittle after death, it is quite elastic in life. It holds the valves together, and is really in its way a leather hinge. As mentioned already, it is elastic, and when the valves are drawn together, that is, when the oyster shuts his shells, this ligament is squeezed and compressed. The valves are closed by the pull of the great adductor muscles, the part vulgarly called the eye by some, the heart by others. When this strong muscle is slacked the compression of the ligament is relaxed, and it immediately expands, and so lifts up the lighter valve, that is, opens the shell; so that though an oyster can shut his house by pulling to the door, the door is opened automatically by a purely

mechanical device. The animal does not really open it of itself, but *lets* it be opened. On the inside of each valve is a deep or sunken scar of varying color, usually of a dark chestuut. These two scars mark the place of attachment of the two opposite ends of the great muscle. Now as the pull of this muscle is very strong, should it always remain attached near the hinge, the labor of the pull would increase with the increase of length of the shell by annual growth, until the leverage would become so great that the animal would not be strong enough to overcome it; that is, the time would come when the tenant would be unable to shut his own doors. To obviate so serious a danger the animal moves its attachment towards the nib, keeping up with the yearly increasing length of its shell, thus effectually preventing any increase of leverage. These changes of the place of attachment of the muscle are controlled by the amount of shell extension or growth, and the last attachment, while always advancing towards the nib, never reaches it, but is kept sufficiently far from it to sustain a hold on the thick part of the shell, for if it came too near the nib, that would be too thin for a well-sunken hold of the muscle into the shell. The effect of this annual removal of the scar-pit is to make a long depression or groove, which would so alter the form of that part of the shell in which the animal lies as to become inconvenient for the position of its organs. To prevent this the creature, as the muscle moves forward, fills up the canal behind with nacre or mother of pearl.

As already shown, the oyster only when in its larval state has the capacity of locomotion, and even then only by its cilia, not by any pedal organ proper, such, for instance, as that by which a clam ploughs and progresses through the mud. Still, to our surprise, the ingenious malacologist, Mr. W. H. Dall, attached to the United States Fish Commission, has discovered the pedal muscle in the oyster. "It is attached to the valves near the hinge in *Ostrea Virginiana* by a small purplish scar." I have a noble oyster taken this winter from a native bed in Raritan Bay, near Sandy Hook, which shows both these pedal scars very finely. However, this muscle is at best only rudimentary, and is unusable for locomotion. Is it a relic of a more highly endowed ancestral oyster with pedestrian habits? Robert L. Pell, in his prize essay, "Edible Fishes of New York," written in 1858, probably draws from the depths of his consciousness in saying: The oyster has "an organ called a foot, composed of layers of fibres, which by contraction and expansion bestow on it the

power of locomotion in a small degree." It is enough to say that if let alone the oyster makes a life-long attachment.

The growth of an oyster shell is entirely from within. The lime carbonate is spread in a thin lamina over the inside of each valve, thus thickening them, and this thin layer is pushed outwards, the deposit at the edges, however, being at first a grayish, semi-horny or animal matter called conchioline, upon and into which this carbonate of lime is laid. By this process the shells are widened and lengthened. The effect of this mode of increasing the size is to add, shingle-wise, a series of laps, or what are called "shoots." The youngest shoot, that is, the last one made, seems to be pushed out from the inside of the shell, which is the fact, and the old "shoot" is the little shingle highest up on the outside and close to the hinge. At the hinge, in the trough of the lower beak, is a series of parallel lines. These are the terminal edges of the planes, or layers of increase, recording, as do the "shoots," in my opinion, the annual shell growth. I once heard a man of more than the ordinary intelligence claim that these flaps or shoots denoted "moon growths." How suggestive this of the notion advocated by some, that the supposed annual rings in the boll of a tree are only season growths. As to the shell of our bivalve, the series of shoots, and that of the hinge-lines, also that of the muscle-scars have a correlation, and if rightly made out should tell the age of the oyster in years, since, as I view them, they do record the annual accretion or growth of the shell. Twenty years has been set down as the limit of an oyster's life. This is not correct. In February, 1882, I published in *Popular Science Monthly* an article—"The Longevity of the Oyster." Two oysters taken up at Keyport, N. J.; were submitted to me to tell their age. One was seven inches long, and three and a-half inches wide; the other was seven and a-half by four inches. Both specimens were quite uniform in their markings. It was evident that their growth had been slow and regular, and that the edges of the shoots had been worn smooth. All these points tallied with the facts. They were taken from a poor bottom—sandy and hard—and the smoothness was due to the rocking by the water on the sandy bed. Plainly, they were transplanted "Virginias." I depended for my diagnosis mainly on the hinge-lines, for the increase had been so gradual as to make the task difficult. The hinge groove was in places coated with a limey deposit of bryozoa, thus in part obliterating the lines. As was to be expected, the beak, with its groove of the lower

shell, was much larger than that of the upper shell, the one being two and a-half inches, and the other one and a-half. This fortunately reduced the question to a calculation of proportion. So with a pocket-lens I examined the parts not affected by the bryozoa and found in the upper beak that the growth-lines were quite uniform, and that there were five of them in a quarter of an inch; this gave thirty lines for the beak. In the lower beak or groove there were three lines and a third of a line in a quarter of an inch, which would also give thirty of these annual layer-lines for the whole length of the groove. The known facts were these: that about twenty-nine years previously that bed had been planted with Virginias, and in due time the crop had been harvested. It was not satisfactory, the bed being a hard bottom, and so it was not again planted. On examining this old bed to see what its state was, these two oysters were taken up. They were escapes from the dredge of twenty-nine years ago. It is observable that the oysters contained in them, though not prime, were good and fair, a fact not true, usually, of excessively old oysters. I am satisfied that oysters attain an even greater age. I have had an occasion to testify in court as to the probable ages of a number of oysters placed before me, and the opinion rendered was not contested even by the side to which it seemed adverse, and who knew the real facts, as the specimens were cultivated "plants." Says Mr. Pell, in the essay already quoted: "I think I can discover the age of any fish at any time within six years, and also the age of oysters." The worth of these marks as indicators of age is, I think, almost universally admitted by oystermen, and yet doubt is cast upon it by one whose judgment is worthy of high consideration. At any rate, as the matter has its practical side, it has seemed to me to be worthy the room here given to it.

Very few have a correct idea of an oyster as it lies in its shell, for this animal has its four cardinal parts, a behind and a before, a right side and a left. If one takes between his two hands a round clam, (*Venus mercenaria*,) and holds it with the thin part downward, the thick part upward, and the two umbones, or beaks, directed from him, the part to his right hand will indicate the right side of the animal, and the part to his left hand its left side, while the upper part will indicate the animal's dorsal part, and the lower edge its ventral part. Let us thus take up an oyster. We hold it between our hands, its flat valve to the right hand, and its round valve to the left hand, the nib

downward, and the beaks uppermost, and directed from us. Thus, the flat valve indicates the animal's right side, and the round valve its left side, the nib the ventral, and the beaks, or hinge-end, the dorsal part.

The popular belief is that the nib is the true, that is to say, the natural forward end of the oyster. Like common-sense people, when acting upon knowledge, naturalists hold that the head-end of any animal is its forward or anterior end. Now the oyster, though eyeless, has an ingenious mouth, with lips, œsophagus, &c. But this cephalic region is near the hinge, hence the hinge-end is the anterior, and the nib the posterior end of the oyster.

It has been argued in high quarters that the normal position of the oyster is with the hinge-end down, and the nib-end up. Where oysters are crowded, and there is a struggle for existence, this is of necessity its position—a force-put of the environment—as there is a pushing upward of the posterior end for the sake of food, and of the action of the gills; and the result is those unnaturally elongated specimens, known in South New Jersey as "stick-ups," "cat-tongues," &c., and a still more exaggerated form farther South, known as strap oysters and "coon heels." The oyster when in too deep mud will at the heavy end gravitate downward, and in its efforts to escape "smothering," will eject the mud and water by frequent snapping of the valves, and in this way keep up for a while a funnel-shaped excavation around it in the mud, so that it can breathe. The natural position, and that in which the best oysters are obtained, is when the mollusk lies on its round or ponderous, that is, its left side. The "stick-ups" spend their lives standing on their heads.

4. THE PHYSIOLOGY OF THE OYSTER.

In the animal and in the plant the physiologist finds certain groups of organs set apart for the growth and material well-being of the individual. Because of their similarity of function, the entire series is known as the vegetal class of organs. The system is really a triple one, and very distinct in the animal, each branch having to do respectively with the functions of food elaboration, the vitalizing of the life-fluid, and the distribution of the same. Hence, they are called the alimentary, the respiratory, and the circulatory systems. As will appear, our mollusk is richly endorsed in these particulars.

The Alimentary System.—Having opened an oyster carefully and

removed its flat, or right valve, we observe a thin membrane, and notice that it covers, or enfolds, the mollusk on both its left and its right side; also, that though continuous at the dorsal region, and near the muscle, it is open on the ventral side. Its two edges have each a row of coarse cilia, or tentacles; they are really fleshy mobile hairs. This membrane is the pallium, or cloak. When the oyster is opened a little way, in its native fluid, the edges of the pallium are pushed to the opening, displaying the double fringe, or beard, popularly so-called. Says Dr. J. A. Ryder, in Major Ferguson's Report, 1881, p. 14: "I believe that the turgid, translucent appearance of the edges of the mouth in the oyster is due to the passage inwards of water through the mouths of numerous vessels which open freely on its surface; these, from my microscopic examinations, seemed to be the extremities of the capillaries of the mantle, and I find that for this belief I have the concurrent testimony of other writers." May it not be that the cilia or tentacles are stiffened and made erectile by being filled with water, as in the case of the tentacles of the actinia or sea-anemone? Thus, it aids the frill in its functions which keeps up a vibratory motion that regulates the flow, and causes the water to set into the shell, chiefly on the ventral side of the animal. The gills lend their aid, as will be shown, in passing the food-laden water up between the pallium folds. Let us remove this right side, or half of the cloak, by gently turning it aside. Now we have a better exposure of the prominent organs. Forward, and well up to the hinge, are two pairs of flattish organs with their edges uppermost—that is, they seem to be standing on their edges. These are the lips, or palpi, and between the two pairs is the oral orifice, or mouth. A little below this, but out of sight, is the œsophagus, which is just over the stomach, and this latter organ lies, as it were, imbedded in this dark brown mass, which is the liver. The stomach is prolonged into an intestine, which extends a good way towards the posterior end of the shell, stopping against one side of the adductor muscle, where it doubles upon itself and returns nearly to the œsophagus. Here again it is reflexed, and returns posteriorly until the vent terminates close to and just at the opposite side of the adductor muscle. In fact the fæcal duct here rests at the margin of a depression through which passes the outflowing water, hence it may be called the cloacal region. The gills render valuable aid to the alimentary organs by helping the food flow to the lips. The gill plates are covered with innumerable and infinitely small cilia, which, by a sort of rowing

motion, urge onward the food-laden water to the labial palps. These separate the food particles from the water and pass them into the mouths, whence by ciliate action they are borne slowly along the alimentary canal. The filtered water stops at the lips and is now returned to the gills, between whose plates it enters at certain apertures at the branchial base or place where the anterior edges of the gills lie upon and are attached to each other. Prof. J. A. Ryder, in report for 1881, of Commissioner Ferguson, makes this interesting point, that though externally the nutrient duct is nearly cylindrical, internally it is, so to speak, a large cylinder with a smaller one soldered to the inner wall, extending "from the pyloric end of the intestine to the vent," thus increasing immensely the absorbing surface of the duct. Hence the fæces of an oyster are not cylindrical as with mollusks generally. A section of one is shown by the unshaded subfigure in Plate I. This singular form, taken with the great length of the organ, affords a nutrient system of such marvelous efficiency as to exact our admiration.

I have already instanced the remarkable composite function of the branchiæ; that they do mechanically serve the alimentary system in aiding the palps to get the food. But we must say a word upon the liver, whose compound functions in serving the ingestion are simply astonishing. On this point I shall simply extract a beautiful passage from Dr. J. A. Ryder's address at the eleventh anniversary of the American Fishcultural Association:

"It is not correct to speak of the liver of the oyster as we do of that of a higher animal. Its function in the oyster is the same as that of the different glands in us, viz., the gastric follicles, the pancreas and the liver, to which we may add the salivary, making a total of four in the higher animals, which are represented by a single organ in the oyster. In fact, experience has shown that the secretion of the liver of mollusks combines characters of at least two, if not three, of the glandular appendages of the intestine of vertebrated animals. There are absolutely no triturating organs in the oyster for the comminution of its food; it is simply macerated in the glandular secretion of the liver, and swept along through the intestine by the combined vibratory action of innumerable fine filaments with which the walls of the stomach, hepatic ducts, and intestines are clothed."

The above is truly an extraordinary passage, and should be re-read by the ordinary reader, that he may take it in.

The Respiratory System.—The breathing organs of an oyster consist of four gills, or bronchial plates. These are largely made up of very minute tubules, each with a row of holes on one side like a flute, and rows of infinitely small cilia which seem to lash the water through these little holes. As already mentioned, this water has been filtered and sent back from the palps. These tubules make up a laboratory in which two delicate processes, the one mechanical, and the other chemical, are carried on. Here the air is separated from the water, and from this air the oxygen is eliminated and given to the blood, while the carbonated water is passed off at the cloacal region; thus an outgoing current is established which receives and bears away the fæcal refuse from the vent of the alimentary duct into the sea.

The Circulatory System.—Having oxygenated the blood, the gills pass it by means of six arterial ducts to the auricle of the heart. The crypt or pericardium containing this organ is close to the anterior or upper side of the adductor muscle. It is covered with a very thin, translucent membrane or caul. Let us gently pull aside the veil, and look into this mystic chamber. Here is the little heart, with its two divisions. That section nearer to the gills is the auricle. Dissection would show two chambers, receiving from the six arterial ducts the revitalized blood. The larger section farther from the gills is the ventricle. This receives the blood from the auricle, and by two aortas distributes the life-fluid, through the one to the posterior half, and through the other to the anterior half of the body. The pulsations of this pretty organ are easily seen, and the weird movement is kept up for a good while. I have counted six pulsations in a minute, but a specimen just taken from the water would pulsate quicker. The blood of the oyster is of an opalescent hue, and its circulation is carried on with a quite complete system of arteries and veins.

The Nervous System.—There is a functional behavior even in the conduct of our oyster which is proper to it as a sentient being, and which is not possible to a plant, nor would be possible to the oyster without a suitable outfit of nerves. Looking at a beetle we see that its body is composed of three parts—an abdomen, a thorax, and a head. A true insect does not breathe at the mouth, but by two rows of holes or organs called spiracles, situated on each side of the abdomen, each hole opening into a tracheal tube. The thorax supports the legs and wings, and the head sustains the palpi, antennæ, eyes, &c. All this is easily discernible. But dissection discloses the fact that

each of these body sections has a nerve mass, or brain suited to the functions of the organs of that part of the body. Each of these sectional brains is made up of several ganglia or knots of nerve matter. As already hinted, each of these nerve groups or brains is functional —that in the abdominal region has to do with respiration, that in the thoracic region has to do with locomotion, and the one in the head region is concerned with sensation and volition. The brain mass of the higher animals is concentrated in the skull, but the three-fold division occurs here, and with the same correlation of function. The smallest brain, the *medulla oblongata*, is concerned with the functions of respiration, the next larger brain, the cerebellum, has to do with the locomotion, and the largest, the frontal mass, the cerebrum, has entrusted to it the functions of sensation and volition. In the more highly-organized mollusks, this three-fold set of ganglia occurs. The pecten or scallop, which is quite a traveller, especially when young, even leaping through the water, has three sets, which control respectively the functions of breathing, locomotion and sensation. But the oyster is a traveller, at most, only during the five or six days of its embryonic or larval life. Once attached, if let alone, it is a fixture for life. Hence, it has but two brain masses, to which are delegated the functions of respiration and sensation. It has no brain specialized for locomotion. Its respiratory brain is large, and we have seen how extensive, intricate and effective the machinery which it has to run. The psychic brain mass is not so large; yet, we may affirm of it some pretty potentialities. That which the being possessed of a higher cerebration sometimes does not do, the oyster does—it profits by experience. This lowly thing learns to accommodate itself to new situations. When an insidious sponge or burglarious mollusk has bored into its habitation with murderous intent, it has been known to bar entrance by promptly plugging up the hole with a stopper of pearl. I have known a broken oyster to repair its shell, even when very badly damaged. Though without eyes, it is said to be able to distinguish between light and shadow. This has been pronounced impossible. I would ask, why not? What is blinder than the eyeless earth-worm? yet, it can tell light from darkness. There is a great difference between visual sight and simple sensitiveness to light. Prof. Kneeland says of oysters: "They are sensible of light, as is known by their closing the valves when reached by the shadow of an approaching boat, and they have numerous short, pedunculated, yellowish-brown eyes be-

tween the fringes of the mantle for more than a third of their length." But that these are functional eyes is far from proven. The scallop has a number of them, beautiful blue spots.

It seems proper to put on record, just here, a practice in the oyster industry of New Jersey in the olden time; hence, I quote from my own articles again: Before the railroad days, our oyster-growers used, early in the fall, to canvass the villages on the Hudson River for orders, to be filled just before the river should be closed with ice. The meaning of this is, that these men committed themselves to supply oysters in the shell, with the guaranty that the bivalves thus supplied should not die before their time came. The oysters were actually kept alive during the greater part of the long winter. The bivalves were handled with some care and spread on the cellar floor, the round or lower side down, so as not to allow the liquor to escape.

That such a life required a great change of habit in the bivalves is evident; and it needed a training, yes, an education, ere the oyster attained to such ability. And this was the way it was done: Beginning early in the fall, the cultivator of the oyster took up the fat bivalves from their bed where he had planted them, and laid them a little higher up on the shore, so that, for a short time each day, they were exposed out of the water. After a few days of this exposure by the retreating tide, they were moved a little higher still on the shoreline, which gave them a little longer exposure to the air at each low tide. And this process was continued, each remove resulting in a longer exposure. And with what results? Two very curious ones—inurement to exposure, and the inculcation of a provident habit of making preparation for the same. What! providence in an oyster? Yes, when he's educated. When accustomed to this treatment, ere the tide retires, the oyster takes a good, hard drink, and retains the same until the tide returns. Once, while waiting for the stage at a country hostelry, we overheard the following between two rustic practitioners at the bar: "Come, Swill, let's take a drink!" "Well, I don't know. Ain't dry myself. Hows'ever, guess I will take a drink, for fear I *might* get dry!" With better philosophy on their side, these educated oysters, twice in every twenty-four hours, took their precautionary drink.

The old French method of oyster training was more laborious. The adult bivalves were carefully spread out in the water and periodical lessons given to each one individually. Each oyster, on this

occasion, received a tap, not with a ferule, but with a small iron instrument. This caused the bivalve to close tightly. Finally, the last day came, with its last premonitory tap. Its education thus finished, it took passage with fellow-graduates, for Paris. As a result of its education, it knew how to keep its mouth shut when it entered society!

This provident faculty is seen in those oysters called, by Sowerby, *Dendostrea*. They are "the tree oysters (*O. parasitica*, and *O. polymorpha*,) which attach themselves to mangrove and other bushes in the tropics," whose roots or pendent branches dip into the water, but are left exposed by the retreating tides. They "enclose within the shells a sufficient quantity of water to keep up the respiratory currents," until the tide returns.

As it is hardly possible to make quite clear this question of physiology without special engravings, I shall follow this discussion with an illustrated section, in order to clear up the finer points of anatomy and shell-growth of the animal.

5. ANATOMY OF THE OYSTER.

The design of this section is to supplement the preceding one by the instructive figures of Dr. John A. Ryder on the anatomy of the oyster and the growth of its shell. They are taken, by kind permission of Major T. B. Ferguson, from his report of 1881, as Commissioner of Fisheries of Maryland. Without following Dr. Ryder's words strictly, it will suffice to explain the figures which I have cast into Plates I. to IV., inclusive.

PLATE I.

Fig. 1. *H*, the hinge. *lig.*, the ligament. *A*, the posterior end of the shell. *G*, the gills. *M*, the mouth. *Cl*, the cloaca or outlet of the fæces from *V*, the vent. *Mus*, the compound adductor muscle, which is composed of two kinds of fibres—those in the larger portion in the area *I* are brownish-gray; those in the smaller area *II* are whitish; the line of contact between the two is sharply defined by the curved line *III*. The back or upper side of the animal extends from *b* to *c*; the ventral or lower side reaches from *c* to *a* up to the mouth *M*. *Mt Mt*, the mantle, which covers or enwraps the animal and thus

lies next to the shells and secretes and deposits carbonate of lime. *tent*, the tentacles on the edges of the mantle are organs of touch and probably sensitive to light. *P*, the palps or palpi. *P sp*, the palpal space or region continuous with the inferior gill cavity *I cav*, from *d* to *c*; in this space, the four leaf-like branchiæ or gills, *G*, hang suspended by a membrane, which unites with the mantle on either side along the line *E*; this membrane, together with the bases of the gills, forms a cavity, limited below by the upper edges of the gills at *G*, and above by the viscera along the line below *C st*, the mesosoma, *mes*, or lower middle portion of the body, and the adductor muscle. This upper gill cavity, *U cav*, extends from *b* to *c*, and is continuous with the cloaca *Cl*, which is the space between the upper free folds of the mantle from *b* to *c*. *C st* is the so-called crystaline style, whose function is not known. *L* is the liver. *Int*, the intestine. *Per*, the pericardium, containing the heart. *I flds*, the inner folds, a peculiar double fold which projects into the intestinal cavity, extending from the pyloric end to the vent. Its function is to present a large absorptive surface to the nutriment. It is shown by transverse section in the unshaded subfigure, while the shaded subfigure shows the form of a transverse section of a fæcal cast. The heart consists of three chambers—the upper and largest is the ventricle, *ve*, and the two smaller, lowermost, brownish, paired chambers are called auricles, *au*. They all lie in the pericardial chamber, *Per*. *ao*, *aó* are the aortæ, the first supplying the fore part, and the latter the hind part of the body. *bc* are the branchio-cardiac vessels, which carry the blood from the gills to the auricles.

The above is unavoidably somewhat technical, but must be understood if read in connection with section 4, on the physiology of the oyster.

PLATE II.

Fig. 2. The generative organs, or mass, are shown at *Gen*. In the oyster they form an immense part of the animal. This mass is ramified by numerous tubular branches which unite into two large canals, one on each side of the body, which open into the upper gill cavity at *ov.*; the oviducts, if the specimen be a female, and the *vasa deferentia*, if it be a male. In this figure, *Mt* denotes the mantle, *G* the gills, *Ms* the muscle, *H* the heart, and *P* the palpal region.

Fig. 3. An oyster fry, or larva, with its umbonal cap, or tip over

the hinge. It is one-eightieth of an inch in diameter, and is in what we have already called the umbonal stage.

Fig. 4 is the same, showing the umbonal cap as seen from the inside of the shell.

Fig. 5 shows the three notable stages in the growth of the shell. First, the perfectly symmetrical stage attained by the valves of the fry or larval oyster; second, the asymmetrical stage of the "spat;" and third, the asymmetrical form of the shells assumed by the adult. In the fry *ls* both shells are equal. A section of the "spat" is unequal; *Rs*, the right shell, is concave within, and convex without, while *Ls*, the side attached to the rock *B*, is flat, conformably to the object to which it is affixed. The contrary facts exist in the adult shell; *Rv*, the right valve, is very flat, and *Lv*, the left valve, is concave within, and convex without. The muscle, *Mus*, shows progressive changes of place, also the ligament, *lig*, and both movements are in the same direction.

PLATE III.

Fig. 6 is a cross-section of a bank of "stick-ups"—oysters growing in a vertical position in St. Jerome's creek. Oysters taken from such beds come off in adhering clusters, as shown in Figures 7 and 8. Fig. 7. *a*, *b*, *c*, *d*, represent four generations—*a*, the oldest, are dead shells, *d* and *e* are young spat, *e* having fallen down an opening in the cluster. In Fig. 8 we see evidence of a struggle for existence—the adult *b* and the spat *c*, each by the curved umbo, or beak, showing its efforts to get the free-ends of the valves, that is, the "nibs," uppermost; and the strange effort of *a* is seen trying to curve round the one above it.

Fig. 9. A larval oyster, or "fry," artificially raised. The smaller one is the natural size, and the other one much enlarged. It is supposed to have been attached to its rock seven days, and is interesting as being already as large as a European oyster, figured by Möbius as being one month old. It shows the extraordinary growing properties of the American oyster.

Fig. 10. Natural size, supposed to be not over twenty days old.

Fig. 11. Known to be not over forty-four days old.

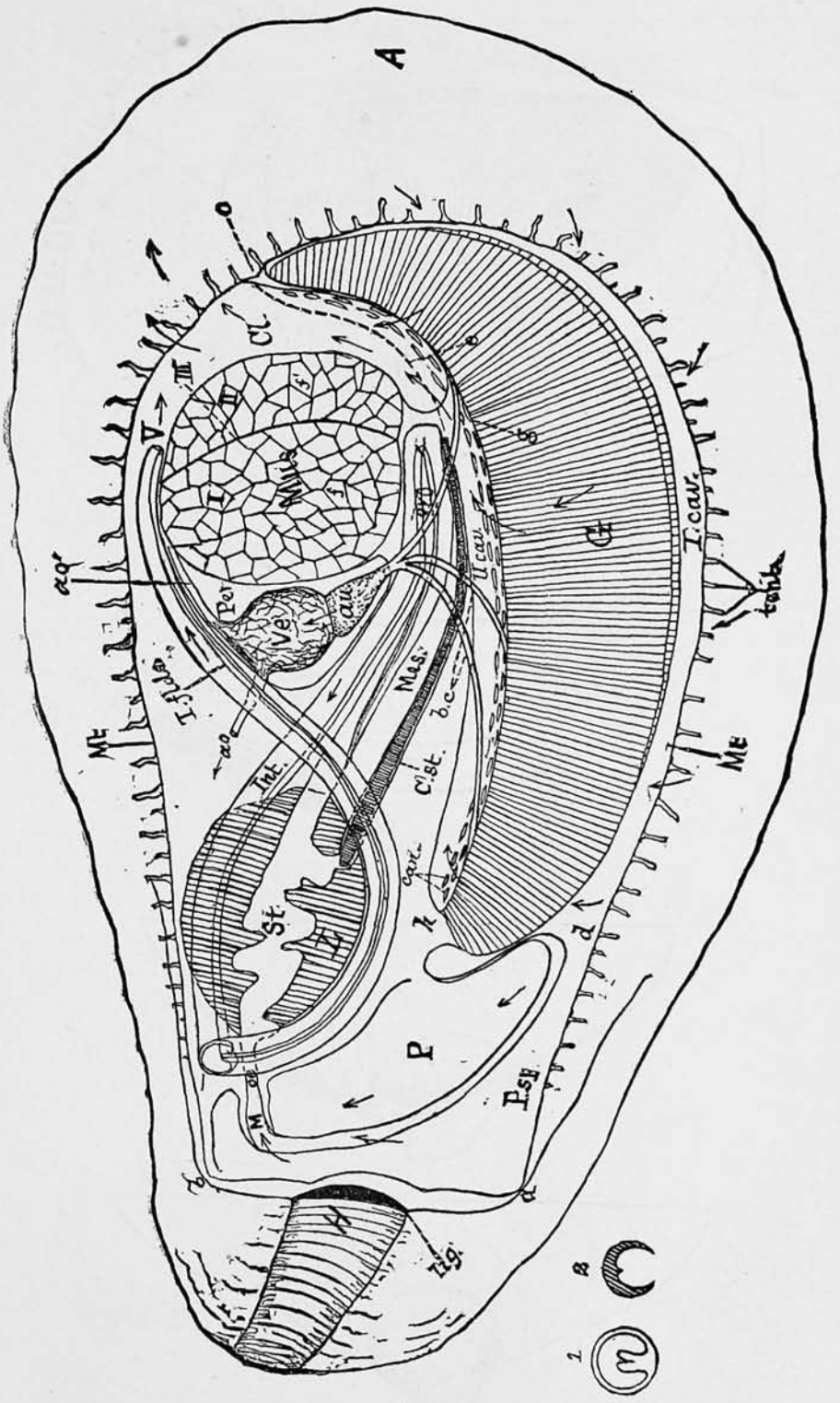
Fig. 12. Not over forty-five days old.

PLATE IV.

Fig. 13. An oyster seventy-nine days old. Fig. 14 is eighty-two days old. There is no assignable reason for its elongate form and twisted umbo, it being the only elongate form among many round ones, all growing upon the same attachments.

Fig. 15 is interesting. It was known to be between two and one-half and three months old, and was taken from the inside of a wreck at Cape May, N. J. It shows strikingly the growth capacity of the American oyster. The European oyster is scarcely larger than this when taken to market, and is then about two years old.

PLATE I.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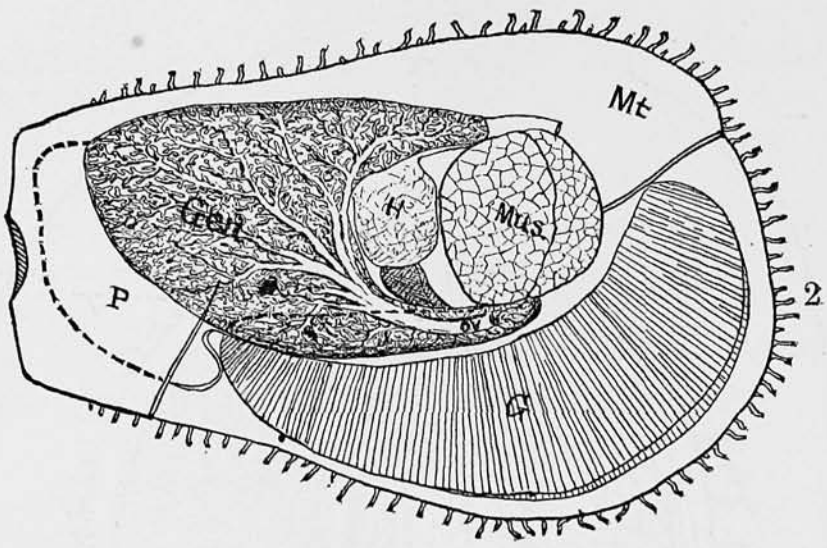
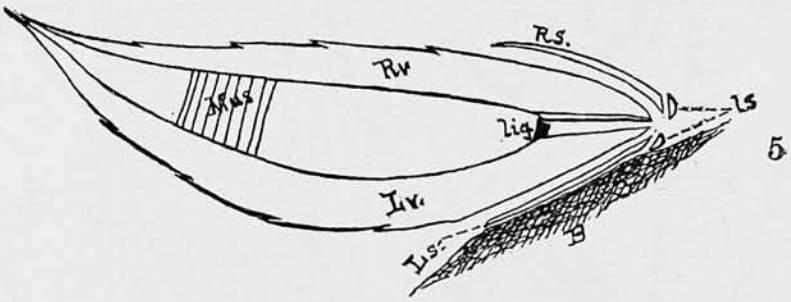
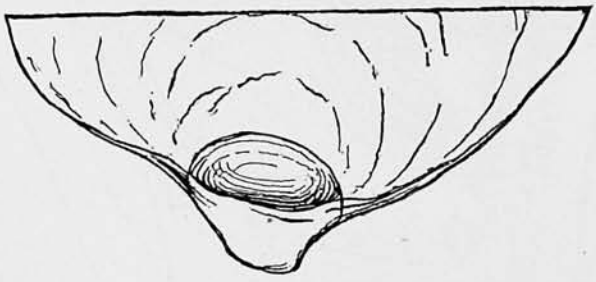
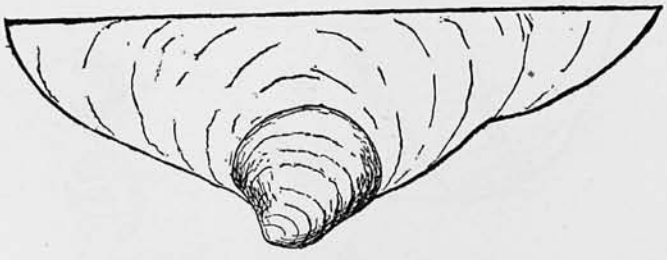
1.

PLATE II.









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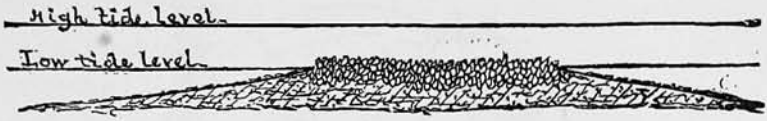

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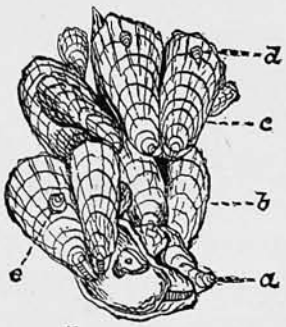

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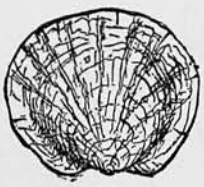

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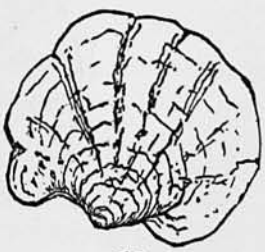

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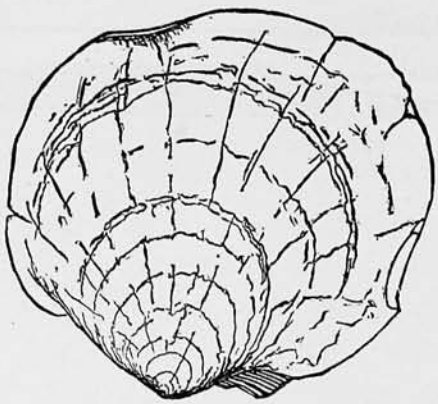

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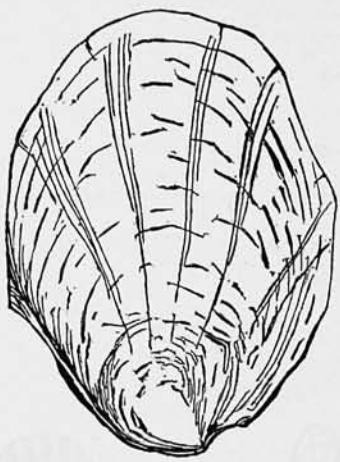

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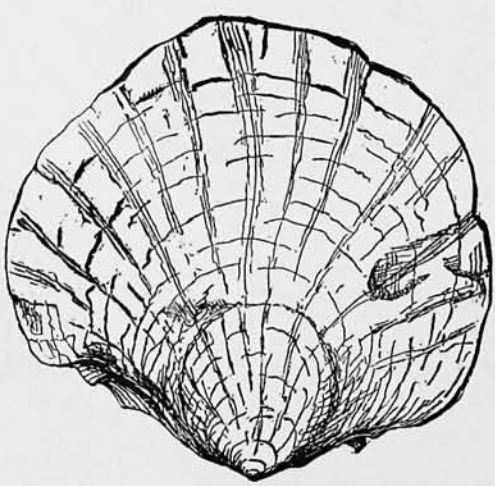

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6. THE OYSTER'S FOOD.

The general microscopist knows well how rich in microscopic forms of life is the muddy bottom of a pond. His instrument reveals to him innumerable living things, both vegetal and animal. Diatoms, desmids and those minute algæ, which sometimes appear as green slime, and their infinitely small sporules. On the animal side are the spongillæ, with their gemmules or eggs, the ova of polyzoa, the rhizopods, and tiny crustaceans. These make the rich food on which the unios, or mud mussels, become so fat. As these objects are practically unrecognized outside of scientific quarters, they have no popular names, but when spoken of at all, are thrown into one almost unmeaning term, "the animalcules."

As with the fresh water so it is with the sea—a muddy bottom is rich in these tiny forms of life. The soft clam, *Mya arenaria*, is a gross feeder. Unlike the oyster, it swallows mud and all; hence the cleanly cook always eviscerates it. I have taken from a single stomach the siliceous skeletons of diatoms by the thousands. There is probably no bivalve so nice about its victuals as the oyster; and the beauty of the forms which constitute its diet is simply exquisite and incomparable.

Experience has shown that the richest oyster grounds are those with from one to three inches of mud, or not too deep and soft to smother the animal. Other considerations are suitable depth, density, stillness, and temperature of the water, for these being right, the animal has its best fattening conditions. But a shifting of the surface may happen, and smothering ensue. The oyster may be badly affected by some untoward condition at low tide line. Here is grown considerable feed, which the high tide catches and the ebbing tide carries out to the bivalves. The spores of the shore-line and shallow-water algæ, or sea-weeds, the red, the olive, and the green, the first-mentioned being the soonest to decay. But decaying sponge and algæ are not only malodorous, but unwholesome. The spawning season covers the r-less months, and coming out of them the spawning oyster is emaciated and watery. In New Jersey the close of August and the first week in September are apt to have a few muggy days of steamy heat. It was at this time last year that a bottle of water was sent me from the Shrewsbury River, with the request to tell what ailed it, as "the red water" was making the oysters sick. It was in too bad condition

for sure determination, since decay of its contents had gone so far as to give it a very offensive smell. I detected with the microscope the presence of an extremely minute unicellular alga. It was of a rusty red color, but doubtless before death it was of a pretty rosy hue. I at once suspected it to be the dreaded object which during the few muggy days here spoken of, at the "cod saltings," makes the fish become red and imparts a tendency to rapid decay. During the heat of summer it often covers the flats at low tide with a film of reddish slime, but in the damp, hot days it will decompose and impart its color to the water. It has a cousin which sometimes taints the fresh water, giving it the dreaded "pig-pen odor" too often known to the water supply of cities. Nor will it gain friends when introduced to our readers by its fearfully hard name: *Clathrocystis roseo-percicina*, Henfrey.

The finest natives have a creamy color. I have heard an oyster-man, when praising some "naturals," say: "They were just as yaller as goold!" I think this comes of abundance of vegetal food, such as single-celled algæ, and algæ spores generally, but especially those of the red weeds. As green oysters are highly prized in France, the oyster culturists find no difficulty in producing them. It simply requires that they be planted where green food abounds. With us the "green gills" are not hankered after.

As to the "green oysters," they occur both abroad and at home, and from the same cause. Dr. J. A. Ryder, in *American Naturalist*, January, 1883, repeats what he had previously stated, that this coloring, though it may be caused by the nature of the food, is not caused by the simple presence of the granules of chlorophyll, the green matter of plants. He says: "It is now well established that *Ostrea Virginiana* is affected in precisely the same way as *O. edilis* (of England) and *O. angulata* of the Tagus. The coloration is *unquestionably* due to a tinction or staining of the blood cells of the animal, or else may be a hepatic coloring principle, which through some derangement * * * has been dissolved * * * and taken up by the blood cells."

Professor Brooks holds that an oyster community never perishes from want of food simply. Here, as elsewhere, the problem is complex. He contends that long before the food gives out they may become reduced by other conditions. Example: the want of some especial ingredient in the food, as when a crop on a farm may fail from some

especial defect of nutriment in the soil, when it is observable that the young plants will grow awhile and stop. But on this point we have no knowledge. The laboratory has made no nutrimental analysis for the oyster, such as it has for corn. It may be that the good effects of "shifting" have to do with this special local exhaustion, acting as an appetizer to the bivalve.

Oysters need lime for their external skeletons as we do for our bones. The ocean contains it in solution, and in inexhaustible quantity. As the oyster shells when old yield to the action of the water, it has been observed that the young fry grows better on old natural beds. Even with all things favorable, the growth of meat and shell does not always keep pace in proper proportion, for the shell should have a solidity at every stage enough for its wants. The following from Ingersoll was told in my presence:

"Captain Benjamin Decker relates that some years ago he had a strange experience in this direction: a bed of oysters, which he planted at Keyport, doubled their size in a single month! 'I sold these oysters in the New York market,' he says, 'and they sold well. The shells were so thin you could see the light through them. They beat anything in the market. The growth was wonderful. I sowed them thin and yet they choked one another. I should think at least half of them died from this cause.'"

It does happen that these rapid growers may be plump, yet of poor flavor, and yet become first-class on being planted on other ground. In fact, even with the Virginia plants the oysterman has found, like the skilled gardener, that taking up and replanting in another bed is of great advantage to the bivalves, and pays, although the process exacts time, labor and expense, so that the practice of "shifting," as it is called, is quite general.

Further discussion of the items of an oyster's bill of fare might prove to the general reader as unintelligible as a French menu, since it must be almost as technical. Besides, we have not yet attained such knowledge on this subject as is of much practical worth, for though we can raise the fry from the egg, we don't know how to supply the baby oysters with food, except by setting the fry adrift in a supposed favorable place, which is really to expose it to imminent peril of life.

When the oyster is considered sufficiently grown for market, which too often is at three years old, whereas it should be prime at five or six years, it is taken up by dredge and tongs from its salty home and is

given a "drink," the meaning of which is that the skiff-load is thrown into a fresh water or tidal creek. One tide is sufficient, though some give them two; and the effect is quite surprising. After this fresh-water bath of a few hours, they are taken up again and sorted into three or four sizes or qualities—cullings or cullinteens, culls, box and extras. The effect of the "drink" is two-fold—cleansing and "fattening." Of course the latter cannot be literally true, but it is apparently so. The oysters are whitened and bloated. They have taken the fresh water into their tissues as well as viscera. When thrown into the creek they were imbued with a marine fluid of heavier density than the fresh water, so that by the operation of osmosis the fresh water penetrates the tissues of the flesh and literally bloats or puffs up the animal. Though less disgusting, in effect this practice is not unlike that of the butcher who "blows" his meat.

7. THE OYSTER'S COMPANIONS.

A choice word borrowed from old Chaucer, and long of fair repute among good writers, has at last become obsolete. This is the word "commensal," by which the poet meant one feeding at the same table. Disallowed of rhetoric, it is now adopted by science. The old naturalists made no distinction between the innocent co-dweller and the harmful entozoon. In a general way the former we may call commensals, and the latter parasites. Says Woodward, speaking of the great Mediterranean mussel: "A little crab which nestles in the mantle and gills of the Pinna was anciently believed to have formed an alliance with the blind shell-fish, and received the name of Pinna-guardian from Aristotle." It was thought the little thing kept watch with its sharp eyes, and warned its host of any approaching danger, who at once would shut up its establishment until the peril had passed over.

In like manner our oyster has an intimate and familiar friend, a certain dapper little fellow in a scarlet jacket with trimmings of gold. From its size and form it is sometimes called the pea-crab; but, from the fact that it is only found in the oyster, it is properly known as the oyster-crab. Fishermen have insisted to me that it was the young of the edible crab. No naturalist, not even a tyro, could make this mistake. Say named this little crab, *Pinnotheres ostreum*. Usually it is the female that one finds in the oyster. The male is much more rarely

met with, and is smaller than the female, and of more sombre coloring. A dull brown is the predominant hue, though the legs are white. On the back is a figure remarkably like an anchor, done in white. But the history of the oyster-crab is imperfectly known. This pretty little crab is a harmless commensal. Whether it is always welcome by its entertainer we cannot say, but this is sure, Pinnotheres has always been known as the oyster's bosom friend. Some oystermen assert that this little crab is an enemy, and its presence injurious. The professional "shucker," that is oyster opener, who has taken any note of things, knows that, as a rule, the crab domiciles only with an oyster in good condition; and an old observing oysterman tells me that he regards their presence as a good sign. Major Ferguson gives reasons for supposing that *Pinnotheres* is a benefactor to the oyster, having seen one with a colony of the bell animalcule, *Zoothannium arbusculum*, upon it. This colony would feed the oyster and crab, as it propagates with great rapidity.

Algæ, or sea-weeds, sometimes anchor to the bivalve, and thus adorn it with their fronds of olive, ruby, and emerald, while the spores which rain from them are as manna to the oyster. The elegant red sponge, *Microciona prolifera*, Verrill, with its clustered lobes, almost like chalina, is sometimes found perched on the upper valve, like a great showy cockade. When, many years ago, before the Southern oyster was planted North so generally, they used to take up the rich "naturals" around Bedloe's Island, this beautiful native sponge was often found in great tufts as large as a peck-measure. The oystermen called it "red-beard;" and often might be seen, at the door of an oyster-saloon in New York, a heap of choice oysters, surmounted by a grand specimen of this red sponge. This sponge often renders a singular service to some fine old bivalve sinking with the weight of years into the rich organic ooze. It actually buoys it up, and rocks it, so that the under valve sometimes becomes white and bright with the gentle friction.

In the crevices made by the lapping shoots on the upper valve, like tiles on a roof, are often found tiny univalves, sharing in the crumbs of the banquet on which the occupant of the great house feasts. I have often with a penknife pried them out of their hiding-cracks, although much smaller than a grain of rice. It is many years ago, and I think the species was *Odostomia fusca*, about an eighth of an inch in length. Very singularly I have found in a specimen of the

most ancient fossil oyster in the New Jersey marl, or Cretaceous formation in Monmouth county, a commensal strikingly like one I have found in the native oyster at Keyport. It is a small Pholas, or burrowing bivalve, a little over a quarter of an inch in length, the *Diplothyra Smithii*, Tryon. It makes a slanting burrow into the solid part of the oyster's shell, then lives quietly in its pearly cave, feeding on the general supply as it comes along. It certainly is interesting to find that ancient oyster, the *Pycnodonta vesicularis*, having a commensal so similar in size, form and habit to that which is found in the shell of our living oyster. It does not appear that this little pholas is harmful, though, if numerous, it should be, as it would honey-comb the oyster shell; yet, according to Ingersoll, in California some allied species have a bad reputation: "On the Pacific coast *Gastrochæna*, and various pholadiform mollusks are a great bane to the oyster-beds, they penetrate by digging burrows wherein their whole shell is lodged. Large numbers of these, with the help of boring-worms and sponges, may so riddle a reef as to cause its entire disintegration."

Often on the upper, that is, the right side, of the valve of the oyster, may be seen some very small holes. These, if the solid shells be broken with a hammer, will be found to be the entrances to burrows of about an eighth of an inch in diameter. In these live, each in its own chamber, a small burrowing bivalve. It literally bores in advance, so that the tunnel ahead is conical in form. This calcareous meal thus made is the animal's food. Whether hurtful or harmless to the oyster I cannot affirm. Doubtless when in great numbers it is injurious. Perhaps, we may regard it as neutral, since it can hardly be considered helpful.

The oyster serves for anchor to many species of *Polyzoa*, or as the old name was, *Bryozoa*. Often, if examined closely, an oyster-shell may be found partly coated with a delicate net-work, as if some fine Valenciennes lace had been cemented thereon. These are the skeletal cells of the *Bryozoa*, or animate moss; for, though like moss somewhat, the little builders are living creatures, and, under the microscope, a bit of a living bryozoan patch would look like a bed of animated daisies; for these tiny flower-forms are in lively motion fishing for their infinitessimal prey. There are several arboreal or tree-form species of these *Polyzoa*. Hence the oyster is literally embowered in a substance that looks like diminutive trees. Its color varies from a reddish to a very pale brown, almost gray. The oystermen call it

"gray-beard." Shore-visitors often pick up tufts on the beach, and press them for sea-weeds. They are really the skeleton structures of a remarkable zoophyte, the Sertularia. We have an elegant species that grows upon the oyster in salty waters, named *Sertularia argentea*, because, when shore-bleached, it is often so white and glittering that it looks almost like silver. These I have found sometimes sixteen inches high, making, when supported in the water, the most exquisite gossamer-tree. But it is no tree or plant proper. Their substance is chiefly lime. They might well be called sea-ferns. When magnified, living specimens show what might be mistaken for little buds. If the microscopist is skillful and patient, he will see a little starry object like a flower push itself out of one of these buds, which is really its case in which it lives. It may be seen waving its little life-petals about, catching food. The sertularia buoys up the oysters, as does the red sponge. And one may readily conceive how the animalcules must swarm in these gossamer-like forests or groves, so that not only the zooids but the oyster also enjoys the richness of the fishing-ground. In this respect they are mutual helps, and I think it would be found on investigation that those are good feeding grounds where these bryozoa and branching sponges abound. Of this beautiful hydroid, five species have been made out for the Eastern States north of Virginia, of which three have their southern limit in the marine waters of New Jersey, and extend thence to the Arctic seas.

Small, limey contorted tubes are often found adhering to the oyster; in fact their animal occupants have built them on the oyster's shell. The constructor is a worm, but, for all that, a creature of surpassing beauty. Its name is *Sabellaria vulgaris*, Verrill. In company with this, another little being builds a tubular home on the oyster. It is a small serpula or serpent-shell, and is called by Verrill, *Serpula dianthus*, the pink serpula, because, when the little dweller therein projects its tiny florets, in form and color it suggests the pink of our gardens. But there is projected by the side of that pretty little pink, a curious, funnel-shaped process, that looks like the tiniest kind of a trumpet. I have watched those pretty creatures with their floral heads out fishing. Let the slightest jar be given, and the little thing takes alarm and instantly withdraws into its stony tube: first the floral head disappears, then the trumpet-like structure is drawn in, which actually plugs up the entrance. I have a strong suspicion that these tiny serpents do catch an occasional oyster egg. The oysterman does

not like them much; he says they roughen the shell and make it hold mud, or, as he expresses it, "It hairs up the oysters."

If a pile of oysters be examined soon after leaving the water, especially if taken off a pretty clean bottom, a number of specks, about a quarter of an inch in width, may be seen adhering to the oyster, chiefly the upper side. They look like grease-spots, or small lumps of jelly. They are little Actinias or sea-anemones, collapsed and perhaps dead. Alive in the water these are pretty objects, having a disk of a flower-form, with an orifice in the centre which opens into the animal's stomach, and which is really its mouth. Such, then, is something of the oyster's environment. With such surroundings, so much of beauty, with a piece of Nature's humor, just enough to make this beauty true and pure, on the principle that a person is known by the company he keeps, the oyster might be set down as an individual of varied and refined tastes.

Still, I fear that a little farther on I may feel constrained to speak less favorably of ostrea's flowery friend, Actinia.

For want of space a number of the oyster's messmates must be passed by. It is evident that not all of the oyster's companions are true friends. There is an outsider, among the birds, which renders this bivalve true service. The black scoter, surf-duck or coot, as it is variously called, has the scientific name *Fulica Americana*. The Connecticut Commissioners say these birds frequent the waters of the Sound in great numbers and feed on the star-fish. As many as twenty small stars have been found in one crop. As these birds are worthless for food, why not give them legal protection?

These birds, known as the hunter's nuisance, are gross feeders, consuming many small mollusks; hence, in all probability, destroying numbers of the boring snails, should have special protection from oystermen.

We come now to a less pleasant but equally interesting topic.

8. THE ENEMIES AND PERILS OF THE OYSTER.

THE WINKLE.—We have two large spiral shells variously known along the coast as conch, winkle and periwinkle. The first one has a whirl of "horns" on the keel of the spire, and the last one has a depression or canal around the spire. The fishermen have told me that "the horny one is the he and the grooved one the she conch." There is no truth in this, since the two animals do not even belong to the

same genus; hence their natural relationship is as widely apart as that of a he tiger and a she wolf. The one with bosses on the whirl is the *Fulgur carica*, and the other the *Sycotypus canaliculatus*.

As to the method of the assault made by the conch on the oyster, I cannot do better than simply to give Mr. Ingersoll's account:

> An examination of a specimen will show that in both species the muscular part is large and strong and the mouth powerful. The food of the conch being mainly the flesh of other mollusks, its method of killing them is one of brute strength, since it is unprovided with the silicious, file-like tongue, by means of which the small "drills" set at naught the shelly armor of their victims. The conch is a greater savage than this. Seizing the unfortunate oyster, unable to run away, he envelops his shell in the concave under-surface of his foot, and, by just such a muscular action as you would employ in grasping an object in the palm of your fist, crushes the shell into fragments and feasts at leisure on the flesh thus exposed. Where oysters or other prey are abundant, this operation is quickly repeated and vastly destructive. One planter in the upper part of Buzzard's Bay, where this pest is very troublesome, told me that one winkle was capable of killing a bushel of oysters in a single hour. They do not confine themselves to oysters altogether, of course; any mollusks or other marine animals, sluggish and weak enough to be caught and broken up, suffer from their predacity. I was told in New Jersey, by an intelligent man, that the conch would even draw the razor-shell out of his burrow and devour it. If this be true, no doubt the soft clam also falls a victim to the same marauder. The oyster beds most subject to attack and harm by the winkles and conchs are those planted in water which is quite salt.

DRILLS.—There are several species of mollusks, varying from forms very diminutive to the sea snail, which is quite large, that have the reputation of boring into the oyster and killing it. "They are called 'white snails,' 'snails,' 'drills,' 'borers,' and 'snail-bores,' and belong to several species of *Natica, Anachis, Astyris, Tritia, Ilyanassa*, etc.; but the master and most destructive, as well as most abundant of them all, is the little *Urosalpinx cinerea* of Stimpson. This is the common 'drill' of the oyster beds; and it is its eggs, laid in small vase-shaped capsules, which are often found attached in groups to the under surfaces of stones. Several of the small mollusks mentioned above lay eggs in this way, but the drill's capsules have very short stalks, or are almost sessile, and are compressed with an ovate outline, while angular ridges pass down their sides. The natural home of the drill is the tide-pools and weedy borders of rocky shallows, where barnacles, hydroids, anemones, rock-loving limpets, and other associated forms that find shelter among the algæ, afford it abundant food. Though this is precisely where the mussels grow till the rocks are

almost black with them, it is said that they are never attacked by the drills."—*Ingersoll.*

As to the way in which the drill effects its burglarious entrance into the oyster, perhaps I cannot do better than to reproduce in part my published description written in June, 1873:

Urosalpinx cinerea is a small univalve, seldom over an inch in length, which is justly chargeable with murderous assault on the oyster. It is a very pretty shell. The tongue is set with three rows of teeth like a file; it is, in fact, a tongue-file, or dental band, and is called, by conchologists, the lingual ribbon. This tongue-file is perfectly flexible, and with this it drills a hole through the hard shell of the oyster. Owing to the fact that, when using this dental ribbon, the broadly-spread pedal disk hides it, the exact method of the operation is concealed. Having with the utmost care witnessed the creature a number of times in the burglarious act, I give the following as my view of the case: With its fleshy disk, called the foot, it secures by adhesion a firm hold on the upper part of the oyster's shell. The dental ribbon is next brought to a curve, and one point of this curve on its convex side is brought to bear directly on the desired spot. At this point the teeth are set perpendicularly, and the curve, resting at this spot, like the point of a drill, is made to rotate one circle, or nearly so, when the rotation is reversed; and so the movements are alternated, until, after long and patient labor, a perforation is accomplished. This alternating movement, I think, must act favorably on the teeth, tending to keep them sharp. To understand the precise movement, let the reader crook his forefinger, and, inserting the knuckle in the palm of the opposite hand, give to it, by the action of the wrist, the sort of rotation described. The hole thus effected by the drill is hardly so much as a line in diameter. It is very neatly countersunk. The hole finished, the little burglar inserts its siphon or sucking-tube, and thus feeds upon the occupant of the house into which it has effected a forced entrance. To a mechanic's eye there is something positively beautiful in the symmetry of the bore thus effected—it is so "true;" he could not do it better himself, even with his superior tools and intelligence.

There is no doubt that the urosalpinx attacks the spot or blister oysters. Capt. J. O. R. Brown, an experienced oyster planter at Keyport, has furnished me with oyster spots not more than a few weeks old, which were killed by a borer. These shells were about three-fourths of an inch across, and the holes were very small. I do not

think that the common drill effected this, but believe it to have been done by some much smaller species of the *Muricidæ*, perhaps the pretty little *Ranella caudata*, which I have often collected in Raritan Bay.

MUSSELS.—An enemy more to be feared than despised is the edible or black mussel. Its growth is rapid, and it is mature at one year old. This is the *Mytilus edulis*. I used to find in former years considerable numbers of the Southern mussel, *Mytilis hamatus*, and had my fear that they would get naturalized in New Jersey waters. They were brought here on Virginia oysters, and like them, it seems that they do not propagate north of their native waters. The black mussel has a byssus, or bunch of strong threads, by which it attaches itself to an object, and when they unite in large clusters they bind themselves together. The French turn this point to advantage and sow mussel-fry, about as big as sunflower seed, on spots which they desire to strengthen against the action of the sea. Hence, should they gather on an oyster bed, they will so web the bivalves that they cannot open and must die. I am unable to tell the paper which gave the report from which the following is extracted, except to say it was a New York journal, and the time was last fall:

Prince's Bay is seriously threatened with a scarcity of the bivalves. These oyster grounds are about seven miles long by five wide and cover about thirty-five square miles. Of these, from the Light to the Gray Kills, a distance of three miles, and from the shore to the South Channel, also three miles, the beds are badly infested with mussels. Over this nine square miles the mussels "set" and are starving the oysters so that they are dying by thousands. The owners of the grounds are moving their oysters and trying to rid them of the mussels, but they are unable to do very much. Mr. J. M. Sprague, an oysterman, said: "I am afraid that those of us in the infected district will lose more than half our crop. These mussels do not come every year, although there are generally a few of them to be seen. When they come they 'set' on the back of an oyster, or the part of the shell which opens, and grow there in bunches. The result is that the mud covers the oyster up, so that it strangles. It cannot feed."

"What do you do to stop them."

"All we can do is to take the oysters up and transplant them after cleaning them. But this does not do much good. They die too quick. I know some men who have planted six hundred baskets, and who will not get more than that number back."

Mr. Wm. Manee, who has been in the oyster business for a great many years, said: "I never saw as bad a year for mussels as this one. When we plant the seed we put it down on the mud or hard bottom. This year the mussels have attacked all of the oysters on the mud. There does not seem to be any rule for these attacks of mussels. Some years they come and some they do not; sometimes they go to the mud and sometimes to the hard bottom. When they first come they are little white specks about the size of a small pin-head. They fasten themselves by a kind of hair

to the oyster and then set on the beak. They are like the oyster spawn—they will not set or fix themselves on anything which is not clean. When they grow about as big as your thumb nail, they hold the mud between them, and the oyster cannot open its beak to eat. They are about the worst enemies the oyster has."

"Will the crop here be very much diminished?"

"I do not know how much, but it will be a great deal smaller than it was last year. Last year was a splendid year for oysters. Everybody made money."

Fishes.—There are several species of fish which are destructive to the young oyster, and some of these seem wanton in their destructiveness, killing many more than they eat. Could we hit on just the right time, I would say let us visit one of those orderly communities in oysterdom, known as a bed, or planting ground, or more properly a plantation. Supposing, then, the right time to be chosen: We are seated in a boat, and, gliding through the phosphorescent sheen, soon near the oyster-bed. It is a moonlight night, about the close of summer. Hark! what singular sound is that? Boom! boom! boom! Almost sepulchral, and, strange to say, it comes up from beneath the waters. One would think they were Nereids' groans. The oystermen, whose capital lies invested there, hear it with sad forebodings of loss, which they cannot well sustain. It is one of a school of visitors who come with marauding purpose. The fishermen call it the big drum. This drumfish is known among naturalists by the name *Pogonias chromis*. The acknowledged beat of this scamp is the Gulf Stream, from Cape Cod to Florida; and a terrible fellow is this Pogonias, for he is recorded as having attained the great weight of eighty pounds. One of twenty-five pounds would be but an ordinary affair. Their mouths are furnished with pavements of hard teeth, a little rounding on the top, and set together exactly as are the cobble-stones of the old city highways. The function of these dental pavements is to crunch the young oysters, which, after being crushed, are thus swallowed, shells and all.

Happily, these terrible visits do not often occur in New Jersey. I think it was in 1851, that a school of drums destroyed, at Keyport, $10,000 worth of oysters just as the crop was ready for market. "One planter of Keyport lost his whole summer's work—material and labor—in a single September week, through an attack by drums. A City Island planter reported a loss of $10,000 in one season a few years ago." Says Ingersoll, who also mentions other fish enemies: "When drums are absent, various other carnivorous fishes prey upon

oysters, such as the tautog, sheepshead, toad-fish, members of the cod family (if any of them ever get near a bed, which is rarely at present,) and the skates or rays. Of all these *Trygon centrura*, the sting-ray or "stingaree" of the fishermen, is the chief. He is always present and steadily at work along the whole coast. Lying flat on the bottom, he works his triangular flippers until he has washed away the sand from about the oyster he wishes to seize, if it is at all concealed, and then crushes it between his powerful jaws. Even clams do not escape his sagacity in capture and strength of mastication, but are devoured in great numbers. A dredge can hardly be hauled from New Jersey to Cape Cod, without bringing up one or more of these enemies of the hard-working oysterman."

It may be said, as a rule, that predaceous fishes are wonderfully endowed with facilities of mastication and digestion. The Gillaroo trout of Ireland has a gizzard, and I saw at least a gill of univalve mollusks which were taken from one of these fish. Says Pell: "The digestive apparatus of the sturgeon is simple and complete, and is capable of secreting gastric juice very rapidly, and in great abundance. To prove this, I killed one five hours after he had swallowed a frog, but there was nothing remaining of it in his stomach except two small bones." Like the owls, which vomit what they cannot digest, the fishes evict indigested shells at the mouth. My belief is that the devil-fish, or squid, and other unsuspected inhabitants of the deep have capacities for mischief upon oyster beds. The sea-wolf, *Anarrhicas lupus*, is not the only destroyer of the lambs. But may it not be that Nature knows no *unmitigated* evils? Sometimes a serious want of the growing oyster, especially the young, is calcic pabulum, that is, lime in the right condition for its use. Although these rapacious fishes throw up much indigested shell, yet, owing to the action of the gastric juice, they return a good deal of shell substance to the water in a solvent state.

The Sea-Star.—This is the most insidious foe the mollusk has. Raritan Bay has hardly been troubled with the star since the closing of the inlet, which a great many years ago made an island of the peninsula of Sandy Hook. Shrewsbury River, also, has upon occasion thus been invaded, when the sea has broken through. Our coast has two species of the sea-star, the *Asterias arenicola* and *Asterias vulgaris*, and, as the latter favors a more northerly latitude, it is the former that is known chiefly to us. Its method of destroying the oyster is

described as being done with the hard collar or ring which surrounds the oral opening at the centre of the rays. Grasping the thin nib by clasping the rays upon it, the star breaks it off in little crumbling bits by pinching it with the collapsing ring. An entrance effected, it everts its stomach sack, pushing it between the valves. The inner membrane which lines the stomach is the digestive surface, and this is brought against the flesh of the oyster. There evidently is an absorbing effect. The sea-star will, if not disturbed, keep on squeezing itself in until its rays are brought back to back, and its whole body is forced into the bivalve, and it becomes thoroughly gorged. Where the star gets control, the mischief is very serious. In Long Island Sound they do enormous damage to the oyster, probably not overestimated at $200,000 a year. A steady increase has been observed in their numbers, where oyster cultivation has been carried on for any considerable length of time.

There is something almost preternatural about this singular animal. It aggregates in immense balls, not in platoons, but in this wise it moves, or gets moved towards the scene of action, a living avalanche. Old oysterman speak of them with a shudder. The fearful "five-finger" is literally a terror. Away from the scene, few except fishermen can realize the true significance of the following dispatch:

GREENWICH, Jan. 12th, 1883.—Star-fish have appeared in great numbers on the oyster beds in our harbor and other places along the sound shore. The oystermen are greatly alarmed, as these fish, if allowed to remain, soon destroy the bivalves. Many oystermen have been busy for weeks taking the fish from their beds. The famous Bridgeport natural beds have been attacked by the pest.

The last report of the Connecticut Commission on Shell Fisheries dwells upon the inroads of the sea-star with painful interest:

It is not infrequent that losses fall upon the grower as sudden and unexpected as they are ruinous. Thousands of bushels of oysters in one patch have been destroyed in a week by the star-fish. A well-known firm recently lost twenty thousand dollars' worth of oysters in one bed—ate up by these marauders. Another firm has in like manner in the last two years lost one hundred thousand dollars' worth in the same neighborhood, off Charles Island. These creatures seem to move in bunches, and when they reach a bed they unfold and proceed in every direction to eat up the crop. The more intelligent oystermen claim that with proper dredging these bunches may be discovered, and the star-fish caught before they spread out to feed. One of the best-informed growers in the State struck an immense bunch a few days ago while hunting for them on his grounds, and in a short time gathered seventy-five bushels of

stars! By careful hauling he prevented the rest from spreading out, and so saved his bed, which, he says, would have been cleaned out in four weeks.

Another animal foe to the oyster bed is a bipedal being, that, if not so destructive, is more irritating and vexatious than the "five-finger," or star. This is the "ten-finger," or oyster-thief. There is but one way to deal with this bipedal foe, which is to set a locust star upon his tracks, and when caught incarcerate him. One planter at Perth Amboy wrote to Mr. Ingersoll that "in spite of all vigilance and paying watchmen, we lose all around about 10 per cent. every year by thieves."

These oyster thieves are a great grievance in Connecticut waters also. Says the Commission: The Oyster Growers' Association recommend the appointment of an oyster police, consisting of four or six capable and trustworthy men, whose duty it should be to patrol the grounds in row-boats—two to each boat—to prevent depredations and to arrest trespassers. The Commissioners seem to think the expense would be too great to warrant the undertaking at present.

CRABS.—The largest crustaceans are terribly destructive to the young oyster especially. We have at least four species which attain large size and have much capacity for mischief. The *Platyonichus ocellatus*, or Lady-crab, so called from its gay colors; the *Cancer irroratus*, or Spotted-crab, which loves sandy shallows; the *Libinia canaliculatus*, the Sea-spider, or Spider-crab; and worst of all is the common edible crab, the *Callinectes hastatus*, which when shedding becomes our common "soft crab." From its habits and numbers this crab is the most dangerous of its tribe. It can live in deep and dense sea-water, and it can ascend the creeks into the almost fresh water with impunity, hence it can go wherever the oyster can live, which the other crabs cannot do. The numbers of the edible crab are often very great, and, at times, an inroad of this foe means general desolation. Even in this cold January, 1883, we read in a local paper: "Three thousand crabs were caught in a day and a half at Sandy Hook, by parties from Keyport last week."

THE SQUID.—According to Ingersoll, squids play a strange role. "In the Delaware Bay the spawn of squids, in the shape of clusters of egg-cases, appropriately called "sea-grapes," often grows on the oysters so thickly, during the inaction of summer, that when the fall

winds come, or the beds are disturbed by a dredge, great quantities of oysters rise to the surface, buoyed up by the light parasitic "grapes," and are floated away. This is a very curious danger." I have collected this singular squid-spawn in Raritan Bay, but it is never there in quantity enough to be serious.

SEA-ANEMONIES, OR ACTINIAS.—I have often seen the shells of fresh oysters speckled as if with drops of tallow. These were collapsed actinias, which, when living in the water, with their expanded rosettes of long waving tentacles, were very pretty objects. I have watched them for hours at a time moving those singular organs in seemingly mystic or aimless motion in the water. It was far from aimless. Each one sent forth invisible looped threads, or lassos, switching into its central maw the invisible prey. Though not of serious harm to the mother oyster, yet in the spawning season the actinia has a fine hunting ground, and without doubt, devours large numbers of eggs, and the minute larval fry. Dr. Ryder, the translator of the recent paper on *O. edulis*, by Dr. R. Horst, of Utrecht, says the Dutch scientist "found that the sea-anemonies, or actiniæ, such as are commonly found on 'oyster-beds, destroy large numbers of fry."

INJURIOUS SPONGES.—The Red-Beard, or branching sponge, has been mentioned as a messmate or commensal of the oyster. This sponge simply uses the oyster as an anchorage, or place of attachment, and as already shown, its presence, as we think, is of welcome service to the mollusk. But there are parasitic sponges, whose presence like the human sycophant, is an intolerable nuisance. One especially must be mentioned as a common pest, the *Cliona sulphurea*, of Verrill, which is very pretty, but very pernicious, for it eats into oyster-shells. The shell will become so honey-combed with perforations in all directions, by this or some other cliona, as to cause it to exfoliate and go to pieces, as if it were rotten. Although hard on the oyster, these boring sponges serve an important function in marine economy, for by devouring and disintegrating shells, dead and alive, they help to prevent the formation of reefs in the mouths of rivers, and in the sea, besides returning the disintegrated carbonate of lime to the water in condition for solution again. Their tiny burrows often pass completely through the shell, and frequently the oyster saves itself by plugging the holes

with nacre or pearl. Some of these boring sponges are quite beautiful objects, being arrayed, when living, in gay colors. I have seen them dredged in Casco Bay, Me., of different hues of yellow, lemon, sulphur and gold. My friend, Prof. J. D. Hyatt, after giving a lucid account, in *American Miscroscopal Journal*, for May, 1882, of the burrows in an oyster-shell, by the little boring sponge cliona, was so kind as to send me a fine mounted section, with mount of spicules, and specimens of the sponge. We have in our waters *Cliona sulphurea*, and *Suberites compacta* boring sponges. The burrow cut in sections, when highly magnified, shows little bites, as it were, around the burrow, much like the appearance of an old-fashioned post-hole which has been cut out with a mallet and a gouge. The way in which the sponge cuts its burrow is yet a mystery, as it has no mouth nor any other apparent tool for such a purpose.

Although the list is not exhausted, it is shown that the number of enemies to the oyster's peace and welfare is formidable. These same enemies have always been, and yet it may be doubted, whether any animate enemies, except man, ever entirely exterminated an oyster-bed, but their effect on man's industry is sometimes calamitous.

DISEASES.—Of the ailments of the oyster we do not know much. They do, however, seem to have their own maladies. Says a local journal: "In the early part of the season, [September], the oystermen of Fair Haven, Conn., found that the oysters that they took up were affected with 'black spot.' They ascribed it to the continuous hot and dry weather, and only sent off enough oysters to fill their orders. It is thought the cold weather will check the disease."

Ingersoll tells that formerly the "Somersets," of Taunton River, Mass., had a good reputation, and attained a large size, but that latterly they have fallen into disfavor, having become green. "The general opinion is, that eating a dozen raw ones is certain to be followed by violent sickness at the stomach. No doubt prejudice has much to do with it, for there is no food which the imagination would more quickly influence the stomach to reject, than the soft, slippery, and somewhat insipid fresh-water oyster. The same green appearance occurs of late in the oysters of Seekonk River, and in both cases transplanting entirely removes the stain and elevates the quality, which is said to be slowly improving. In consequence of this stain, the eating of Somerset oysters, in their natural state, has been nearly given up,

and the whole trade of the River is devoted to the production and sale of seed."

These sicknesses of the oyster it remains for science to explain. I have seen the soft clam, *Mya arenaria*, with the liver unnaturally distended, and of a mottled color; in a word, the animal was badly afflicted with renal disease.

OTHER PERILS.—These are meteorological changes. Storms of wind, excess of rains, droughts, shifting of bottom, undue increase of deposition of the sediment or floating ooze, so that the mollusk gets smothered. I heard similar complaint against the Hudson River Railroad, when just constructed, that it had killed the oysters up the River. This I only know, they then began dying and soon became extinct. I also heard that the Shrewsbury oyster was badly hurt some years ago by the washing from the ferruginous sand of the new highway. Without asserting, there seems to me to be some show of reason in the opinion. This I do know, that the water, seemingly clear as crystal, which supplied a trout hatching, ran through the same geological member, and the iron oxide was deposited on and killed the fry. Animal enemies can be fought, and if not eradicated, can be kept down. Not so these external perils. An oyster bed may even be destroyed by excess of thrift. The spat may set upon it so thickly that the infant oysters may form a bed upon and kill the parent bed.

Like land crops the harvest of the sea can be badly hurt by storms. Great expectations arose from the discovery, in 1879, in large numbers, by the United States Fish Commission, on the western edge of the Gulf Stream, of a new and valuable food fish, some of which reached the weight of fifty pounds. It received the name *Lopholatilus chamæleoticeps*, and the popular name Tile-fish. Prof. Verrill, in the *American Journal of Science*, for November last, tells of the great destruction of the tile-fish, mollusks, and marine life generally, last winter, as the result of a severe storm. The agitation of the water caused the cold layer to occupy the place of the warmer one, so that the animals perished from a change of aquatic climate.

Forest and Stream mentions that last spring New Jersey fishermen were surprised at the sight of immense numbers of dead fishes of a kind which they had never seen. These were the tile-fishes, and they covered the water from Grand Banks to Barnegat. This track of death was from thirty to fifty miles wide. Prof. Baird thinks that "concussion

caused by terrific storms which raged off the Banks, might account for it." Search for the tile-fish this summer has failed to find it; and it may be some time before it appears in numbers again. As affecting the oyster, not only do storms change the temperature of the water, but sometimes the force of the under-tow ploughs up and removes the bed of the waters.

VESSELS.—The following grievance, noted by Ingersoll, one would think should find a remedy in legislation: "The Raritan planters are also troubled by vessels grounding upon their beds and ruining from one hundred to five hundred bushels at once. There are no authorized buoys or light-houses to point out the proper channel to strangers, and there is, I believe, no redress. The planters complained to me sharply concerning this matter, and thought that legal protection should be given them, but I did not learn precisely what they wanted from the Federal Government."

The Connecticut Commissioners complain of the effect on some of the oyster grounds of the river wash of the waste from factories, especially chemicals. "In some places the beds are entirely destroyed; in others they are greatly injured by change of color and flavor." It is sad to know that the famous seed beds of Newark Bay are being thus disastrously affected.

CHAPTER IV.

LOCAL OBSERVATION AND EXPERIENCE.

An earnest effort has been made to get facts from the oyster-growers themselves all over the State. Of course these communications unavoidably contain much repetition, and, as will appear, some of the statements must be taken with caution:

SALEM AND CUMBERLAND.—Our informant, a person of large experience, in Bridgeton, gives an interesting account of the perils which beset the oyster industry in Maurice Cove and Delaware Bay: "In the latter part of March and early in April the weather is often cold enough to kill the oysters on deck, in their transit from Virginia. Also, if the vessel suffers detention, with warm weather and adverse winds, the oysters in the hold may become heated and perish.

"With regard to the effect of stormy weather on bedded oysters: The depth of the planting grounds in Maurice River Cove at mean low tide varies from six feet to three fathoms; northeast and southeast storms when attended by heavy winds set adrift the mud and sand, which cover the oysters up and destroy them. In the gales of September 17th, 1876, and October 23d, 1878, the majority of planted oysters were entirely covered up and destroyed, on grounds that before had plenty of oysters on them. After the gale none at all could be caught. A south and southwest wind never blows heavy a great while at a time; if it should it would be dangerous, as it would sweep up into the cove and on the planting grounds a large lot of sand. A northwest wind sweeps down the Bay across the natural beds, and across hard bottom, and always has a tendency to clean the planting grounds from any foreign substance, sediment, or mud, for having stirred it up, the ebb-tide sweeping south to Cape May and the mouth of Delaware Bay, carries it off. Thus a northwest wind is considered a benefactor.

"As to the effect of excessive rains, an oyster will live and fatten in them, but will not spawn much, and the growth will be but small.

The effect of drought is contrary. The greater the drought the greater the spawn and the growth of the oyster, but they do not fatten so well. The waters never become unhealthy, nor does the oyster ever become unwholesome except when spawning, that is, in June, July and August. At this time 'they are in milk.' Still, even then, they are eaten without danger, though they are not so good.

"As to the natural enemies of the oyster, the sea-star does not trouble us, and the drill has not done much mischief for several years. Nor have I noticed that the winkle has done any harm.

"The great risks in oyster-planting in Maurice Cove come chiefly of the grounds getting covered with mud and sand by storms. Some years a sort of moss seems to form on the beds, and to smother the oyster.

"We have never had any branch of the opening business carried on here until the present year. The Union Oyster Company of Baltimore, planted from Chesapeake Bay about 50,000 bushels on the flat grounds of Cape May County, off Dias Creek and Pierres Point, and erected a building on Maurice River at Port Norris. The oysters are brought from the Cape May shore to Port Norris, where they are opened, and shipped west in six-gallon buckets. The company are not buying any oysters of our oystermen, but opening only their own. Their stock has died badly, and the venture is not very promising. The labor is all done by men. In every part of the oyster business able-bodied men are required; though sometimes a boy of 17 or 18 finds employment as cook.

"The men find work all the season, from June 15th to September 1st. Too many spend their leisure in idleness. Some engage at farm-work, and those who have boats use them in carrying hay, sand, truck, wood, and freight generally. As a rule, the captains are sober and industrious, but their crews are too generally thriftless, and spend as they go."

CAPE MAY COUNTY.—"Warm, foggy weather is sometime fatal to oysters coming from Virginia. A vessel may strike on the bar, and so injure the cargo. Excessive rains do no harm, except in upland creeks, which empty on the oysters and turn them yellow. In very dry weather the opposite takes place. They then do the best in or near the creeks. The others get to be very salt, and grow slowly.

"At Seaville, the drill snail is reported as the greatest enemy to the

oyster in these waters. It seems to work the worst on the Southern oysters.

"There is hardly any 'shucking,' or oyster opening in this county and but few boys under eighteen years of age are employed in the business. The men work from four to eight hours a day. The majority of oyster planters in the County have small farms, on which they are occupied when not at oystering."

ATLANTIC COUNTY.—"In bringing oysters from Virginia loss is often incurred by stress of weather, especially if warm, when oysters will live only three or four days out of water. In cold weather they will keep good for three weeks, if not too cold, and a little delay incurs no loss. Sometimes a cargo is killed by heavy thunder and lightning. Don't think oysters are materially hurt by heavy rains or drought, except in bays and shallow waters, where sometimes a storm covers them with mud. A supply of fresh water fattens them, and long-continued drought makes them poor and salt. In winter when the bays are frozen over for a considerable time, or when the water is riled by heavy storms, the water may be said to be unwholesome for the oyster.

"The natural beds are situated in brackish water, near the mouths of rivers, where the tide ebbs and flows. When the rivers are flooded, and the oyster is too long supplied with fresh water, they have what is called 'green-gill.' Some think it due to the copper from the heads of rivers. I think there are equally good reasons for thinking that too much of a good thing makes them feel kind of blue."

[Our informant is sensible. Copper has nothing to do with it. The cause is excess of green conferva in the food. It is noteworthy, that as a class, oystermen do not pronounce the oyster unsafe to eat in the r–less months. Some contend they are good if fresh; but generally they are reticent on the subject.]

"In the mouths of Great Egg Harbor, Tuckahoe and Little Rivers, respectively, are eleven, seven, and six natural beds, each containing about three acres, making about seventy in all. At the mouth of the Mullica, or Little Egg Harbor River, probably there are one hundred acres of natural beds.

"The natural enemies of the oyster do little damage here. The star-fish troubles some on the beds nearer the Ocean, the drill and crab more in the Bays, and the winkle some in the larger Bays. Here, too,

the drum-fish makes occasional raids on the natural beds, crushing the small oysters with his strong jaws, and destroying large numbers in a short time. But these raids of the drum-fish are not so frequent as formerly. The drill is more common in the Bays near the mouths of small Creeks, where they inflict much injury. It is said to bore instictively to the heart of the oyster and kill it, when it enters for a feast. [The so-called heart is simply the muscle. The drill does not enter, but intrudes its sucking siphon at the hole it has made.] The winkle does not do much damage here. Its way is to fasten onto the oyster and suck its daylights out. The star-fish operates much in the same way.

"Most of the men here, when not employed in the oyster business, work at trades or on farms."

Says an Absecom correspondent: "Oysters taken from the fresh-water near the mouths of Rivers, and planted in the salt-water of the Bay, become black. The small crab which is found in oysters is one of its greatest enemies. The crab, or its egg, finds its way inside the shell, and lives upon the oyster." [A great mistake.]

An informant at Leeds adds an item, which is, to a varying extent, true of all the oyster waters of the State; he notes as hostile to the oyster, the stingaree, or sting-ray, and the devil-fish, or squid.

Port Republic reports that "probably about one-eighth is lost in transit from weather causes. In respect to storms, their injury depends on the quarter whence the storm comes. Hard westerly storms and heavy rains are beneficial, while the contrary is true of easterly storms. The effect from drouth is bad. The water often becomes unhealthy. Cause not known. The water should be closely observed and analyzed to get at the cause."

"An oyster may be eaten when in milk, up to within a week of spawning, but should then be cooked."

"The drill or borer is so troublesome on some bottoms that the cultivation of the oyster has to be abandoned. The winkle does not trouble us much. From Port Republic to Tuckerton there are about thirty-two quite large and some small natural beds, running, probably, from three to twenty acres each." Says one, at Smith's Landing: "The star does not trouble in the bays, and the drill is the worst at the mouths of creeks." Atlantic City reports the drill as especially severe on young oysters.

BURLINGTON COUNTY.—Tuckerton has a similar experience.

OCEAN COUNTY, as represented by Barnegat, Cedar Creek, &c., cannot differ much.

MONMOUTH AND MIDDLESEX.—For the latter county, Geo. H. Shaffer & Co., of Perth Amboy, give some interesting facts.

"In shoal water the sand is often washed over the oysters, thus suffocating them, especially if it occur soon after they are planted. Also the mud and sediment which is washed from the streets settle on the beds and smother large numbers. A single storm last fall killed more than 25,000 baskets of oysters in Raritan Bay; also the rain, (fresh water running into the Bay in large quantities,) followed at high tide by salt water, physics the oysters and injures them for the market.

"At Perth Amboy and Keyport droughts are considered damaging. In the Shark River and the Shrewsbury they are regarded as sometimes of advantage, as these waters need salting in a wet season.

"Though not so good from the middle of May to the middle of August, the oyster can be safely eaten at any time if cooked.

"There are natural beds in Raritan River, Newark Bay, and Rahway River, along the Sound, and the Shrewsbury River. At Keyport natural seed is got to some extent in the creeks, and from the sedge, or grass on the flanks of the salt meadows.

"There seems to be no trouble from the sea-star, but considerable from the drill. The heavy rains of last fall destroyed large numbers of our oysters."

As a rule the reports are not flattering to the men engaged at oystering. Their employers complain of their thriftless and intemperate habits. Keyport, happily, seems to furnish an exception, the men being said to be quite temperate. Some opening is done at Perth Amboy, men only being employed. Boys as young as ten years of age are employed at lighter work, such as sorting oysters.

Among parties consulted in Monmouth and Middlesex, there was, in the main, agreement with the foregoing opinions. At Keyport it was added, that they did not know of injury to oysters in transit, except from delay, and from this cause it was alleged that two-thirds of the Virginia plants of last year were in bad condition. They complained that often oysters were suffocated by the movement of the sand when planted on sandy bottoms. As to the eating qualities of oysters in the spawning season, it was thought that natives were not healthy; but that it did not apply to the Southern plants, as they did not spawn in Northern waters. Still, it was claimed for all, that if cooked they were safe eating.

I will add here an extract from Ingersoll: "A Baltimore correspondent writes: 'Thunder sours milk and kills oysters. You may load a vessel to its utmost capacity, start for market, and one good round clap of thunder will kill every oyster in the vessel immediately. Pounding with an ax upon the deck of a vessel, when oysters are thereon, or pounding upon the side of a vessel with a heavy weight, will kill every oyster that feels the jar.' I am not sure of the precise truth of this assertion; but I know, that on the Massachusetts oyster-schooners no wood-chopping is allowed, and I have heard it argued, that steamers could never be used in transporting Virginia oysters northward to the planting-beds, because of the jar of the machinery."

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CHAPTER V.

DIETETICS OF THE OYSTER.

Peter Kalm, the scientific traveller in New Jersey in colonial days, could congratulate his King that here the poor could always get a good store of great oysters. And it seems that the r-less months were observed as close-time except by the poor, who even then lived "on oysters with bread." But oysters, like salmon, are not a luxury "all the time." Indeed, have I not shown that even the oyster itself, to get into good condition, sometimes needs a change?

Are oysters good to eat? Said Montaigne: "To be subject to colic, or deny one's self oysters, presents two evils to choose from." This is very fine for Montaigne, but it is a libel for all that. Besides, he was a sickly man at best of times. Says Reveille-Paris: "There is no alimentary substance, not even excepting bread, which does not produce indigestion under given circumstances, but oysters never. We may eat them to-day, to-morrow, eat them always, and in profusion, without fear of indigestion." It is said that the first Napoleon always ate oysters on the eve of his great battles, if they could be got. Says Figuier: "The oyster may thus be said to be the palm and glory of the table. It is considered the very perfection of digestive aliment. * * * It is 'nothing more than water slightly gelatinized.'" But Figuier does not put it well. The oyster, even when solid and plump, has very little fat; real adipose is hardly in it at all. The so-called fat is nutritious living gelatine. It is actual protoplasm, barely differentiated into tissue. But this brilliant French writer is sometimes too careless to be correct. It is better to trust the food specialist in such matters than the general naturalist, and here we have authority, recent and trustworthy, in that little book "Foods," by Edward Smith, M. D. Here is the dictum of the physiologist: "The oyster is not a food of high nutritive value, but is nevertheless useful to the sick, while its delicacy of flavor leads to its selection when other foods are rejected. The more usual mode is to eat it when uncooked; and it is very doubtful whether cooking increases its digestibility. It is,

however, possible that the flavor of scalloped may be preferred to that of the raw oysters, or that the vinegar which is usually eaten with the latter may be disliked, or may disagree with the stomach, but, with such exceptions, the usual method of eating them raw is to be preferred." We shall recur to this question of digestibility a little farther on.

The writer in *Lippincott's Magazine* states the following:

"Dr. Leroy d'Etiolles, the famous French surgeon, was accustomed to attribute the foundation of his great physical strength to the two dozen raw he always ate before breakfast. Dr. Lenac has pronounced them the most nourishing food in existence. * * * Dr. Pasquier says they may be given with great advantage to persons of intemperate habits, who by inefficacious medical treatment have fallen into debility and lowness of spirits."

Fortunately, the nutritive value of the oyster, as well as the relative worth of the New Jersey oyster compared to the Southern, has lately been determined by the chemist, Prof. W. O. Atwater. The results, in advance of the report of the U. S. Fish Commission, for which they were obtained, appeared in *Proceedings of American Association for the Advancement of Science*, 1881. Analyses were made of oysters, clams, scallops, lobsters and cray-fish:

"The samples of oysters showed much wider variation than might have been anticipated, both in the proportions of the shell contents, solid and liquid, and in the amounts of actually nutritive material contained in them. In general, the oysters from the coasts of New England, [New Jersey] and New York were much richer, both in total shell contents and in actual nutrients, than those from Southern localities, Norfolk and the Potomac, James and Rappahannock Rivers. Thus the samples from East River, N. Y., and Buzzard's Bay had respectively 20 and 20.3 per cent. of shell contents, while those from the James and Potomac had 13.8 and 12.1 per cent., and one from Norfolk only 11.2 per cent. That is, of the whole weight of the East River and Buzzard's Bay samples, four-fifths were shell and one-fifth "meat and juice," while in the Southern samples the shell contents, *i. e.*, meat and juice, made only one-eighth of the whole weight.

"The ratio of solids to liquids in the shell contents were still more variable. A sample of Blue Points had 13.4 per cent. solids and 5.3 per cent. liquids, and one of Stony Creeks, 7.3 per cent. solids and 11.8 per cent. liquids. The percentages of solids ranged from 13.4 per

cent. in the Blue Points to 4.7 per cent. in the Norfolks; those of liquids, from 11.8 in Stony Creeks to 4.9 in Shrewsburys.

"The actual nutrients, however, are to be found in the dry (water-free) substance of the shell contents. Here again we find wide variations. Thus in the flesh (solids) the percentages of dry substance run from 23.7 in the Blue Points to 15.5 in the Staten Islands, while the liquids contain from 6.0 per cent. of actual solid matter in the Fair Havens to 2.8 per cent. in the Rappahannocks. Taking the total contents, flesh and liquids together, we have in the Blue Points 19.2 and in the Norfolks only 8.6 per cent. of nutritive substances, the rest being water.

"As regards the constituents of the flesh, that of oysters is found to be quite watery, as would be expected, and to contain but little fat. On the average, the flesh (solid) of oysters, like that of fish, contains a little more water and less dry substance than ordinary meats. The oysters seldom have much fat, while some fishes have a great deal.

"Clams are similar in composition to oysters, though rather richer in nutritive materials. Scallops (the adductor muscle, the portion commonly eaten,) are still richer, both in total nutrients and in fats. The amount of nutritive matter in lobsters and cray-fish is very small."

Dr. Edward Smith makes a distinction between the flesh of mollusks and that of the crustaceans, such as crabs, and lobsters. He calls the flesh of the former gelatinous, and that of the latter fibrinous.

Speaking by the rule of thumb, it has been stated that the oyster, as a muscle-making food, is not much below lean beef, and is equal to eggs. Such a claim is, at best, extravagant. However, in such matters we can depend only on the analyst, and in this direction the above work of Prof. Atwater is the most recent, as it is the most valuable contribution to the subject yet made, and is only in keeping with the usual solid work on fish foods which the United States Fish Commission is producing.

The careful reader will have noticed that these analyses are eminently favorable to the oysters of our own State.

The haste of the producer to get his crop into market is an American vice. Immature vegetables and unripe fruit, in violation of all hygiene, are put openly on sale. The oyster is forced to market at an average age below three years, though, as a rule, it is not at its best until it is five or six years old. Our practice of eating, as a luxury,

the soft-shell crab is repulsive to foreigners. The animal is certainly, at the time of shedding, more or less sick, like a bird in the moult.

Those ancient Romans ate oysters at an enormous rate. They seem to have inspired themselves for great mental efforts with raw oysters, happily not having either whiskey or coffee. The poet Horace, the lawyer Cicero, and the moralist Seneca, braced up with oysters. Still, they had respect to economy and decency, knowing well that when spawning the bivalve should not be eaten. They recognized as close time the warm term, our r-less months, and it is written by a mediæval bard:

Mensibus erratis
Vos ostrea manducatis.

Which may be rendered thus:

Lapsing the *r-less* months 'tis meet
You may oysters freely eat.

These mollusks, however, may be eaten with safety, even in the r-less months, if they are not in a spawning state, for oysters sometimes have an off-year, owing to causes not always apparent. Besides, spawning can sometimes be prevented, as by removing to deeper or colder water. With favoring conditions this bivalve may be in prime flesh even through May, June, July and August, and the presence of immature eggs may be even an advantage to the epicure. But all this supposes it not to have reached the state when, in oysterman's phrase, it is "in milk."

Says Louis Figuier: "The small proportion of nutritive matter explains the extreme digestibility of the oyster." But the oyster contains a much larger amount of nutrition than this writer supposed, and there are chemical considerations which he did not know. It is opportune to light upon the following item in *Scientific American*, December 16th, 1882:

THE DIGESTIBILITY OF OYSTERS.

Why oysters should be eaten raw is explained by Dr. William Roberts in his lecture on "Digestion." He says that the general practice of eating the oyster raw is evidence that the popular judgment upon matters of diet is usually trustworthy. The fawn-colored mass, which is the delicious portion of the fish, is its liver, and is simply a mass of glycogen. Associated with the glycogen, but withheld from actual contact with it during life, is its appropriate digestive ferment—the hepatic diastase. The mere crushing of the oyster between the teeth brings these two bodies together, and the glycogen is at once digested without any other help than the diastase. The

raw, or merely warmed oyster, is self-digestive. But the advantage of this provision is wholly lost by cooking; for the heat immediately destroys the associated ferment, and a cooked oyster has to be digested, like any other food, by the eater's own digestive powers. "My dear sir, do you want to ruin your digestion?" asked Prof. Houghton, of Trinity College, one day of a friend who had ordered brandy and water with his oysters in a Dublin restaurant. Then he sent for a glass of brandy and a glass of Guinness's XX, and put an oyster in each. In a very short time there lay in the bottom of the glass of brandy a tough, leathery substance resembling the finger of a kid glove, while in the porter there was hardly a trace of the oyster to be found.

The above sets the oyster in a strong light. It, seems, then that a very important factor in favor of the oyster, when compared with other foods, lies in the small amount of energy expended in its elaboration by the digestive tract, which is a clear nutrient gain. Even an egg requires from three to four hours for digestion, or the same time as mutton.

Yet it seems to me that the brandy and XX experiments were one-sided, and not conclusive, however correct the dyspeptic theory. Alcohol will act very differently upon the oyster as the condition of the mullusk itself varies. I will try to abbreviate some interesting statements of Dr. Ryder: "With animals generally, there is a periodic development of the generative organs. The productive mass in the oyster—it scarcely deserves to be called organs—is wasted away at the end of the spawning season. It is not only spawn-spent, but all evidence of its sex is gone. In its stupendous feat of giving off so many millions of eggs, it has converted an immense amount of tissue into 'generative products,' and now a large part of the animal is composed of exhausted tissue, strands of spongy, emaciated tissue cells. A marvellous change in the solidity and consistence of the animal takes place. The shrinkage of a spawn-spent oyster in alcohol, or chromic acid solution, is excessive, and will, when complete, reduce the animal to one-tenth of its bulk while alive. This shrinkage is due to abstraction of the water with which the loose, spongy tissue of the exhausted animal is distended. A so-called 'fat' oyster, on the other hand, will suffer no such excessive diminution in bulk when placed in alcohol or other hardening fluid."

It is enough for the dietetic and dyspeptic argument to know that in its effect on food the mischief of alcohol consists in its hardening effects. It displaces the water which is a solvent in the solid, and occupying its place, it is itself, so far as it goes, a neutralizer of solvency.

Sometime ago a microscopist thought he had discovered an entozoan in the oyster. But his find, so far as I can learn, has not been confirmed. Naturalists well know how badly fishes are afflicted with true internal parasites. From these pests the oyster is quite free, and I think it is the only food animal of which so much can be said, and which for this reason can be safely eaten without cooking.

The notion implied in the common expression "coppery oysters," if meaning that these mollusks get their flavor or color from an oxide of copper, is quite untenable. It surely must be to the absence of that coppery tang, which European epicures so much extol, that P. De Broca alludes in his report on the oysteries of the United States, when he declares our oysters "insipid." For he emphatically pronounces ours "a mollusk thicker, more tender, richer in nutritive elements." "The American oyster, when cooked, is certainly superior to ours, and as it preserves its properties better during the process, it is highly regarded by physicians as an article of food for convalescent patients." "I should therefore consider it a national blessing if we can obtain their reproduction in France, a consummation which we have every reason to hope will take place next spring, since the oysters deposited by M. Coste in the basin of Arcachon have developed as rapidly as in the best American plantations." This from the edition of the report of 1865, translated for the report of the United States Fish Commission of 1876. What success this attempt at acclimation met with I cannot say.

Professor Joseph Leidy thinks that the green color comes from feeding on the spores of the green sea-lettuce, *Ulva latissima*. In *Forest and Stream*, June, 1882, and *American Naturalist*, January, 1883, Dr. Ryder has, for the first, established the cause of this phenomenon. It is primarily due to the food, next to a consequent change in the blood-cells, which are distended with a greenish substance due to change of color in the secretions of the liver. That is, "it is a tincture of the blood-cells, sometimes even found packing behind the heart-valves so as to impede their action." Though "abnormal accumulations, they are not parasitic, nor do they necessarily render the mollusk unwholesome."

"If the classical writers are to be trusted, to the green, yellow, and white-fleshed sorts we must add, red, tawny, and black-fleshed ones. Pliny tells us of red oysters found in Spain, of others of a tawny hue in Illyricum, and of black ones at Circeii, the latter being, he says, black both in meat and shell. Horace and other writers awarded

these the palm of excellence." To these might be added certain violet-colored oysters in France.

As a rule, the American oyster when black is in bad condition, and it will be found that the tissues of the flesh are permeated with black mud. It may occur that an oyster bed is constantly receiving a deposit of dark, impalpable slime, so that the ooze will settle upon the mollusk, and in time bury it. But for a while the animal struggles against its misfortune, still getting worse and worse, until at last it succumbs. If taken before this happens, it will be found to be in a bad state. "Shifting" to better ground will save them, for they will rapidly recover, and become clean and fine.

But food should not only be a muscle-maker. It should in some instances have prophylactic elements, or offsets of disease. An egg contains albumen, oils, and sulphur, and this mineral "is a constituent of the proteine compounds of animals, in the taurine of bile, and the cystine of urine." And similarly there are health-giving properties in an oyster. Says *Nature*, December 21st, 1882: "The French *Official Journal* publishes a report on oyster culture, which is in favor of the Portuguese oyster. It appears that one hundred grammes of the flesh of this mollusk contain about one and one-tenth grammes of iodine, bromine, and chlorine, just twice as much as the common oyster." This must be due to the abundance of alga food, and has very important dietetic relations, as I think.

But food should be for enjoyment as well as nutriment. The freshening of the oyster, unless the animal be really dirty, in which case it will be ill-flavored too, is a discount upon its quality, since it takes from it the saline tang so gustatory to the epicure. In Philadelphia they are catering to this refined taste, hence the distinction between freshened and salt oysters. It is noteworthy, too, that by reason of this artificial bloating which the mollusk gets, it does not keep long. It soon collapses, and having lost its artificial gain, it has also lost its natural quality. But it seems they must be got into market fat, or seemingly so. An old oysterman told me that in the former days, when he was selling oysters up the North River, "at one time the weather was muggy, and the wind was hardly enough to carry a feather. The oysters shrank right up, and would not sell, and it seemed as if I should lose the whole jag, pretty much. I took water up onto the sloop, and gave them a drink again, as many at a time as I could. They fattened right up, and I got them all off my hands safe."

I cannot say what the merits of the practice were, or whether it is

still in vogue—but I know that, formerly, in England, oysters were subjected to a domestic fattening. The process simply consisted in putting them in tubs of fresh water in which oatmeal had been stirred. But this was not done by the dealer. It was a common practice of the purchaser, who received a hamper at a time. Whether a real fattening, or more correctly, fleshening, was the result, I am quite unable to say. By those who practiced it there was implicit faith in the process. I also know an instance in which the owner of a little bed of "Cove oysters," in New Jersey, fed them with Indian meal. Generally, the intelligent regard it as a whim. It should be settled by experiment.

After writing the above I was surprised to find the following in De Broca's Report: "There is a very prevalent opinion in the United States, and in England, that oysters may be fattened by pouring Indian meal into the water which covers them. It is said that certain planters in New Jersey adopt this method in small ponds; but it is very probable the meal has no effect whatever upon the oysters, their stomachs being too delicate to digest such nourishment. Many persons reject this opinion as a mere prejudice without foundation."—*U. S. F. Com. Rep.*, 1876, *p.* 299.

May it not be doubted whether so many good things can be said of any other article of animal food? Hence our Ostrea well deserves the epithet, "The festive oyster." So long as obtainable it will ever command a prominent place at the social board. Though the belief has prevailed in some quarters that this bivalve possessed aphrodisiac properties, the idea may be dismissed as a silly delusion unworthy of discussion. But in the sick room the oyster is often a precious boon. As a wholesome luxury it is deservedly esteemed; and may the day never come at home, as it has abroad, when it shall cease to be an item in the common dietary of the people. Hence, for the enlarging of the supply by judicious preservation, and much greater increase by wiser methods of propagation, it deserves the best consideration of the statesman, the scientist, and the oyster planter himself. The one should husband his observations and experience, the other must delve at experiment and investigation, and the first-mentioned must find his heavy ammunition in statistics. But it should not be overlooked that while the general figures of wages and production can be got, we may fail to get full and trustworthy data of the amount of this food eaten by the operative himself and his family, simply because, not being bought with money, the consumer takes no account thereof. But this of itself is no small item in the wealth of the State.

CHAPTER VI.

OSTRACULTURE.

The following prophecy is from the *New Jersey Coast Pilot*, December 22d, 1882: "Oysters are scarce and high in price. The indiscriminate raking and drifting for spawn has caused the Barnegat oyster to be almost a thing of the past. The avaricious oysterman will soon be compelled to turn his attention to the cultivation of his native pine barrens, and the story of the roseate days when two hours' labor would support a family of ten persons will be chanted by the fireside of the indigent cotter as a wild legend of the palmy days of yore, in which both speaker and listener will launch anathemas upon the heads of their improvident ancestors.

"Nor is this the only trouble with our natural privileges. Large quantities of valuable food fishes are now being caught and in many instances left upon the ice to freeze, to be carried away by those who are too lazy to look for a first-class article; and we find, to our sorrow, that the fishing interest needs looking after as much as the waning oyster interest."

According to Ingersoll, City Island led off in a systematic cultivation of oyster seed. He says: "The East River is the scene of probably the most painstaking and scientific oyster culture in the United States, and the methods in use there merit careful notice. It is impossible to ascertain when it first became a custom there to transplant oysters from the abundant natural beds along the shore to staked-in tracts off shore, nor is it of much importance to inquire. Probably the very first of this was done in the Harlem River. * * * About 1833 East River oysters were almost unknown in New York markets; and it was not until about 1843 that any planting was engaged in. The character of this planting is not indicated; but I have no doubt that, whatever was the date of its origin, the credit of first truly propagating oysters from seed caught upon artificial beds, or prepared receptacles, belongs to the men of City Island."

Having made personal observations of the methods of oyster cul-

ture in the Mediterranean, Robert L. Pell excited some expectations in his essay as published in the *Transactions of the New York State Agricultural Society*, 1858. He says: "I have made two artificial beds of them in the Hudson River, and one in my pond, and will be able next year to report progress." I cannot learn that such report was ever made.

The writer in *Lippincott's Magazine* alleges that "the primary cause of the threatened destruction of this industry is the failure to cultivate the oyster." To this, Lieut. Winslow, in *Popular Science Monthly*, November, 1881, responds: "It would have been better had he said, 'the failure to protect the oyster beds.' Oyster culture is one thing, no doubt an admirable one, but an expensive, laborious undertaking of doubtful financial success. Oyster protection is a matter easily achieved, with but small expenditure of money, and with but little distress to those depending upon the fishery for support."

It would seem that since the above was written the learned Lieutenant has thought at least well enough of the matter to conduct some valuable experiments in raising the oyster fry from the eggs. An article by H. C. Hovey, in *Scientific American*, November 18th, 1882, is of interest on this point. The best scientific work has been done by the United States Fish Commission and the Fish Commission of Maryland. For painstaking, intelligent experimentation, the two brothers, Capt. Chas. H. Townsend and Mr. George H. Townsend, long led the van. And there are others who have worked with commendable intelligence and on a generous scale in Connecticut. There is no doubt that for extent in plantation ostraculture, Connecticut outranks all other places. Says Hovey:

> The modern oyster farm is essentially a Connecticut idea. The laws of other States do not yet make it a possibility elsewhere. In Rhode Island the oyster grounds are rented at $10 an acre for a period of ten years, but those who wish to cultivate farms have no guaranty that they can reap the final results of their best endeavors. The law in Maryland and Virginia is that a man having riparian rights, can stake out and have a life interest in one acre contiguous to his own shore property, not for cultivating, but simply for planting. All else is public property. In Connecticut, however, while the "natural oyster beds" remain free to all comers, the remainder may be sold to private individuals. * * * An Oyster Commission is appointed to hold office for four years, or longer on re-appointment. They have drawn a shore-line from point to point, within which all is the property of the several towns along the shore of Long Island Sound. Each town has its own oyster ground committee. Outside the shore line, and as far as the lately-defined State line between Connecticut and New York, are about three hundred thousand acres of water territory, a large amount of which is supposed to be suitable for the cultivation of oysters.

All this is under the jurisdiction of the Oyster Commission, who map it out and designate the portions surveyed to applicants for the purpose of actual cultivation. The price is $1.10 per acre, for which a deed of permanent possession is given. Among the conditions, is one enabling the purchaser to return the ground if it should prove to be worthless for the purpose in view; in which case he gets his money back. But, on the other hand, if he allow it to lie unimproved for five years, it returns to the State as forfeited. In Connecticut waters there is room for enterprise, as shown in the cultivation of what may very properly be styled "oyster farms." There are at this time more than three hundred applications before the Commissioners for the designation of grounds, varying in size from a few acres up to one thousand or more; and some of the grounds hitherto sold and now under cultivation include several thousand acres.

The largest oyster farm in Long Island Sound, if not the largest anywhere in the world, belongs to Mr. H. C. Rowe, of Fair Haven, who controls between ten thousand and eleven thousand acres of oyster ground, and has it all staked off by buoys, so that he can go from one field to another, as a farmer would traverse his wheat-fields and grass-lots. For the successful cultivation of such extensive grounds resort has been necessary to steam dredging, but not without strenuous opposition from those who feared that such a method would injure the natural beds. Several other persons have now entered farms from two thousand to six thousand acres, and more will be staked out as soon as the surveys can be completed.

The trim, wide-awake little steamers run four large dredges and rake up a thousand bushels of oysters a day. With the facilities thus furnished, grounds are managed under water from twenty-five to fifty feet deep.

Not long ago the Connecticut Academy of Arts and Sciences accepted an invitation to visit the oyster farms, on the new steamer the "Gordon Rowe," in company with the Commissioners and Lieut. Francis Winslow, U. S. N., of the U. S. Fish Commission. The day was favorable, and a large party went, including Profs. Dana, Brewer, Waldo, Platt and others. Omitting the incidents of the excursion, it is my intention to explain to the reader the facts exhibited by Lieut. Winslow.

During the present year, Lieut. Winslow has been able to reduce the period required for the hatching operation from six or eight days to two or three, and has been trying to devise methods of raising oysters artificially that would be of practical value. His investigations show that the Chesapeake beds are rapidly disappearing, and it remains to be decided whether experiments for restocking them are to be carried on by individuals or by the States. The latter seems to be impracticable, because the young brood will unavoidably attach themselves to localities, instead of benefiting the public oyster grounds at large. Hence Lieut. Winslow has been carrying on his experiments in Connecticut waters, where he can put large quantities of newly-hatched oysters directly on the beds where they are to stay.

The parent oysters are first cut up by knives, or more usually ground fine in a small mill, and mixed in glass jars holding sea-water. As soon as the particles have settled somewhat, the excess of spermatozoa is drawn off by a siphon, and the remaining mixture is set away to await further developments. The principal difficulty thus far is to supply the young with a sufficient quantity of food and lime in suitable proportion to aid in the formation of the growing shell. * * * In the mixture each egg is forthwith attacked by the spermatozoa. All this takes place in a few minutes after the chopped particles are stirred together. After segmentation, numerous cilia are put forth, and the young oyster uses them to enable it to swim about during its brief life of freedom. The sight is a strange one of a hundred of

these diminutive creatures darting about in a drop or two of water, executing a sort of dance under the magnifying glass.

Each female oyster is estimated to contain from one to ten million eggs, not a tenth of which are vitalized in the course of nature. But by the artificial process, when perfected, it is hoped that fully one-half may be safely brought through the embryo state and then left to take care of themselves. As the matter now stands, each five-gallon planting can used by Lieut. Winslow, when finally lowered with its load of young oysters, is thought to contain about fifty million alive! These cans are provided with double caps, one at each end, which are removed by cords attached to them after the can has been let down to the spot to be occupied by the young colony. Care is taken to mark the location exactly, so that it can be found again; and thus in a few months we can tell if the experiment has been followed by practical results.

As will appear farther on, the "chopping" and "grinding" process, at best barbarously crude and wasteful, is superseded by neater and more economical methods. Especially as written since the above, perhaps it would be well to quote the Connecticut Commissioners themselves, when speaking of the Lieutenant's experiments. They say:

"Lieut. Winslow, during the past summer, experimented upon the native spawners of the Sound. In a few hours the embryonic oyster appeared. The time required for development varied, according to circumstances, from twenty-four hours to six days. Lieut. Winslow found that carbonate of lime expedites the process. Many died during this period. Those that survived were placed in a tin can, lowered into the deep water and left to distribute themselves over the catch. About ten millions of young oysters were thus planted on grounds in the Sound belonging to Mr. H. C. Rowe. The result cannot be satisfactorily ascertained. Mr. Rowe thinks that there is a good set in the neighborhood of the spot where the young oysters were deposited, but he is uncertain whether it is the result of Lieut. Winslow's labors or not. The experiment will be repeated this coming summer, and in such ways that its results will be accurately ascertained. If this plan is successful, one of the chief risks of the business will be avoided. The catching of a 'set' is what the oyster grower looks for with the deepest solicitude, and too often with bitter disappointment."

Says Pell: "I noticed, when on the coast of Baia, near Naples, and in the Lake Tacino, an immense number of reeds, so arranged as to form circles, just showing their ends above the surface of the water, and on inquiry, was informed that they were covered with oysters. When required for use the reeds were raised, one after the other, and those having attained the proper size removed, when the reeds were

replaced. In these waters oysters attain full size at two years old." A Japanese student informed me that in his country bamboo stakes were used in a similar way. The French and others on the Mediterranean, use fascines or bunches of twigs suspended, for catch. The following, identical in principle, and almost similar in manner, from the last report of the Connecticut Commissioners is worthy of careful perusal:

"A method has been tried at Groton, not unlike, in some particulars, to the French method of catching spat. It may be called the brush method, and is well suited to muddy bottoms, where spreading oyster shells for catch so often fails." All attempts at artificial breeding had failed upon these grounds at Groton until the new method was successfully tried. This method, briefly described, is as follows: "Birch trees of fifteen or twenty feet in height, and three to four inches in diameter at the butt, are thrust about three feet into the mud under the water so as to stand at an angle of about forty-five degrees with the current. They cover the bottom on each side of the main channel to within fifty feet of the shore. At spawning time the water is full of floating spat, which coming in contact with the branches, adheres to them in great quantities, and there grows until ready to be harvested for market or transplanting.

"Unfortunately, in the spring of 1881, an epidemic of scarlet fever and diphtheria prevailed to an alarming extent in the neighborhood of the oyster-beds, and the board of health of the town of Groton having been unwisely advised that the sickness was attributable to the birch brush and oysters, ordered the total destruction of the beds as a nuisance, and they were destroyed accordingly. The owners resorted to the court for compensation, claiming that the beds were in no sense a nuisance, and could in no way be any detriment to public health. The trees were in water of ten to twenty feet depth at low tide, and the oysters thereon were never out of water.

"Judge Culver, before whom the case was heard, found that 'neither the brush nor oysters, nor both combined, were the origin or producing cause of said disease.'"

"The Connecticut Commissioners report the probability that by the time of the opening of spring work in 1883, ninety thousand (90,000) acres of oyster land will be held by cultivators under State jurisdiction, which is double the amount so held in May, 1881. During the next two years, one cultivator alone looks for no less than one million bushels of marketable natives from his own grounds."

A striking evidence of the extraordinary activity of this industry in Connecticut is the statement that thirty steamers are employed in this business in the Sound.

The pressing need of oystermen is home seed, as against Southern plants. In the planting at Keyport this last year, we are informed that 150,000 bushels of Virginia plants were laid to 100,000 natives. Hence it is coming to this, that oyster culture must take the scientific methods now pursued in fish culture. For the sake of the young and better educated oysterman, I will condense into as small a space as possible Dr. Brooks' method of raising the oyster fry artificially:

The first thing to be done is to select the oysters, that is, to get for certain some of both sex. But there is no way of distinguishing the sex of an oyster by any form, mark, or color, either outside or inside. Notwithstanding this, the following methods will determine the sex without mistake. We must examine the contents of the oyster in spawning time, that is, when they are "in milk." An experienced oysterman can at this time cleverly guess the she one. But what about the he one? The better way is to have no guessing in the matter. If the point of a clean, bright knife be passed into an oyster, and it be a spawning female, the stain or drop on the blade will be somewhat thick or milky-like. This stain under a microscope of eighty diameters will look granular, and these apparent granules are the oyster's eggs. But if the animal be a male the appearance will be very different; the stain will be clear and homogeneous, as if it were that of clean water. If this be put under a high magnification, say that of five hundred diameters, it will be resolved into countless numbers of little objects, something of a pear-shape, each one having a thread or lash, and when put in water showing great activity as it whips itself about. Now the granular mass are the true eggs, sometimes called the female cells, and the little tailed objects are the spermatozoa, sometimes called the male cells. Of course, here, as in other matters, tact and experience are necessary. Dr. Brooks says: "When the eggs are mixed with a drop of water they can be diffused through it without difficulty, while the male fluid is more adhesive and difficult to mix with the water. By these indications I was able in nearly every case to judge of the sex of the oyster before I had made use of the microscope."

Having in this way determined the sexes of your oysters, you proceed to impregnate the eggs artificially. A few vessels, preferably glass, and varying in capacity from a gill to a half gallon, will be

necessary. Also a few watch crystals or very small saucers, and a supply of pure sea-water, keeping it as nearly as possible at the temperature of the water from which you obtained your oysters.

"In order to fertilize the eggs, all that is necessary is the mixture of the ripe eggs with a little of the ripe male fluid in a drop of water. If the point of a knife blade be dipped into the fluid of a female and touched to a glass slide,* and then dipped in the fluid of a male and touched to the same spot on the slide, and a drop of sea-water be added, to cause the two to meet, most of the eggs will be fertilized, and their early stages of development can be studied in a single drop of water.

"After the oysters have been opened, and at least one ripe male and one ripe female have been found, cut off the mantle lobes and gills of the male with the scissors, close to the visceral mass, and tear them out with the forceps and throw them away. Cut around the adductor muscle with the scissors, so that the visceral mass may be lifted out of the shell and transferred to a small saucer, or to a watch crystal. Holding the visceral mass with the forceps, cut out with the scissors as much as possible of the digestive organs and liver and throw them away, and then chop up the reproductive organs with the scissors, picking out and throwing away any fragments of the liver, digestive organs, mantles or gills, which may present themselves. In order to have the young oyster thrive, the water must be kept free from fragments of the various organs of the adult, as these would soon decay and destroy the embryos, and it is therefore important to remove them as completely as possible. After the mass has been chopped up as fine as possible, fill up the watch crystal with fresh sea water, stir it up, and then allow it to run into one of the smallest beakers or vessels, which has been nearly filled with sea-water. As the water runs out of the watch crystal, be careful to allow as few of the fragments as possible to run with it.

"Now fill up the watch crystal with water again, and stir and pour off as before, and repeat the process until nearly all of the male fluid has been washed out of the fragments and poured into the beaker. Stir the contents of the beaker for a short time, and then allow it to stand about five minutes to allow any fragments to settle

* "A glass slide" is the little strip of glass on which the object is placed when it is put under the microscope. Usually the strip is three inches long and one inch wide. Of course, they are useless without a microscope. But this, as I shall show, is not indispensable.

to the bottom, then pour the fluid, which should be quite milky, into another small beaker, leaving behind, to be thrown away, any particles which may have settled to the bottom. The male cells retain their full vitality for several hours after they have been mixed with sea-water, so the beaker may be set aside to wait until the eggs are ready. The eggs swell up and break to pieces within a very few minutes after they are mixed with water, unless they are fertilized at once, so it is much better to add the eggs to a previously-prepared mixture of male cells and water, than it is to put the eggs into the water to wait until the male fluid is got ready.

"Taking, now, one of the females, remove and chop up the ovary in the same way in another watch crystal, observing the same precautions in removing all portions of the body. Fill the watch glass with water, and stir and pour off into the beaker as before, giving the contents of the beaker a good stirring after each lot of eggs is added, in order to diffuse them through the water at once, and thus insure the speedy contact of each of them with some of the male cells.

"Fill the crystal with water again and stir and pour off, and repeat until all the eggs have been washed out of the fragments of the ovary.

"Another female may now be cut up, and the eggs may be added to the contents of the same beaker; but if the females are large and yield many eggs, it is not best to use more than one, for although there are enough male cells to fertilize a very great number of eggs, the eggs are heavier than water and soon sink to the bottom, and if they form a very thick layer, only those which lie near the surface have room to develope.

"The beaker should now be allowed to stand for about ten minutes, and in the meantime some of the eggs may be picked out with a dipping-tube for examination under the microscope. In using the dipping-tube, cover the large end with the tip of the finger and run the small end down close to the bottom of the beaker, and then take the finger off the top and as the water runs in at the bottom it will carry some of the eggs with it. When the tube is filled, place the finger on the top again and draw it out of the water, and holding it perpendicularly on the centre of a glass slide, and taking the finger off the top, allow a good-sized drop to run out on the slide.

"If things are working properly, each egg should now have a number of male cells attached by their heads to its outer surface, with their tails radiating from it in all directions as shown by Figure 51.

"It is not necessary that more than one male cell should fasten on to each egg, but they usually cover them in such numbers that the lashing of their tails causes the eggs to rotate and move through the water.

"As soon as all the eggs have male cells attached to them, it is necessary to get rid of the superfluous male fluid, for it would soon decay and pollute the water if it were allowed to remain; and if it is not drawn off from the eggs while they are at the bottom, it is almost impossible to remove it after the embryos have begun to swim without losing them as well.

"After a final stirring, the beaker should be allowed to stand for about five minutes to allow the eggs to settle to the bottom, and the fluid above them should then be drawn off through a siphon reaching nearly but not quite down to the eggs. A fresh supply of sea-water should then be added and the eggs stirred and allowed to settle, and the water drawn off as before, and this should be repeated until the water, after the eggs have settled to the bottom, remains clear.

"The beaker may now be set aside where it will not be exposed to sudden changes of temperature, and the eggs will require no further attention until the embryos begin to swim, which will be in from two to six hours, according to the temperature. The little oysters must, of course, be supplied with fresh sea-water from time to time during their development, and as they are so small that the water cannot be drawn off after they begin to swim, they must be supplied with fresh water by transferring them from time to time to larger and larger beakers. In two hours or so after the eggs are fertilized, the embryos begin to swim, and crowd to the surface of the water in great numbers and form a thin stratum close to the surface. This layer of embryos may be carefully siphoned off into a very small beaker, and a little fresh sea-water added. In an hour or so, there will be a new layer of embryos at the surface of beaker No. 1, and these should be siphoned into No. 2, and this should be repeated as long as the embryos continue to rise to the surface of the first beaker. Every five or six hours a little fresh sea-water should be poured from the height of a foot or more into beaker No. 2, until it is filled. The contents should then be poured into a larger beaker, and sea-water added four or five times a day as before. In this way the embryos may be kept alive for a week, although they have by this time got into such a large vessel that it is impossible to find any of them for microscopic examination."

It was really kind in Dr. Brooks to give so simple, full, and clear

a statement of his methods of hatching the spawn. The amateur should begin pretty much in this way, and he will find after a little experience that he can even simplify this process. The most recent experimenters have reduced some of these operations to methods more like those practiced in fish culture. The mode is given by Dr. Ryder in *Forest and Stream:*

"During the past season, [summer of 1882,] I have found after opening the animal carefully, that it is easy to remove the ova and milt from the female and the male by stroking the generative ducts towards their outlet, when the products can be picked up by a pipette or 'medicine dropper,' and transferred to water free from extraneous matters of every kind. I have also found that when the milky mass is dropped into water the character of the cloud of particles produced in the water at once determines the sex of the individual from which the spawn has been obtained. If the animal be a male the cloud produced upon stirring, breaks up into wisps and streaks, which resemble the cirrous clouds or mare's tails of meteorologists. If the specimen be a female, the spawn when dropped into the water immediately breaks up into a distinctly granular cloud. These differences are so marked that any person may be taught to recognize them in a few minutes. The new method of removing the spawn and milt from the reproductive organs insures greater success in impregnation. Ninety per cent. of the eggs may be fertilized by the new method; a result scarcely possible with the usual plan of chopping up the reproductive organs. This method, together with the mode of discriminating the sexes without the use of a microscope, puts us in a fair way to realize some part of a scheme of artificial propagation."

Lieutenant Winslow, Dr. Ryder and Colonel McDonald continued their work on artifical breeding through the spawning season of 1882. The two last mentioned succeeded in obtaining "the fixation of the fry to the sides of the hatching vessels twenty-four hours after impregnation." This is very promising. Complete success, however, is yet prospective, and the results of these and further experimentations are looked for with some impatience. Perhaps this is especially true of such experiments as those of Lieutenant Winslow's future deposits of artificially-raised fry in the open waters.

The reader will now perceive that one great point in the problem, supposing the eggs to have been successfully hatched, is how to secure the "set" or "catch," that is, the attachment of the fry, so as to become spat. There are two general methods from which to choose.

They can be set adrift in open waters where there is proper cultch for them to attach to. This cultch may be oyster shells or other objects strewn on the bottom, or set in the water. But if a slime should settle on the cultch, there would be no set or catch, and the fry would be lost, unless some borne away should attach elsewhere. Captain Brown, of Keyport, has brought such instances under my notice. The boundary poles locating fishermen's nets lately became covered with oyster spat. It was observed that for a space on each pole, marking the difference of low and high tide, there was no spat; also, for a space of some two feet from the bottom there was none. The last fact was due to the action of the active water, which kept the mud stirred up and slimed the poles, but really kept the rest of each pole clean, which part was covered with spat. In the same village a little stir was occasioned by a find at the new dock of the Freehold and New York Railroad. A bed of fine "naturals" was under and around the dock. It was found that the new piles had been literally covered with young oysters. The fry had set on the bark, and such was their rapid growth, that by their weight they had pulled the bark off and fallen on the bed. As already shown the planting of brush in the ordinary oyster culture has in some instances succeeded. But all these open methods are precarious. One season may give a "good catch," and the "good luck" may then pass over, and for no apparent or traceable cause. I have mentioned that the Japanese drive bamboo stakes for collectors. The Chinese have a method in some respects like the French claire or propagating pond, but more expensive, a sort of open cistern. Surely, we can simplify and cheapen the nursery pond, for to this resort we must yet come. The open-water culture of the fry is too precarious, and too much a matter of chance or luck. At any rate I think the close-water method must supersede the open-water method in the new and scientific oyster culture.

Dr. Ryder says M. Brandely succeeded, at Verdon, in artificially fertilizing the eggs of *O. angulata*. The vital properties of both elements were retained for two or three hours. The embryos began to swim in seven hours. The shell was formed on the sixth to the seventh day. The temperature of the water was about seventy-one degrees Fahrenheit. But as showing what has been done in a small pond about thirty-five feet square, I shall quote the following from Dr. Ryder's fuller citation in "*Science.*"

The remarkable success of M. Bouchon Brandely in rearing spat from the artifi-

cially-fertilized ova of *O. angulata* (the Portuguese oyster), at Verdon, in France, as reported in the *Annals and Magazine of Natural History* for October, 1882, and his still later reports to the Minister of Marine of France, in the *Journal Officiel de la Republique Française*, are of the greatest moment as applied to practical oyster culture. M. Brandely, after determining that *O. angulata* was unisexual, like the American species, conceived the idea of rearing the spawn by artificial means. In order to do this, two adjoining oyster claires or ponds, fed by the tides, were arranged at Verdon; the one acting like a reservoir, from which the fresh sea-water (brackish) was drawn through a tube, provided with a filter consisting of a sponge at either end, into the lower experimental claire. The water percolated out of the latter through a bed of fine sand; in this way the embryonized ova placed in this pond were kept from escaping. Fertilized eggs were then put into the experimental pond from day to day, while a number of collectors, or tiles, were at once submerged in the same. In somewhat more than a month success had attended his experiments; and in the course of further experiment, still greater success was attained, when about four thousand spat had been found affixed to a single tile, under circumstances which admitted of no doubt as to their having been the product of the artificially-impregnated eggs placed in confinement in their vicinity. It was found, moreover, that the artificially-fertilized eggs had actually developed into spat in the closed claire a month before any had made their appearance on the thousands of tiles placed on the natural banks in the Gironde.

In my own article on the oyster in *Popular Science Monthly*, 1874, I ventured the intimation that we should have to adopt the French methods. These, in brief, are placing the swarming oysters in an enclosed space of limited dimensions with proper cultch and ample protection of the spawn, the fry and the spat from their worst enemies.

Dr. Ryder, in his address already cited, says: "An earnest, and it is to be hoped, successful effort is being made by the United States and Maryland Fish Commissions to introduce the most approved French methods into the waters of Maryland, and to supplement these by even more advanced processes, if practicable.

"The uncertainty which has hitherto attended ostraculture must disappear in the face of intelligent experiment, and it is to be hoped that in a few years more we will hear of oyster nurseries or incubating establishments in successful operation, where millions of spat will be annually bred from artificially-impregnated eggs, to be sold as seed to planters, who will enter upon the business of ostraculture on an entirely new and scientific basis.

"In this country narrow coves and inlets, with comparatively shallow water, appear to furnish the best conditions for the nutrition and growth of oysters; and, according to my own experience, these are the places where we actually find minute animal and vegetable life in the greatest abundance, and, as might have been expected, the oysters

planted in such situations appear to be in good condition early in the autumn, long before those which are found in deeper and more active water, where this food has less chance to multiply. If the French mode applies successfully to an inferior species, ours, which grows so much more rapidly, ought to derive a proportionally greater benefit from being treated in the same way."

These are wise words. Already has this, our American discovery, been proven to be practical abroad. At the recent Edinburgh Fisheries Exhibition, Mr. Littlewood exhibited English spat five months old, raised from eggs artificially impregnated. This new mode in ostraculture hints at a peculiar natural capacity which the State of New Jersey possesses over every other State. I allude to her topical advantages. Her coast line is remarkable for its coves, large and small; its many small rivers and inlets, which produce natural oysters nowhere excelled in quality. These quiet waters are the choicest places for oyster nurseries. In them the system of French parcs, oyster breeding grounds, could be conducted with perfection. It is a settled fact that native seed when planted in our waters grows much more rapidly than Southern plants, and the article produced is incomparably superior in quality. Once successfully established, the new oyster nurseries would become a source of great local wealth. These oyster parks could be made to be a double source of income. The local nurseryman could sell the oyster seed to great advantage, and be raising in the same place large oysters for market at the same time, while the general planter, working his beds in the open water, finding it now possible to buy native seed, would, in the increase and superiority of his crops, and the better market prices secured by them, be gradually led to give up the Southern or inferior plants. Here would be a double increase of wealth to the State. The great drain of money in buying Southern plants would be stopped, and the enhanced reputation of the home product would result in a corresponding hold of the market.

So far in our State, agriculture has escaped the greed of the monopolist. This is hardly true of the harvest of the sea. The capture of fish with nets drawn by steam, and literally cleaning out the living crop, shows how matters are tending. And too often operations of this sort have an unfavorable bearing on the welfare of the State. It is an outside interest. That certainly is a wholesome condition of labor in any community where small but thrifty capitalists abound. In this view of matters how promising a future the field of ostraculture is.

The fretted coast of New Jersey offers grand possibilities. The new industry would occupy these places in part with oyster nurseries, and soon the general waters would become rich again with the high-quality mollusks of traditional days. Here, then, would arise enterprise both among those of limited means as well as the expanded industry which fostering capital would evolve.

CHAPTER VII.

EMBRYOLOGY OF THE OYSTER.

Of the doctrine of the development of the American oyster from the egg, nothing was known until the recent labors of Dr. W. K. Brooks gave the process to the world. But the work containing this is practically out of reach of the working oysterman. Being courteously allowed the use of the plates in the reports of T. B. Ferguson, Commissioner of Fisheries for Maryland, and believing that among our young men engaged in the business of oyster culture, are some whose education and tastes will lead to experimentation, if instruction be afforded, I shall in this chapter reproduce from those reports enough, for our purpose, of Dr. Brooks' work, giving also in the Plates V. to XIV., inclusive, figures of the egg of the oyster and the young oyster in progressive stages of growth.

Having got the eggs, as directed in Chapter VI., let us, following Dr. Brooks' written account, proceed to examine their fertilization and development. Says the Doctor:

The body of the oyster, like that of all animals, except the very simplest, is made up of organs, such as the heart, digestive organs, gills, and reproductive organs, and these organs are at some period in the life of the oyster made up of microscopic cells. The eggs shown in Figs. 49 and 53 will answer to illustrate the character of the cells which compose the body. Each of these consists of a layer of protoplasm around a central nucleus, which, in the egg, is a large, circular, transparent body known as the germinative vesicle. Each cell of the body is able to absorb food, to grow and to multiply by division, and thus to contribute to the growth of the organ of which it forms a part. The ovarian eggs are simply the cells of an organ of the body, the ovary, and they differ from the ordinary cells only in being much larger and more distinct from each other; and they have the power, when detached from the body, of growing and dividing up into cells, which shall shape themselves into a new organism like that from whose body the egg came. Most of the steps in this wonderful process may be watched under the microscope, and owing to the ease with which the eggs of the oyster may be obtained, this is a very good egg to study.

About fifteen minutes after the eggs are fertilized they will be found to be covered with male cells, as shown in Fig. 51. In about an hour the egg will be found to have changed its shape and appearance. It is now nearly spherical, as shown in

Fig. 1, and the germinative vesicle is no longer visible. The male cells may or may not still be visible upon the outer surface. In a short time a little transparent point makes its appearance on the surface of the egg, and increases in size, and soon forms a little projecting transparent knob—the *polar globule*—which is shown in Fig. 3 and in succeeding figures.

Recent investigations tend to show that, while these changes are taking place, one of the male cells penetrates the protoplasm of the egg and unites with the germinative vesicle, which does not disappear, but divides into two parts, one of which is pushed out of the egg and becomes the polar globule, while the other remains behind and becomes the nucleus of the developing egg, but changes its appearance so that it is no longer conspicuous. The egg now becomes pear-shaped, with the polar globule at the broad end of the pear, and this end soon divides into two parts, so that the egg (Fig. 6) is now made of one large mass and two slightly smaller ones, with the polar globule between them.

The later history of the egg shows that at this early stage the egg is not perfectly homogeneous, but that the protoplasm which is to give rise to certain organs of the body has separated from that which is to give rise to others.

If the egg, at the stage shown in Fig. 6, were split in the plane of the paper, we should have what is to become one half of the body in one part and the other half in the other. The single spherule at the small end of the pear is to give rise to the cells of the digestive tract of the adult, and to those organs which are to be derived from it, while the two spherules at the small end are to form the cells of the outer wall of the body and the organs which are derived from it, such as the gills, the lips, and the mantle, and they are also to give rise to the shell. The upper portion of the egg in this and succeeding figures is to become the ventral surface of the adult oyster, and the surface which is on the right side in Fig. 6, is to become the anterior end of the body of the adult. The figure, therefore, shows the half of the egg which is to become the left half of the body. The upper portion of the egg soon divides up into smaller and smaller spherules until at the stage shown in Figs. 24, 25, and 26 we have a layer of small cells wrapped around the greater part of the surface of a single large spherule, and the series of figures shows that the latter is the spherule which is below in Fig. 6. This spherule now divides up into a layer of cells, and at the same time the egg, or rather the embryo, becomes flattened from above downward, and assumes the shape of a flat oval disk. Figs. 29 and 30 are views of the upper and lower surface of the embryo at about this time. In a sectional view, Fig. 31, it is seen to be made up of two layers of cells; an upper layer of small transparent cells, *ec*, which are to form the outer wall of the body, and which have been formed by the division of the spherules which occupy the upper end of the egg in Fig. 25, and a lower layer of much larger, more opaque cells, *g*, which are to become the walls of the stomach, and which have been formed by the division of the large spherule, *a*, of Fig. 25.

This layer is seen in the section to be pushed in a little toward the upper layer, so that the lower surface of the disk-shaped embryo is not flat, but very slightly concave. This concavity is destined to grow deeper until its edges almost meet, and it is the rudimentary digestive cavity. A very short time after this stage has been reached, and usually within from two to four hours after the eggs were fertilized, the embryo undergoes a great change of shape, and assumes the form which is shown in three different views in Figs. 32, 33, 34 and 35.

A circular tuft of long hairs, or cilia, has now made its appearance at what is thus marked as the anterior end of the body, and as soon as these hairs are formed they

begin to swing backward and forward in such a way as to constitute a swimming organ, which rows the little animal up from the bottom to the surface of the water, where it swims around very actively by the aid of its cilia. This stage of development, (Fig. 32), which is of short duration, is of great importance in raising the young oysters, for it is the time when they can best be siphoned off into a separate vessel and freed from the danger of being killed by the decay of any eggs which may fail to develope. On one surface of the body at this stage, the dorsal surface, there is a well-marked groove, and when a specimen is found in a proper position for examination, the opening into the digestive tract is found at the bottom of this groove. Fig. 33 is a sectional view of such an embryo. It is seen to consist of a central cavity, the digestive cavity, which opens externally on the dorsal surface of the body by a small orifice, the primitive mouth, and which is surrounded at all points, except at the mouth, by a wall which is distinct from the outer wall of the body. Around the primitive mouth these two layers are continuous with each other.

The way in which this cavity, with its wall and external opening, has been formed, will be understood by a comparison of Fig. 33 with Fig. 28. The layer which is below in Fig. 28 has been pushed upward in such a way as to convert it into a long tube, and at the same time the outer layer has grown downward and inward around it, and has thus constricted the opening. The layer of cells which is below in Fig. 28 thus becomes converted into the walls of the digestive tract, and the space which is outside and below the embryo, in Fig. 28, becomes converted into an enclosed digestive cavity, which opens externally by the primitive mouth.

This stage of development, in which the embryo consists of two layers, an inner layer surrounding a cavity which opens externally by a mouth-like opening, and an outer layer, which is continuous with the inner around the margins of the opening, is of very frequent occurrence, and it has been found, with modifications, in the most widely separated groups of animals, such as the star-fish, the oyster, and the frog, and some representatives of all the larger groups of animals, except the *Protozoa*, appear to pass during their development through a form which may be regarded as a more or less considerable modification of that presented by our oyster-embryo. This stage of development is known as the *gastrula* stage.

Certain full-grown animals, such as the fresh-water hydra and some sponges, are little more than modified gastrulas. The body is a simple vase, with an opening at one end and communicating with a digestive cavity, the wall of which is formed by a layer of cells, which is continuous around the opening with a second layer, which forms the outer wall of the body. This fact, together with the fact that animals of the most widely separated groups pass through a gastrula stage of development, has led certain naturalists to a generalization, which is known as the "gastrula theory." This theory or hypothesis is that all animals, except the *Protozoa*, are more or less direct descendants of one common but very remote ancestral form, whose body consisted of a simple two-walled vase, with a central digestive cavity opening externally at one end of the body.

An eminent savant controverts Dr. Brooks' statement of the existence of a true gastrula stage in the development of the oyster. As the point is a very recondite one, and can hardly have any practical bearing on ostraculture, we can afford to dismiss it entirely. Besides, we

are not disposed to listen to criticisms upon one whose work in 1879 has given an impulse to these investigations at home and abroad, such as entitles him to be regarded as an epoch-maker in this line of study.

The edges of the primitive mouth of the oyster continue to approach each other, and finally meet and unite, thus closing up the opening, as shown in Fig. 36, and leaving the digestive tract without any communication with the outside of the body, and entirely surrounded by the outer layer. The embryos shown in Figs. 32 and 36 are represented with the dorsal surface below, in order to facilitate comparison with the adult, but in Fig. 37, and most of the following figures, the dorsal surface is uppermost, for more ready comparison with the adult. The furrow in which the primitive mouth was placed still persists, and soon a small irregular plate makes its appearance at each end of it. These little plates are the two valves of the shell, and in the oyster they are separated from each other from the first, and make their appearance independently.

Soon after they make their appearance, the embryos cease to crowd to the surface of the water, and sink to various depths, although they continue to swim actively in all directions, and may still be found occasionally close to the surface. The region of the body which carries the cilia now becomes sharply defined, as a circular projecting pad, the *velum*, and this is present and is the organ of locomotion at a much later stage of development. It is shown at the right side of the figure in Fig. 37, and in Fig. 45 it is seen in surface view, drawn in between the shells, and with its cilia folded down at rest, as they are seen when the little oyster lies upon the bottom.

The two shells grow rapidly and soon become quite regular in outline, as shown in Figs. 37 and 44, but for some time they are much smaller than the body, which projects from between their edges around their whole circumference, except along a short area, the area of the hinge, upon the dorsal surface, where the two valves are in contact.

The two shells continue to grow at their edges, and soon become large enough to cover up and project a little beyond the surface of the body, as shown in Fig. 44, and at the same time muscular fibres make their appearance and are so arranged that they can draw the edge of the body and the velum in between the edges of the shell, in the manner shown in Fig. 45. In this way that surface of the body which lines the shell becomes converted into the two lobes of the mantle, and between them a mantle cavity is formed, into which the velum can be drawn when the animal is at rest. While these changes have been going on over the outer surface of the body, other important internal modifications have taken place. We left the digestive tract at the stage shown in Fig. 36, without any communication with the exterior.

Soon the outer wall of the body becomes pushed inward, to form the true mouth, at a point (Fig. 37) which is upon the ventral surface, and almost directly opposite the point where the primitive mouth was situated at an earlier stage. The digestive cavity now becomes greatly enlarged, and cilia make their appearance upon its walls, the mouth becomes connected with the chamber which is thus formed, and which becomes the stomach, and minute particles of food are drawn in by the cilia, and can now be seen inside the stomach, where the vibration of the cilia keeps them in constant motion. Up to this time the animal has developed without growing, and at the stage shown in Fig. 36 it is scarcely larger than the unfertilized egg, but it now begins to increase in size. The stages shown in Figs. 44 and 45 agree pretty closely with the figures which European embryologists give of the oyster-embryo at the time

when it escapes from the mantel chamber of its parent. The American oyster reaches this stage in from twenty-four hours to six days after the egg is fertilized; the rate of development being determined mainly by the temperature of the water.

Soon after the mantle has become connected with the stomach, this becomes united to the body wall at another point a little behind the mantle, and a second opening, the *anus*, is formed. The tract which connects the anus with the stomach lengthens and forms the intestine, and, soon after, the sides of the stomach become folded off to form the two halves of the liver, as shown in Fig. 44.

Various muscular fibres now make their appearance within the body, and the animal assumes the form shown in Figs. 44 and 45.

All my attempts to get later stages than these failed, through my inability to find any way to change the water without losing the young oyster, and I am therefore unable to describe the manner in which the swimming embryo becomes converted into the adult, but I hope that this gap will be filled, either by future observations of my own or by those of some other embryologist.

An item which reached me too late for its place in Chapter VI. is not unreasonable here. The device which Dr. Brooks needed for "changing the water without losing the young oyster" was afterwards invented by Col. M. McDonald, of which Dr. Ryder gives an account in *Science*. That none may fail to understand it, I shall make bold to describe it myself.

It is really a Wolffian bottle on a large scale. An aquarium is put at a high level for a feeder or reservoir. This is filled with sea-water that has been carefully filtered through cotton. Below this is a series of glass jars at different elevations, the nearest one being the highest of the series, and the distant one being the lowest, near which is another aquarium, which receives the water after it has passed through the entire series. The water in the floor aquarium, or receiver, is bailed back again into the shelf aquarium, or reservoir. The entire series is connected by tubing, acting like a continuous siphon. This device secures the following advantages: A gentle and increasing movement of the water; thorough aeration of the same; and perfect preservation from loss of the invisible fry or larval oysters.

Although careful reference has been made to each figure as we have proceeded, in order to make easy the understanding of the Plates, we shall now reproduce Dr. Brooks' own explanation of them in regular order.

EXPLANATION OF PLATES.

Figures of the egg of the oyster and the young oyster in progressive stages of growths drawn by and illustrating the studies of Dr. W. K. Brooks. From the report for 1880 *of T. B. Ferguson, Commissioner of Fisheries of Maryland.*

For the sake of those who use the microscope it seems necessary that I should give the following paragraphs from Dr. Brooks' report of his work:

"Unless the contrary is stated, the figures are drawn with a magnifying power of two hundred and fifty diameters, Zeiss. F. 2, but it was necessary to amplify the sketches considerably, in order to reproduce by the process of photo-engraving the features which this magnifying power rendered visible, and the figures as they are reproduced are of about twice the diameter of camera sketches made with the same magnifying power.

"The first thirty-two figures show the process of segmentation. Fig. 1 is an egg at the end of the first period of rest; Figs. 2, 3, 4, 5, 6 and 7, the changes during the first period of activity; Figs. 8, 9, 10, 11, 12 and 13, the changes during the second period of rest; Figs. 14, 15 and 16, those which took place during the second period of activity; Figs. 17, 18 and 19, those which take place during the third period of rest; Figs. 20 and 21, during the third period of activity; Fig. 22, during the fourth period of activity; Fig. 23, during the fifth period of activity, and the remaining figures show more widely-separated stages. In all the figures of segmentation, except Figs. 29, 30 and 31, the formative pole is above and the nutritive pole is below."

PLATE V.

Fig. 1. Egg two hours and seven minutes after fertilization. It is now perfectly spherical, with an external membrane and the germinative vesicle is not visible.

Fig. 2. The same egg two minutes later. It is now elongated, one end is wider than the other, and a transparent area at the broad end marks the point where the polar globules are about to appear. At the opposite end the external membrane is wrinkled by waves which run from the nutritive toward the formative pole in rapid succession for about fifteen seconds.

Fig. 3. The same egg two minutes later.

Fig. 4. The same egg two minutes later. The yolk has become pear-shaped. The polar globule has appeared at the formative pole, in the middle of the broad end of the pear, and the nutritive end of the egg is now less granular than the formative end.

Fig. 5. The same egg two minutes later. The equi-distant furrows have made their appearance, separating it into a single mass at the nutritive pole, and two at the formative pole. At this stage the three masses are about equal in size.

Fig. 6. The same egg two minutes later. The first micromere, *c*, is now perfectly separated and smaller than the second, *b*, and each is smaller than the macromere, *a*.

Fig. 7. The same egg one minute later. Both micromeres are separated and spherical, as is also the macromere. This stage ends the first period of activity.

Fig. 8. The same egg forty-five seconds later. The two micromeres have begun to fuse with each other, and the second micromere, *b*, is also partially fused with the macromere, *a*.

Fig. 9. The same egg one minute later. The first micromere, *c*, has also begun to unite with the macromere.

PLATE VI.

Fig. 10. The same egg one minute later. The line between the second micromere and macromere has disappeared, and the first micromere, *c*, now projects from one end of the elongated mass formed by the union of the spherules, *a* and *b*.

Fig. 11. The same egg three minutes later. The fusion of *a* and *b* is now complete, and a large transparent vesicle is now visible in the first micromere, *c*, and another in the compound mass, *a b*.

Fig. 12. The same egg two minutes and thirty seconds later.

Fig. 13. Another egg, about two minntes later. This is the true resting-stage, at the end of the second period of rest. The two vesicles have become irregular. The remains of an external membrane adhere to one side of the egg.

Fig. 14. The same egg seven minutes later than Fig. 13. The compound mass, *a b*, is elongated; the first micromere, *c*, is well defined, and waves travel from the nutritive toward the formative ends of the two masses. Two segmentation nuclei occupy the positions of

the large vesicles of earlier stages. This stage is the beginning of the second period of activity.

Fig. 15. The same egg one minute later. The second micromere, *b*, is now well defined, as well as the first.

Fig. 16. The same egg one minute later. This stage marks the end of the second period of activity. The formative end of the egg is now occupied by four micromeres, two of which seem to be the products of the division of the first micromere, *c*, and two of them the products of the second, *b*.

Fig. 17. The same egg two minutes later, at the commencement of the third period of rest. The second micromere, *b*, has again begun to fuse with the macromere, *a*.

Fig. 18. The same egg three minutes and thirty seconds later. The second micromere is no longer separated from the macromere, and the mass, *a b*, formed by their union, is nearly spherical.

PLATE VII.

Fig. 19. The same egg two minutes and a half later, at the end of the third period of rest, viewed at right angles to Fig. 18.

Fig. 20. The same egg thirteen minutes later, and in the same position as Fig. 18. The spherule, *c*, of Fig. 19 has divided into two, and the second micromere, *b*, has become prominent, so that there are five micromeres at the formative pole.

Fig. 21. The same egg one minute later, and in the same position as Fig. 19.

Fig. 22. The same egg, in the position of Fig. 20, fifteen minutes later than Fig. 21, and in the fourth period of activity. There are now seven micromeres at the formative pole, six on one side of the polar globules, and one, the second micromere, *b*, on the other.

Fig. 23. The same egg twenty-one minutes later, viewed from the side opposite the second micromere. The cells, which have been formed by the division of the micromeres of the stage 19, now form a layer, the ectoderm, which rests, like a cap, on the macromere, *a*.

Fig. 24. The same egg five hours and fifteen minutes later, in the same position as Fig. 22, but not quite as much magnified. On one side the polar globule is still separated from the macromere, *a*, by a single spherule—the second micromere, *b*. Opposite this the growing edge, *g*, of the ectoderm is spreading still farther down over the macromere. At the point *g*, and at four other points, are pairs of

small cells, which have evidently been formed by the division of the larger spherules.

Fig. 25. Another egg at about the same stage.

Fig. 26. The egg shown in Fig. 24, fifty-five minutes later. The macromere, *a*, is almost covered by the ectoderm, and the second micromere, *b*, has divided into a number of spherules. At the growing edge, *g*, an ectoderm spherule is seen separating from the macromere.

Fig. 27. A similar view of an egg twenty-seven hours after impregnation. The macromere is almost covered by the ectoderm, *e c*, and is not visible in a side-surface view. At *g* is an ectoderm spherule, which is separating from the macromere.

Fig. 28. Optical section of the same egg; *ec*, ectoderm; *e n*, macromere, divided into two spherules. No segmentation cavity can be seen in a normal egg at this or any of the preceding stages.

PLATE VIII.

Fig. 29. View of the nutritive pole of an egg a few hours older.

Fig. 30. View of the formative pole of a still older egg.

Fig. 31. Optical vertical section of a somewhat older egg, figured with the polar globule above and the ectoderm to the right. The egg is now flattened from above downward, and is disc-shaped in a surface view. The macromere has given rise to a layer of larger granular cells, which are pushed in so as to form a large cup-shaped depression. The more transparent ectoderm, *ec*, now carries a few short cilia scattered irregularly, and the two layers are separated from each other by a segmentation cavity. This figure is in Plate VII.

Fig. 32. Surface-view of the embryo at the first swimming stage.

Fig. 33. Optical section of the embryo at the first swimming stage. The ectoderm has folded upon the endoderm, so as to form a primitive digestive cavity, with an external opening, *g*. The cilia of the velum have now made their appearance around the area occupied by the polar globule. This was not present in the egg from which the figure was drawn, but it was seen in other eggs, and is shown in a later stage of another embryo, Fig. 36.

Figs. 34 and 35. Two surface-views of the embryo shown in Fig. 32.

Fig. 36. An older embryo, in the same positions as Figs. 32 and 33. The external opening of the primitive digestive tract has closed

up, and the two valves of the shell have appeared in the place which it had occupied. The endoderm has no connection with the exterior, and no central cavity could be seen.

Fig. 37. A somewhat older embryo, figured with its dorsal surface above. There is a large, central, ciliated digestive cavity which opens externally by the mouth, *m*, which is almost directly opposite the primitive opening, the position of which is shown by the shell, *s*.

PLATE IX.

Fig. 38. A similar view of a still older embryo. The shell, *s*, has increased in size, and the digestive tract has two openings, the mouth, *m*, and the anus, *an*, which are very near each other on the ventral surface.

Fig. 39. The opposite side of a still older embryo, in which the body-wall begins to fold under the shell, to form the mantle, *m*.

Fig. 40. Dorsal view of an embryo at about the same stage.

Fig. 41. Dorsal view of an embryo at the stage shown in Fig. 38, with its valves extended; *rs*, right valve of shell; *ls*, left valve of shell; *an*, anus; *a*, anal papilla; *ma*, mantle; *v*, velum; *b*, body-cavity; *st*, stomach.

Fig. 42. View of left side of still older embryo; *i*, intestines. Other letters as in Fig. 41.

PLATE X.

Fig. 43. Dorsal view of an embryo six days old, swimming by the cilia of its velum.

Fig. 44. View of right side of another embryo at the same stage; *mu*, muscles; *l*, liver. Other letters as in Fig. 41.

Figs. 45 to 47. Views of embryo.

PLATE XI.

Fig. 48. The seminal fluid of a ripe male oyster, mixed with water, and seen with a power of eighty diameters. *Zeiss.* a. 2.

Fig. 49. Fluid from the ovary of a ripe female oyster, seen with the same magnifying power.

Fig. 50. Seminal fluid of a ripe male oyster magnified five hundred diameters.

PLATE XII.

Fig. 51. Egg a few minutes after mixture with the male fluid, magnified five hundred diameters.

Fig. 52. Egg about thirty minutes after fertilization, magnified five hundred diameters.

Fig. 67. Section of a portion of the visceral mass of a male oyster magnified two hundred and fifty diameters. The surface-epithelium of the body is shown at the lower end of the figure. Above this is a loose, thick layer of wrinkled cells, which have the appearance of adipose cells from which all the fat has been removed. Above this layer is a large duct, lined with epithelial cells, and filled with ripe spermatozoa, which have been poured into it from two follicles, which communicate with it on each side. Above this are sections of a number of the follicles of testis, in three of which the contents are figured.

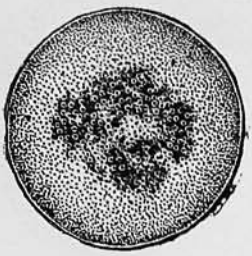
PLATE XIII.

Fig. 53. Section of a portion of the visceral mass of a female oyster, magnified two hundred and fifty diameters; *a*, epithelium of the surface of the body; *b*, layer of connective tissue; *c*, layer of wrinkled cells, which are probably fat-cells, from which all the fat has been removed; *f*, sections of ten ovarian follicles; *e*, the ovarian eggs.

PLATE XIV.

Figs. 54 to 66. Abnormal or direct form of segmentation.

PLATE V.



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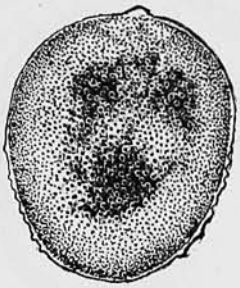

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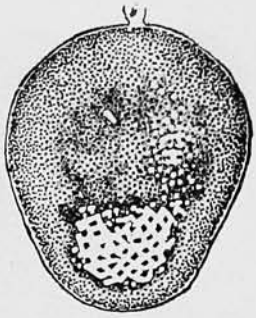

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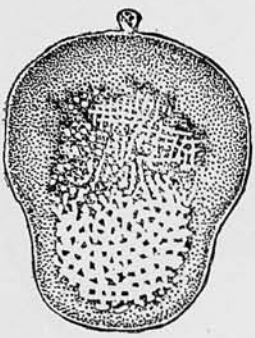

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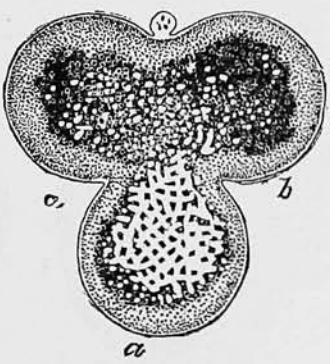

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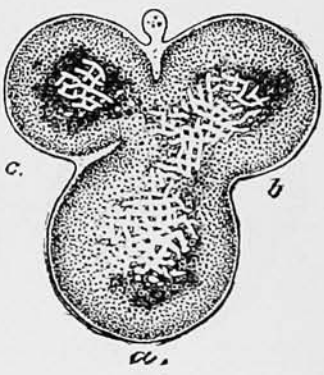

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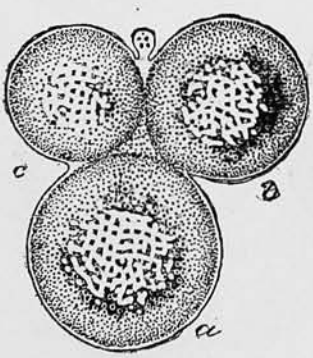

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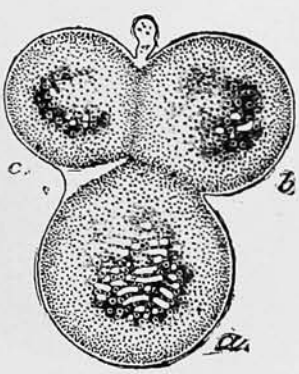

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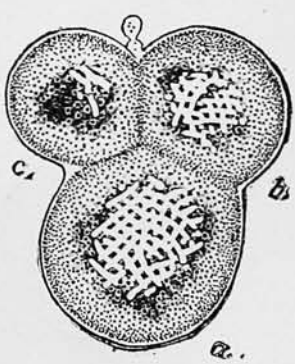

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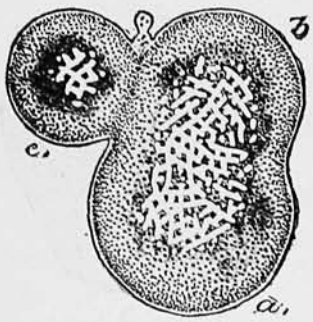

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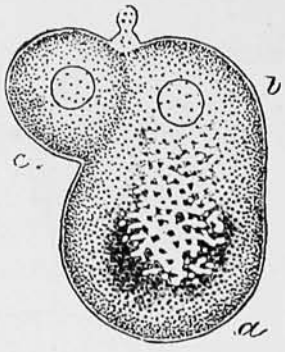

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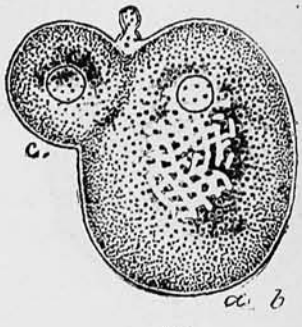

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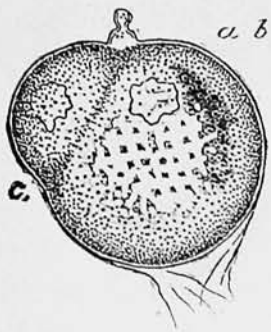

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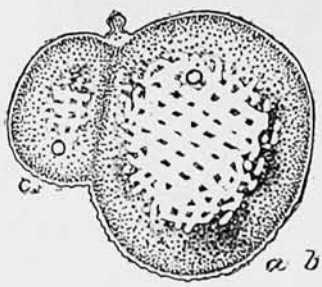

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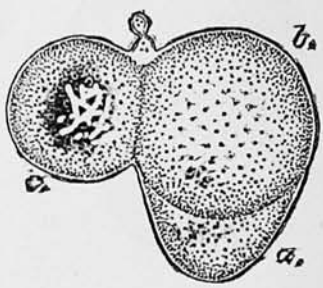

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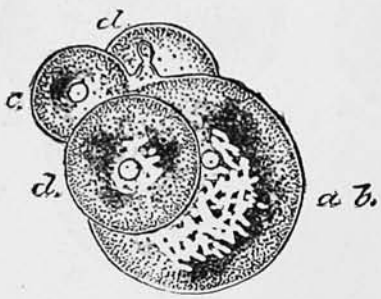

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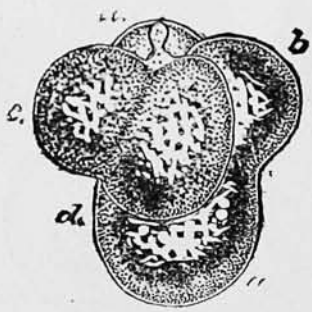

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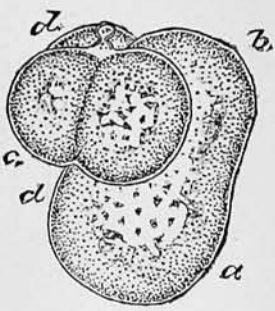

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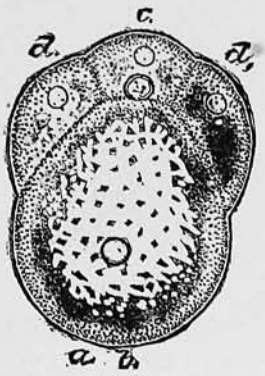

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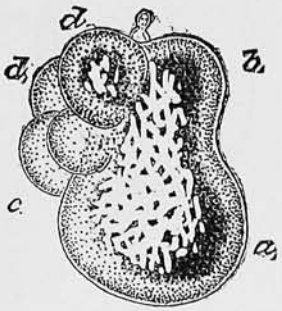

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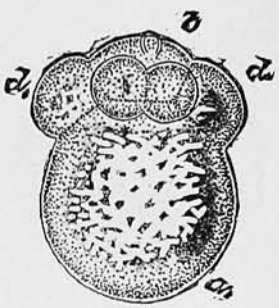

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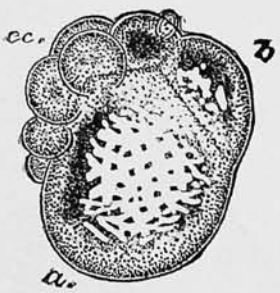

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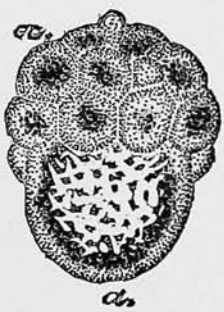

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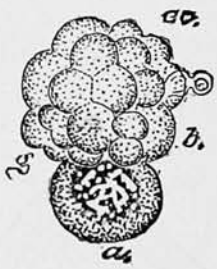

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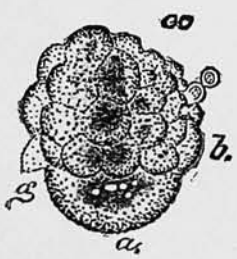

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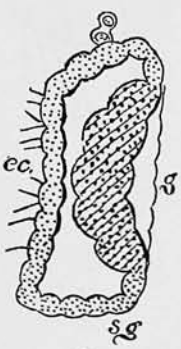

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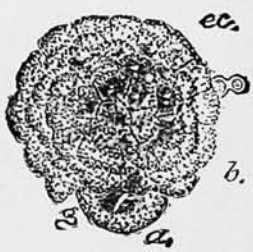

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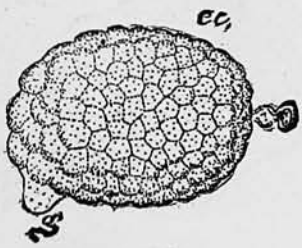

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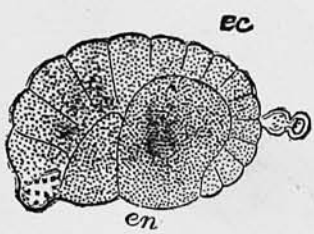

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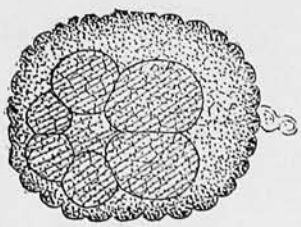

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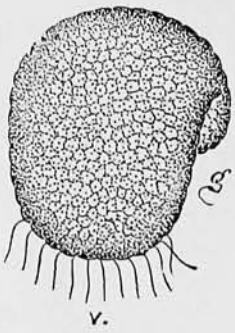

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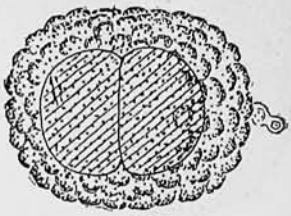

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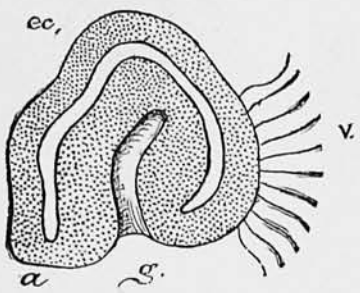

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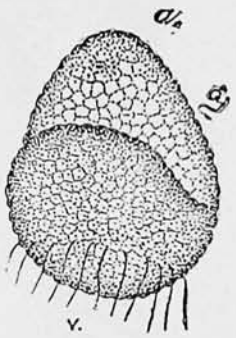

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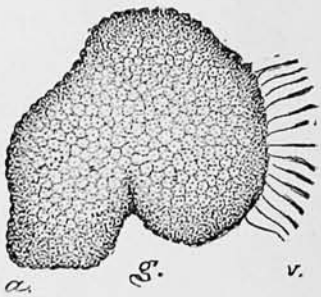

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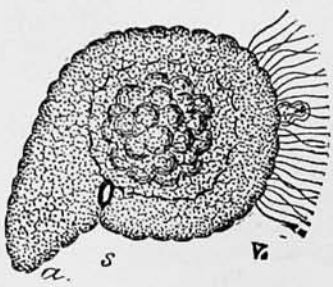

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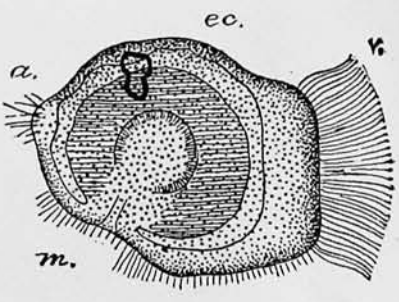

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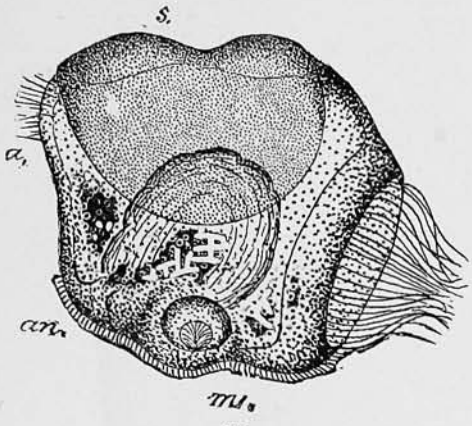

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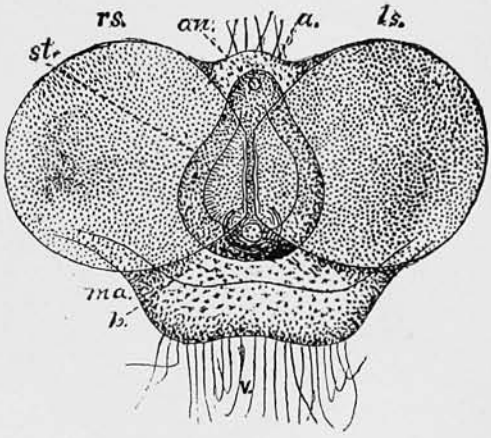

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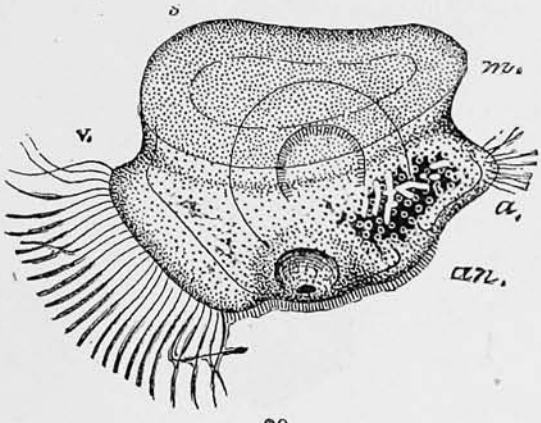

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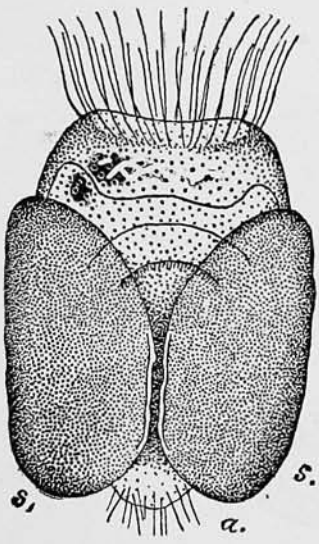

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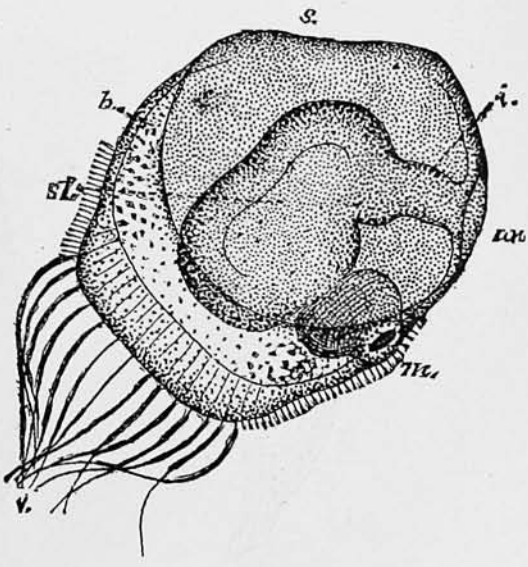

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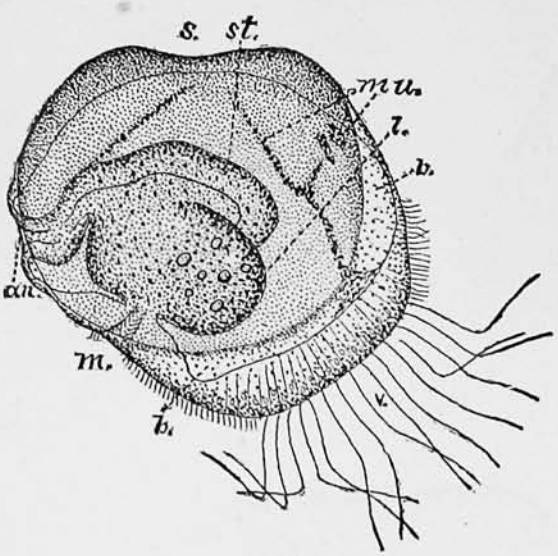

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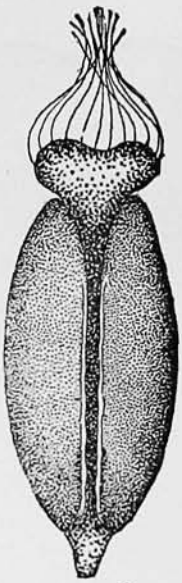

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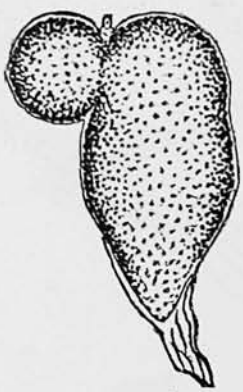

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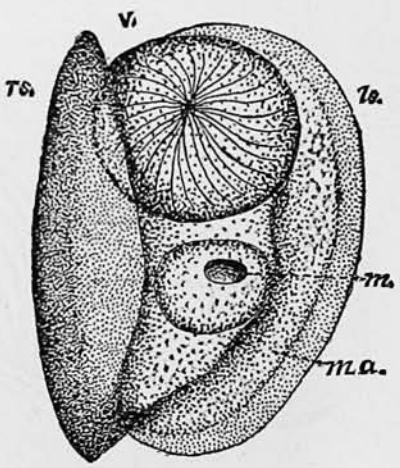

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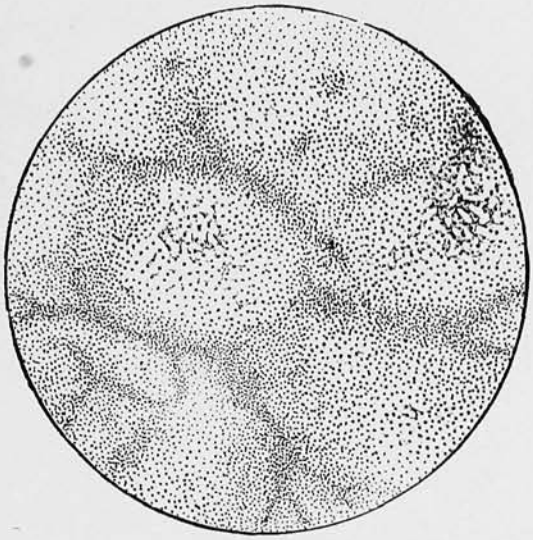

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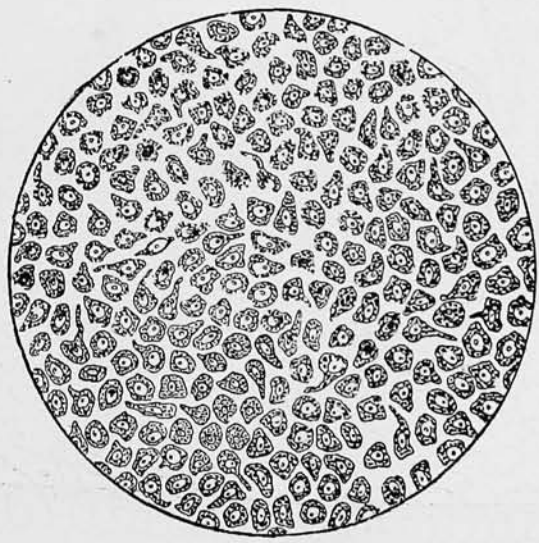

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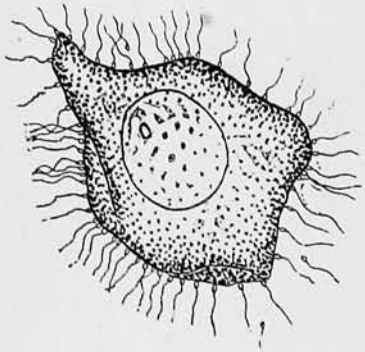

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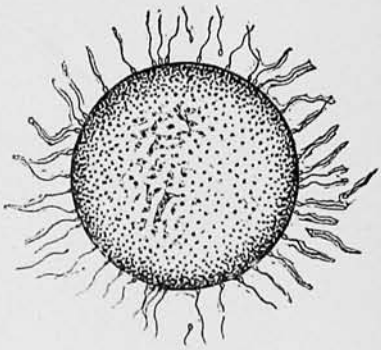

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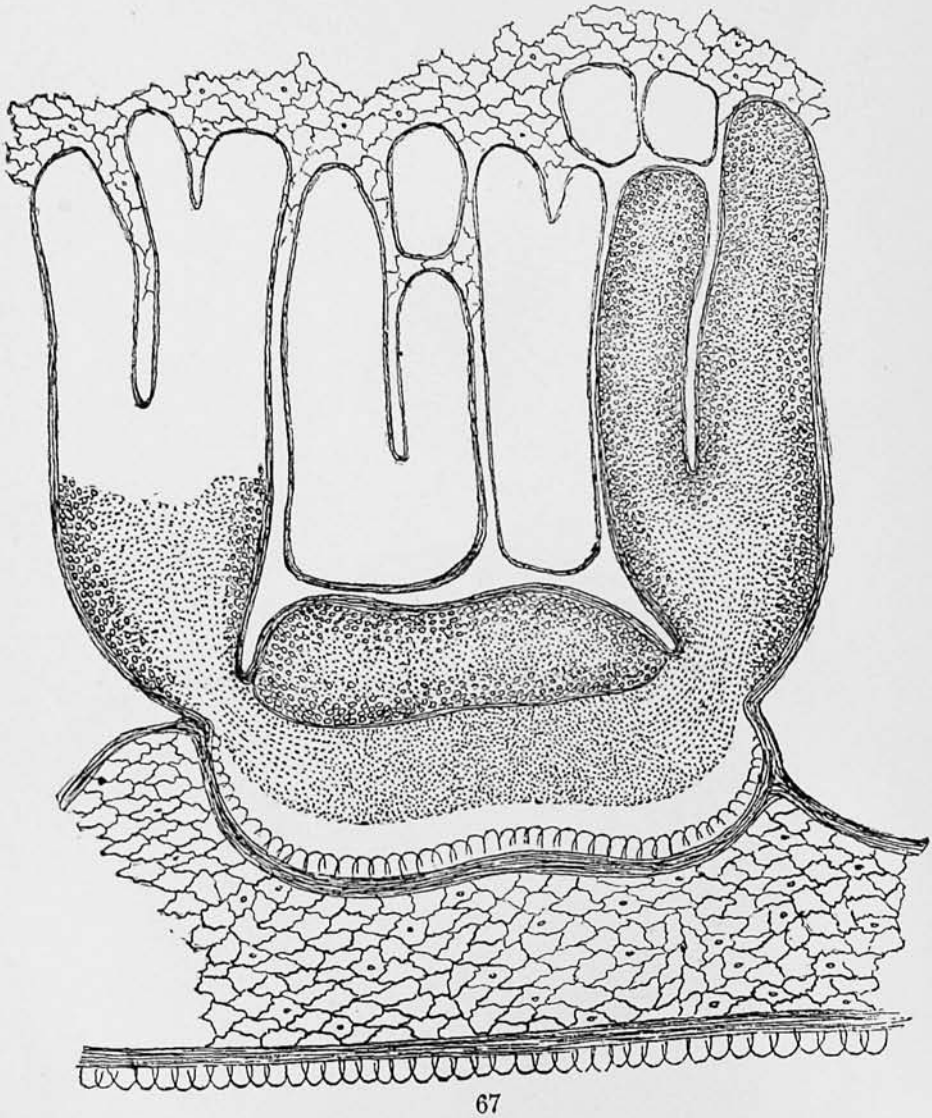

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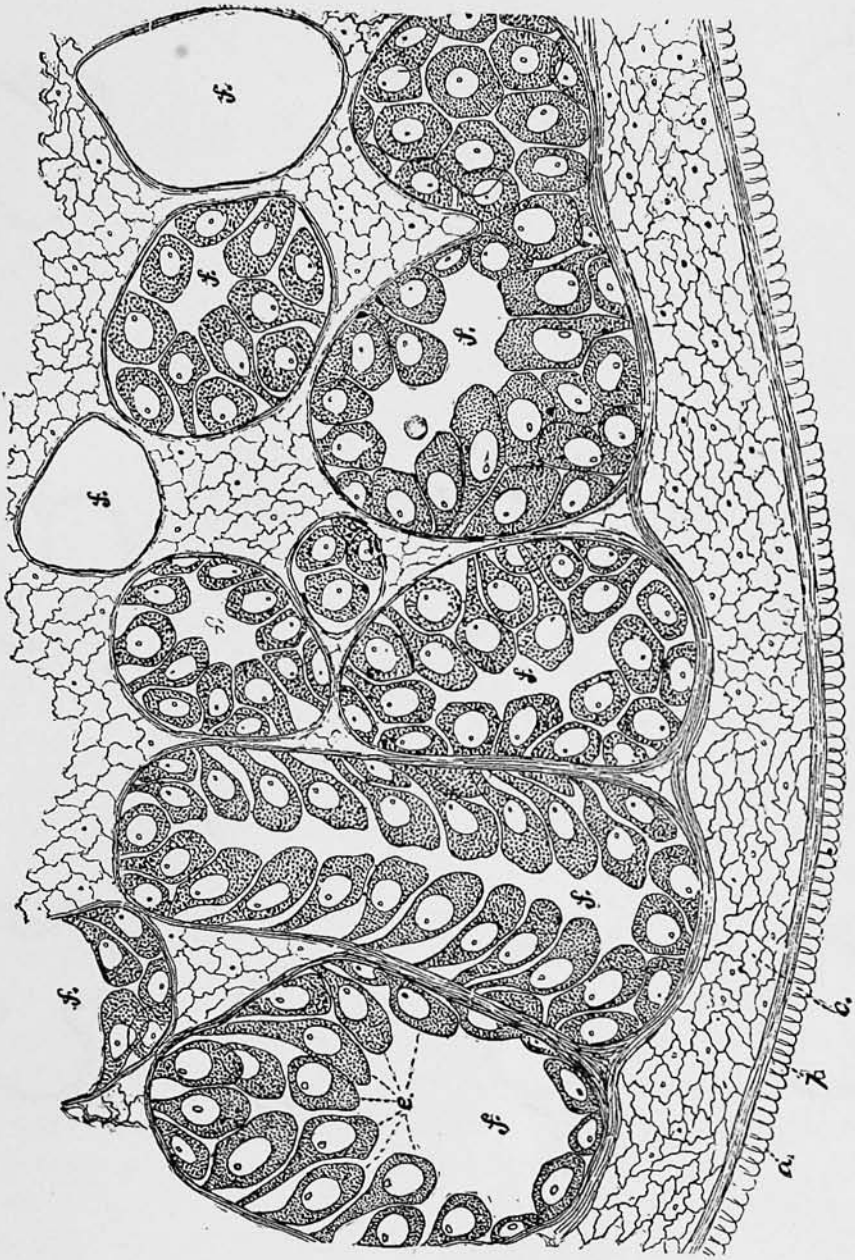
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PLATE XIV.

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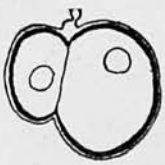

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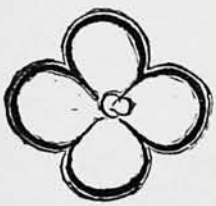

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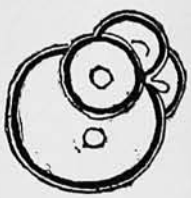

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CHAPTER VIII.

STATISTICS & MISCELLANEOUS SUGGESTIONS.

INFORMATION DERIVED FROM INTERVIEWS WITH PARTIES ENGAGED IN THE TRADE.

In NEWARK BAY about two hundred men are employed, during seven months of the year, in taking up seed from the natural beds. In 1881, the production amounted to 175,000 baskets; while in 1882 only 70,000 baskets were taken from the beds. Although the seed obtained is said to be the best in the world, the price received per basket is only fifty cents—less than is paid for seed from other parts of the country. The reason given for the decreased production and low price is, that many of the men engaged in the business, not only take up the large oysters, but as many shells as possible, selling them with the seed, and thus injure the beds and forfeit the confidence of the planters. Unless the beds are protected, it is asserted that the business will have to be abandoned soon; but that with proper protection the yield would be largely increased. The oystermen recommend the appointment of a commissioner, who is not interested in any particular locality, and shall have power to appoint for each of the natural beds, inspectors, whose duty it shall be to keep the beds supplied with a sufficient quantity of shells and larger oysters, and to prevent persons from carrying them off. The expenses incurred could be defrayed by license fees collected from each boat going on the beds.

At PERTH AMBOY the production of oysters during the year has been unusually small. A heavy freshet during the Fall of 1882, killed a large number, and so seriously injured the remainder as to render many of them unfit for the market. The planters, therefore, have been obliged to return to the beds many thousand baskets because of their poor condition. Two firms, (Shaffer & Co., and Larkin,) em-

ploy abont sixty hands, who open annually ten million oysters. The principal occupation of the oystermen at South Amboy consists in obtaining and selling seed to the planters at Perth Amboy. Fully 30,000 baskets have been sold during the year.

The natural beds in the RARITAN RIVER cover about twelve hundred acres of ground. The production of seed oysters averages about 65,000 baskets annually. The RAHWAY RIVER yields about 20,000 baskets of seed a year, and Cheesequakes Creek about 2,000 baskets.

The general complaint in this district, as elsewhere, is that, the natural beds being free to everybody, seed is constantly being taken away from them, and as a consequence, little effort is made to produce fresh supplies. A few planters, only, throw in shells and scatter a few bushels of oysters among them. It is the opinion of the planters that the cultivation of oysters should be supervised by inspectors, under the authority of the State. A planter should also have the prior right to a limited amount of ground by keeping it properly staked. Under the present system, after he has taken up his oysters, he has no right to the ground, even though he may desire to replant immediately.

In addition to the injury occasioned by the constant raking of the beds, fully one-quarter has been destroyed by the dredging done under the direction of the General Government for the improvement of the harbor.

While at KEYPORT the oysters were not so badly damaged as at Perth Amboy, the planters there have lost about two-thirds of the seed brought from Virginia. This loss was occasioned by delays, and as the oysters which were planted alive were in very poor condition, the production has been far below the average. But on the branches of the Shrewsbury River, the yield has been very large, equaling that of the best years.

A few miles below Keyport Messrs. Oumlick and Wood own three sloops, worth $3,000, and have planted six thousand baskets of seed in a cove. None of them have yet been taken up.

Owing to a very heavy falling off in seed supply during the past three years, oyster production in many places along BARNEGAT and TUCKERTON has not been as good in 1882 as formerly. The oysters in Great Bay, at the mouth of the Mullica River, have been in too poor condition to warrant a good price, and not more than one-fourth

of the usual quantity has been shipped. In Tuckerton and West Creek cove, on the contrary, the oysters have been in better condition than for several years past; but as the ground had been industriously fished and the seed supply was small, the quantity shipped has also been below the average there.

The natural or public beds (not less than 2500 acres in area) have been gradually failing for the past fourteen years, and unless some great change takes place on these grounds the oysters there will become extinct in a very few years. Quite a number of intelligent oystermen advocate very strongly a total rest of all or of a portion of these beds. It must be evident to a careful observer, that too small a quantity of large oysters for breeding purposes is left. "There are too many rakers and tongers for the size of the beds; the close scraping yearly taking away all the breeding oysters. There are now one hundred oystermen where there was only one fifteen years ago. The demand for oysters is greater than the supply. If only one-half of the grounds were permitted to be worked during one year, the beds would soon be as productive as ever."

The yield of marketable oysters and plants during the year was about 13,500 bushels. The capacity of the beds is over a million bushels; but for the last fifteen years the yield has been steadily decreasing.

"Virginia plants about half grown in size and brought on in early spring and planted in our bays have proved in some locations a very profitable investment. In Barnegat Bay, near the inlet, the increase in growth during the past summer was double. Opposite West Creek the increase was one-third. Another year will find the most available bottoms largely taken up with Virginia plants to grow and fatten for the markets. These plants from the South require certain conditions in their removal and a peculiar kind of bottom for their new quarters or they will prove an utter failure. For instance, it will not answer to bring the plants from a long distance up the Virginia rivers or bays and transplant them in our bays near the inlets, but they must be placed in as nearly the same conditions as where found. The same law to be observed in removing wild plants to our gardens regulates the transplanting of the oyster.

"The State would do well to appoint oyster commissioners to superintend all natural or public grounds, hire watchmen, aid in protecting the spawn and in carrying out the laws, generally."

The following extract, from Ingersoll's "Report on the Oyster Industry," 1880, will be interesting in this connection:

"Planting was long ago—perhaps fifty years—well under way in this region, and formerly, perhaps, was more widely followed than at present, but no more successfully. Leaving out of view the attempts just begun to foster the interest at Forked River, Barnegat is the northernmost place in this district where oyster culture is followed. To aid and protect this industry these laws were long ago made by the legislature, as annexed:

1. *Be it enacted*, * * * That it shall be lawful for any person, being a citizen of the State of New Jersey, and resident of the county of Ocean, within the boundaries hereinafter described for the purpose, to stake off any quantity of land covered with water, not exceeding two acres, marking the boundaries thereof by stakes or other marks, plainly visible to persons navigating the waters so occupied, to plant oysters; *provided*, that the share-owners shall have the right and preference to stake off as far as their deeds allow, by running their lines for that purpose.

2. *And be it enacted*, That the boundaries within which land may be so staked off and occupied shall be as follows: Beginning at Cedar Creek Point at low-water mark on the west bank of Barnegat Bay, along said bank to the south line of Ocean county, running off 300 yards distant from the shore.

3. *And be it enacted*, That oysters within the boundaries of all said waters shall be the private, personal property of the persons so occupying said land; * * * and any person who shall * * * injure or carry away the same, while said boundaries are so marked, shall be guilty of larceny * * * and shall forfeit * * * all the implements used for taking the same. * * *

"It would seem as though this language was plain enough to protect the interests of any one who availed himself of the privileges alluded to under its promise. However, there does not exist the public sentiment to secure the execution of the law. No man is willing to risk his money in planting, when he has no surety that he will be able to reap any reward for his outlay. Hence, oyster raising at Barnegat, where there are hundreds of acres of perfectly good but idle bottom, and plenty of capital ready to be thus employed, has dwindled, until the entire crop last season was reported at less than 8,000 bushels, all of which was consumed locally. As this small crop was divided among forty or fifty growers, one can easily see that nothing of a business is carried on here.

"The sentiment of the town opposes any change which shall protect individual planting. Night thieves and foggy-day oystermen, therefore, control and rule the oyster interests, making it so risky to plant that men of means will not put their money into it. Without some

betterment, oyster planting must continue to be a failure here as a business, though thousands of acres of good bottom remain unutilized, where both native and Southern seed would grow to great advantage and a most profitable industry, employing steadily all the now idle laboring element of the shore-towns, here and northward.

"To show how profitable oyster planting may be here, Captain Cox told me that some years ago he laid down a lot of young oysters which cost him $13. After two years he procured a man to take up and sell all that were upon the beds, giving his agent one-half. The returns to him were $57, his agent taking the like amount, showing an increase of about 1,000 per cent. In addition to this, a dozen or fifteen bushels were eaten by each of the two families.

"The experiment of 'shelling' has been made with great success, and it is said that any one might reasonably expect to get 100 bushels of seed from 20 bushels of stool laid down anywhere in the upper half of the Bay. Popular construction, however, makes such cultch-beds 'natural ground,' and everybody will go and rake. It has even occurred that a man's oysters, taken off his private bed and placed on staked ground in a creek to 'freshen,' have been raided upon by thieves, and though he could prove the facts he was unable to recover in local courts."

"There are 72 acres of natural oyster beds in and near the mouth of GREAT EGG HARBOR RIVER; but the annual production now is not more than 10,000 to 12,000 bushels, which is very much less than formerly. The principal cause of this is that the shells have been taken away and there is nothing for spawn to catch to. Capt. Wm. Jeffries said that, some years ago, he had bought a horse for one hundred bushels of oysters, at 30 cents a bushel, having caught them himself in one afternoon. Such a thing would now be impossible. The beds have been badly depleted and are not one-tenth as productive as formerly. The number of acres of natural beds in and near the mouth of the Mullica or Little Egg Harbor is said to be about 200. These are in the same condition as those of the Great Egg Harbor River. Properly protected and shelled they would produce ten times the present supply.

"All the oyster growers affirm that legislation is greatly needed to protect from depredation the private beds and the plants on the natural beds. Under existing laws, it is next to impossible to convict for stealing oysters, for a boat is so easily moved and the oysters are so

much alike as to make it impossible to identify them. The natural beds must also be saved from destruction. On October 1st, when the season opens, a great rush is made for these natural beds to secure 'plants' to put on the private beds, and so thoroughly are they scraped that old shells and 'blisters' are included in the capture. The result is that the tender plants die and the labor is wasted, while the taking away of the shells damages the natural beds more and more each year. Not only should no shells be taken from the natural beds, but 'blisters' and 'plants' smaller than four hundred to the bushel should also be left. Inducements should also be held out for planting shells. March or April, or both months, would be a better time for the 'open season,' as the plants removed then would be less liable to die from sudden changes in the temperature. Oyster wardens are needed to guard all beds during the 'close season.' At present, men who plant shells on their own grounds in the rivers, where the spawn will catch to them, have no protection. There are hundreds of flats in Great Egg Harbor River that could be made very productive by planting shells. One bushel of shells thus planted will produce two bushels of oysters. This would be inducement enough in itself, if thieves could be kept away."

"The natural beds in the TUCKAHOE RIVER are six in number, and are known in a general way as 'Stite's beds.' They cover a surface of about thirty acres, and, under proper restrictions and a judicious system of protection and extension, would furnish a supply adequate to the needs of the industry throughout the country. The River for about two miles from the mouth, in the opinion of those most familiar with the business, might be made an entirely solid seed bed. The bottom available for this purpose is about five hundred acres. If the planters could hold the beds, they would gladly shell the bottom, and by planting seed-oysters among the shells produce new ones. But as the product would still be a natural oyster and common property, no one cares to run the risk of having them appropriated by others. If the State would do something to develope this important branch of industry, a royalty on the amount caught could be made a source of revenue, while the planters would also be greatly benefited.

"The average yield of these beds formerly was seventy-five bushels per man; at the beginning of the present season it did not amount to six. A similar state of things seems to exist at Little Egg Harbor, as the amount planted during the year in this county, from both

places, formerly the chief sources of supply, was less than four hundred bushels. The cause of this is the merciless drain which is made upon the beds by continual tonging, both in and out of season, by people from the adjoining county. These people arrive before the catching season, and, living in their boats, remain near the beds which they visit in the night-time and take away not only the plants, large and small, but the shells to which they are attached. A number of them sometimes come in this way, work through the whole night and depart with the first streak of dawn. Thus the beds have been lowered more than two feet, and unless active measures be speedily taken to prevent it, they will be worked down to the level of the bed of the river, where the mud will cover and destroy them.

"There are also other places, which though not so extensive, might be made valuable to the industry by means of the facilities they offer for the cultivation of oyster plants. These are: Corson's Sound, Mill Creek, Lower Mill Creek, Turtle Thoroughfare, Doman's Creek, Cresse's Thoroughfare, Crooked Creek, Storm Harbor, &c. All these places could be made very valuable to the county, for the natural plants are valued at one-third more than those brought from the South. A person of intelligence and large experience said that Crooked Creek was worth $25,000 for seed purposes, while at present, as a natural privilege, it will not afford more than thirty bushels a year.

"A commission should be appointed for the purpose of carefully considering what legislation is necessary for the protection of the industry. The adverse interests of the clam and oyster industries should be looked into. Then the oyster business itself, should be regulated. In the judgment of the most intelligent planters this should be done through a moderate tax on the ground and increased protection. If the bottom were leased or taxed, no one would take more than he had actually planted. At present parties stake in large areas, and by scattering a few oysters over it, hold it to the exclusion of those who wish to plant it. As oyster ground requires rest after the growth of two or three successive plantings, the planter, in many cases, would gladly pay for the ground and let it rest until it again becomes profitably productive. This he does not dare to do now, for fear of the greed of his neighbors. Under an effective system of protection, all suitable ground would be seeded. A moderate rental per acre, a small tax on the oysters, and a royalty from the beds, would ensure a thorough protection to the planter, develope the seed beds, and bring in a revenue to the State.

"The acreage available for oyster planting is approximately as follows:

Tuckahoe River	500	Acres.
Peck's Bay and Thoroughfare	175	"
Corson's Sound and Thoroughfare	225	"
Ludlam's Bay and Thoroughfare	900	"
Townsend and Stite's Sound and Thoroughfare	1,000	"
Leaming's Sounds	1,100	"
Cresse's Thoroughfare, Genisse's Bay, &c	300	"
Jenkin's and Crassy's Sounds	1,100	"
Richardson Jarvis' Sounds	1,000	"
	6,300	

"THE MAURICE RIVER COVE planting ground embraces a territory of more than fifty square miles, although it is not all suitable for planting, on account of bad bottom. It begins at Egg Island Point, Cumberland County, runs eastward seven miles to Maurice River, thence follows the shore southwardly nearly twelve miles to Fishing Creek, in Cape May County, thence westwardly and northwestwardly to the point of beginning, twenty miles on last course.

"The average number of hands, including the captain, employed in each boat during the planting season, is four men; but during the months from October to March, when a boat has plenty of oysters, as many as two extra hands will be temporarily employed to assist in catching, culling and marketing. * * * The captain always has an interest in the receipts from the sales. The hands are either paid stipulated monthly wages and board, or receive a share of the receipts. Under the latter system, which is fast going out of practice, the supply of provisions during the planting season and until September is obtained on credit, as no oysters are caught until September 1st, when the marketing begins. The owners of the boat receive one-third of the receipts, but pay the captain's provision bills. After the indebtedness incurred in supplying the hands with provisions up to September has been paid, the remainder of the receipts is divided among the crew, including the captain.

"The seat of the oyster trade is at Port Norris, on the Maurice River, in Cumberland County, at the terminus of the Cumberland and Maurice River Railroad. The oysters are caught on the planting grounds in Maurice River Cove, brought in, the different sizes, prime and cullens, separated, laid on floats and sunk under water for two

tides in order to fatten them, the water being partly fresh, and then taken up and shipped to market. About one-half of the boats engaged in business, being partially owned by Philadelphia oyster hucksters, run to the Philadelphia market; the remainder to the railroad on Maurice River, the oysters being sold to men there who put them in sacks or barrels, holding eight hundred to one thousand, and ship them to all points where it is profitable to send them in the shell. The whole market will soon be at Port Norris, where there are no wharfage, no commissions, and no expenses of any kind, the captain selling his own cargo. A large proportion of the boats now running to Philadelphia would not go if not owned there. The captain is compelled to go there. It is profitable to the hucksters, who charge ten dollars a day for selling out the load and a commission for collecting the money. The boats are also subject to wharfage and other expenses."

"There is a small number of natural beds in Delaware Bay, east of Egg Island: Mouth of Dividing Creek, Oronoken beds, Pepper beds, Ballast beds, East Point beds, Cedar Hammocks, &c. Above Egg Island the whole of Delaware Bay north to Stony Point, in Salem County, a distance of nearly forty miles, is interspersed with natural beds: Egg Island beds, Poplar beds, New beds, Ben Davies' beds, Beadon's Point beds, Ship John beds, Stony Point beds, Cohansey beds; but all of them are dredged so hard every year that the supply on many of them is becoming exhausted. Although the beds north of Egg Island are protected nine and a half months in the year, they will never again have much of a supply on them until allowed to rest for at least two years.

"The planting of old shells or brush during the spawning season will catch the spat and produce a natural growth, which will be healthy and rapid. In 1881 I planted six thousand bushels of shells, to which, on July 16th, a growth attached. During the fall of 1882, and up to the present time, there have been taken from the ground nearly one million cullen oysters in good condition. Plenty are still left to grow and will improve because stirred up and thinned out. Sometimes as many as twenty oysters would be found attached to one shell. * * * All our oysters are sold by the thousand.

"The natural oyster beds in Delaware Bay, from Egg Island Point, north, covering a distance of over thirty miles, lie idle from April 1st to June 15th. They should be carefully guarded all the time. This can be done with a sail-vessel. South of Egg Island the Maurice

River Cove covers a large area which is worked from September 1st to June 15th. This should also be watched and protected, but it can be done only with a steamer of shoal draft of water, kept employed during the whole year.

"Three commissioners, appointed by the authorities of the State, should have power to supply this protection and have full control over the captains of the sailing and steam vessels. The expenses should be defrayed by means of a tonnage tax assessed by the commissioners and collected from each oyster boat.

"Non-residents of the state should not be allowed to grow or plant oysters in the deep waters of the Bay; otherwise the space will soon be occupied by outsiders to the great loss and detriment of our own people."

"It is impossible to approximate in acres the area of our natural oyster beds. They extend in patches all over Delaware Bay, from Egg Island on the south to Stony Point on the north, a distance of over twenty-five miles, all in deep water where tongs cannot be used, dredging being necessary. Perhaps, in all there may be four thousand acres. To prevent a total exhaustion we have been compelled to let these grounds rest each year from April 1st to June 15th. The only practicable plan which can be adopted for developing our beds is to divide the whole ground into two parts, north and south, by an imaginary line, having a starting-point at some point on the shore and running southwest directly across the Bay. Then give each of these districts a total rest every alternate year and plant therein large quantities of shells, which will catch the spawn and increase our natural supply of oysters at a wonderful rate."

NUMBER AND TONNAGE OF VESSELS EMPLOYED.

The number of vessels employed in the oyster trade and registered at the different custom-houses in New Jersey, in 1882, was as follows:

At PERTH AMBOY: 142, all under twenty tons. Total tonnage, 1349.85.

At TUCKERTON: 26, of which 5 are over twenty tons. Total tonnage, 298. Value, $20,250. There are also many cat-rigged yachts and other boats employed in the business in this district. The total value of these, including gear, &c., is $80,400.

At SOMERS POINT: 66, of which 23 are over twenty tons. Total tonnage, 1220.59.

At BRIDGETON: 107 schooners, whose total tonnage is 2586.81, and value, $182,000. Of these 71 are over and 30 under twenty tons; 39 (tonnage, 943.08,) are employed in the trade on Maurice River, and their productions shipped to market over the Camden and Maurice River Railroad, while 68 (tonnage, 1643.73,) trade direct to Philadelphia. 105 sloops, all under twenty tons. Total tonnage, 1057.70. Value, $40,000. Of these, 91 (tonnage, 876.57,) trade in Maurice River and ship over the Railroad; 14 (tonnage, 181.13,) trade direct to Philadelphia. 14 boats (three tons and under), subject to a license of $2.50, and all belonging to Cumberland and Cape May Counties, engaged in catching oysters from the creeks and rivers and selling to the planters. Their average production reaches $300, or a total of $4200 annually.

At CAMDEN: 21 schooners and 3 sloops, of which 16 are over twenty tons. Total tonnage, 575.36. Value, $42,000. Trade direct to Philadelphia.

A number of vessels engaged in the oyster trade in that part of Delaware Bay belonging to New Jersey, are also registered at Baltimore and Philadelphia, and trade direct to Philadelphia:

At BALTIMORE, Md.: 17 schooners and 1 sloop, of which 14 are over twenty tons. Total tonnage, 443.70; value, $32,000.

At PHILADELPHIA, Pa.: 31 schooners and 5 sloops, of which 26 are over twenty tons. Total tonnage. 842.98; value, $60,000.

OYSTER BEDS.

As the legal distinction between a natural and an artificial oyster bed is among those interested a constantly mooted question, we give the following for its fulness and admirable clearness. It is taken from the second report of the Connecticut Commissioners of Shell Fisheries:

"All grounds of any considerable extent under water, which are found overspread with growing oysters, are generally called oyster beds. They are *artificial* or *natural*. Those designed and planted by man are artificial beds; all others are natural beds, and they are formed by spat from other beds, drifted by winds and tides, and deposited upon a bottom suitable for its adhesion and growth. This definition is correct in a general sense, but it does not accurately describe the natural bed which the law designs to recognize and protect. Small isolated patches of natural-growth oysters cannot be deemed natural

beds within the meaning of the law; but when such patches are found scattered over an extent of ground in sufficient abundance to remunerate the oystermen a greater or lesser number of years in succession for the labor of gathering them, there is such a natural oyster bed as the law recognizes and protects. This is substantially the idea of those who have labored on these beds for many years. In their testimony before the Commissioners, a natural oyster bed with them was an uncultivated bed where they could find oysters 'in paying quantities'—where they could do 'a fair day's work;' and this view is sustained by legal authority. By the laws of Maryland, no natural bar or bed of oysters can be designated. A case arose in Dorchester County involving the construction of the term 'natural bed.' After an able discussion by counsel, Judge Charles F. Goldsborough decided as follows: 'There are large and numerous tracts where oysters of moderate growth may be found in moderate numbers, but not in quantities sufficient to make it profitable to catch them, and yet where oysters may be successfully planted and propagated. In my opinion these cannot be called natural bars or beds of oysters within the meaning of the acts of the Assembly, and it is just such lands as these that the State meant to allow to be taken up under the provisions of the act. But there is still another class of lands where oysters grow naturally and in large quantities, and to which the public are now, and have been for many years, in the habit of resorting with a view to earning a livelihood by catching this natural growth; and here, I think, is the true test of the whole question. Land cannot be said to be a natural bar or bed merely because oysters are scattered here and there upon it, and because, if planted, they will readily live and thrive there; *but wherever the natural growth is so thick and abundant that the public resort to it for a livelihood, it is a natural bar or bed and comes within the above-quoted restriction in the law, and cannot be located or appropriated by an individual.*' The italicised lines comprehend the true legal definition of a natural bed."

STATISTICS OF THE OYSTER INDUSTRY, 1882.

LOCATION.	Number of Fishermen Employed.	Capital Invested.	Number of Vessels.	Value of Vessels.	Number of Boats.	Value of Boats.	Value of Gear and Outfit.	Bushels of Oysters Produced.	Value of Same to Producer.	Value of Same when Sold.
The State	3,546	$1,063,100	469	$537,850	1,759	$160,050	$103,320	1,769,132	$1,467,450	$1,791,185
Perth Amboy	118	52,100	14	17,800	74	8,050	5,075	59,300	59,300	89,000
Keyport	234	178,000	42	51,400	142	17,500	11,700	276,500	260,500	417,100
Navesink	24	8,500	3	4,000	13	1,675	525	3,150	5,250	8,400
Fairhaven	95	21,500	7	13,000	27	2,625	975	28,650	47,750	72,050
Oceanic	18	7,000	1	2,000	13	1,400	600	9,900	16,500	25,400
Shrewsbury, North Branch	45	21,000	8	15,000	20	1,750	1,250	10,700	17,750	26,850
Shrewsbury, South Branch	57	15,000	3	5,000	8	925	1,050	18,300	30,500	46,100
Port Republic	100	8,000	.....	.....	25	7,250	450	8,500	6,600	6,600
Bass River	75	6,000	.....	.....	18	5,200	335	5,000	3,750	3,750
Cedar Creek and Bayville	150	11,000	.....	.....	37	9,725	675	12,000	9,000	9,000
Forked River	75	7,000	.....	.....	18	5,200	335	6,000	4,500	4,500
Barnegat	100	10,000	.....	.....	25	7,250	450	9,600	7,200	7,200
Cedar Run	50	5,000	.....	.....	12	3,475	225	5,000	3,750	3,750
Manahawkin	100	9,000	.....	.....	25	7,250	450	8,500	6,500	6,500
West Creek	300	27,000	.....	.....	75	21,750	1,350	29,500	22,200	22,200
Tuckerton	150	32,000	26	20,250	37	9,725	675	16,000	12,000	12,000
Atlantic County	380	145,000	66	46,200	350	10,500	1,900	127,747	119,900	166,000
Cape May County	175	50,000	2	3,000	190	3,800	300	77,285	47,000	77,285
Eastern Shore, Delaware Bay	1,300	450,000	297	360,200	650	35,000	75,000	1,057,500*	787,500	787,500

* Total number of cullens, (thousands), 135,000, @ $2; primes, (thousands), 103,500, @ $5.

CHAPTER IX.

AN OYSTERMAN'S DICTIONARY.

[The following is drawn so largely from Ingersoll's Glossary, that it was thought unnecessary to make the usual indications.]

ARK.—A house on a scow or other floating hulk, used as a work and store-house in winter.

BANK.—The oyster colony or locality where they grow. (South.) See *Bed.*

BARNACLE.—The slipper-limpet, *Crepidula* sp.; also, true barnacles. At Cape May limpets are called "barnacles," and confounded by many with the true barnacles. They grow very fast, apparently, for I have seen them fully half-size on the new year's growth (or "bill") of an oyster, showing that they attained all that size in a single season. When limpets grow on oysters the planter knows the oysters are doing well and he expects them to prove fat and profitable.

BATEAU.—A small, flat-bottomed boat, like a sharpie, used for moving about the oyster-beds, for clamming, and other light work.

BEARD.—I. The finely-fringed margin of the oyster's mouth, which shows near the edges of the shells.

BEARD.—II. The protruding byssus of mussels.

BED.—The *bank, reef,* or deposit of oysters in the water, either growing naturally or artificially.

BED.—I. An artifical bed is one designed and planted or produced by man; all others are natural beds.

BED.—II. A natural bed. Whenever the natural growth is so thick and abundant that the public resort to it for a livelihood, it is a natural bed, or bank, and is legally protected, to the extent that it cannot be located or appropriated by an individual or company. It is open ground. Hence natural beds are of two kinds: The

unremunerative ones, which the law does not recognize, and the remunerative ones, which the law does recognize. A remunerative one, is one on which an operative can make day's wages, that is, a livelihood. See Chapter VIII.

BEDDING.—Transplanting oysters of any size to beds prepared for them, from which they are to be removed before the frosts of the ensuing winter. See *Fatten.*

BENCH-OYSTERS.—Those sold at a restaurant or lunch-counter, to be opened for "plate" or "half-shell" custom. See *Fancy.*

BLACK MUSSEL.—*Mytilus borealis*, a variety of *Mytilus edulis.*

BLISTER.—A young oyster, not larger than a quarter dollar. See *Spawn, Spat.* (Barnegat to Cape May.)

BLOOD CLAM AND BLOODY CLAM.—The same as *Blood Quahaug.*

BLOOD QUAHAUG.—The young and small specimens of various species of *Arcadæ*, supposed to be the choicest food of the star fishes. See *Hair Clam.*

BLUE POINTS.—Oysters originally found off Blue Point, eastern end of Great South Bay, Long Island, but now applied to all oysters from any part of the south shore of Long Island, whether native or transplanted, eastward of Babylon.

BOARD-BANK.—A platform set in the bank, or otherwise arranged so as to be alternately covered by tide and flooded with fresh water, for freshening oysters before selling. (Cape May.)

BOAT.—The little mollusk, *Crepidula fornicata.* See *Deckhead.*

BORER.—I. The *Urosalpinx cinerea.* See *Drill, Snail-bore*, etc.

BORER.—II. A sponge, *Cliona sulphurea*, which eats into oyster-shells.

BOX.—A measure for oysters, equal to one-fourth of a barrel; an oblong, shallow box, with cleats as handles nailed on the ends.

BOX-OYSTERS.—An oyster from seven to ten years old, of round, handsome shape, not less than three inches wide and five inches long. The name is due to the fact that many years ago it was customary to ship oysters of this grade to New York in boxes.

BOX-STEW.—A stew made of box-oysters. (New York.)

BUGEYE.—A flat-bottomed, centre-board schooner of three to fifteen tons, built of heavy timbers, without a frame. A bugeye is always decked over and has a cabin aft. (Chesapeake.)

BULL-NOSE.—An old, overgrown, heavy quahaug, unfit for food. (Cape May.)

BUNCH-OYSTERS.—Those growing in clusters. See *Raccoon Oysters.*

BUOY.—To *buoy* or *buoy-off* a certain piece of water area, means, in Rhode Island, to seclude it from being fished as long as the authorities deem proper. The area so secluded is indicated by a limit line of buoys.

BUSHEL-OYSTERS.—See *Cullinteens.*

CARRIER.—An oyster which endures transportation. (Trade term.)

CAT'S-TONGUE.—Long, slim oyster.

CLAIRE.—An excavation, "more or less deep, having a muddy or marly bottom, close to the edges of the sea-board, through which the sea-water passes into them. * * * In these claires they assume that green color [formerly] so much prized by the French." —*Asplet.*

CLAM.—A smooth-shelled, bivalved mollusk. This word is popularly of wide application, and is a corruption, apparently, of the word "clamp," preserved in the name of a huge East Indian species, and which sometimes attains the weight of several hundred pounds, and is used as a font for holy water in many churches, and for domestic purposes. The common "clam" of New England is the *Mya arenaria;* of New York and New Jersey, the *Venus mercenaria.* Many kinds are distinguished by an additional definitive word, prefixed, as beach-clam, (*Mactra,*) etc. On the Pacific coast there are many native "clams," chiefly a species of the *Saxidomus.*

CLAM-CRACKER.—A fish, a species of ray, *Rhinoptera quadriloba,* which molests the oyster-beds. (Savannah.)

CLAM-SCRAPER.—See *Drag-rake.*

CLAM-TONGS.—Differs from oyster-tongs only in the width of the head, which averages three and a half feet.—New York, 1855. At the present day the tongs used for gathering clams.

CLINK SHELL.—A name applied to various mollusks of the genus *Anomia.*

CLUCKER.—An oyster injured by chill, or otherwise, so as to sound hollow when its shell is struck. In England this word is spelled *Clock;* a dealer in London wrote, "The last oysters lost their sea-water, and became clocks and worthless."

COLLECTORS.—An arrangement of arched tiles, piles of stone, hurdles, or anything similar, to collect and give lodgment to the spat. (Europe.)

CONCH.—Various large, univalved, and spiral mollusks, particularly *Fulgur carica.*

COON-HEEL.—A long, slim oyster. (Connecticut.) See *Razor-blade, Shanghai, Rabbit-ear.*

COON OYSTERS.—Small, shapeless, worthless stock, growing in heavy clusters along the salt marshes, or forming great bars. (Southern coast.) At Cape May the word is restricted to young oysters caught on the sedges.

COUNT-CLAMS.—Quahaugs large enough to count eight hundred to the barrel. (Keyport, New Jersey.)

COVE-OYSTERS.—The term *cove*-oyster has a trade-signification differing from that in which it is understood by the oysterman. The packer, by cove-oysters, simply means steamed oysters packed in hermetically sealed cans. They may be, in fact they are, of any and every size and quality. By "cove-oysters" the oysterman means the single oysters scattered through the bays and creeks and old planting-grounds, occurring too sparsely to be taken by ordinary methods of tonging. When the water is clear and smooth the oysterman moves slowly over these grounds, and when he "sights" an oyster, which he can readily do in from four to seven feet water, or even more, he picks them up singly with a pair of nippers. These oysters, as might be expected, are large, fat, and of good shape. They class as "selects" and bring "top" prices in the market.

COVING.—The business of picking up "cove oysters" with nippers. (Chesapeake.)

CULLENS.—See *Cullins.*

CULLER.—One who picks over oysters, or *culls* out the worthless and smaller ones; usually a boy.

CULLINS.—See *Cullings.*

CULLINGS.—The poorest oysters remaining after the *culls* have been picked out.

CULLINTEENS.—The smaller grade left after "extra," "box," and "cull" oysters have been picked out. (Norwalk.) Formerly called "bushel oysters."

CULLS.—Culled-out oysters; the next to the poorest grade; four to five years old. (New York and East River.)

CULTCH.—The shells, gravel, fragments of brick, or any other material placed in the water to catch the spawn of the oyster. See *Cutch.*

CULTIVATE.—To raise oysters artificially from spawn, or from transplanted young. See *Plant.*

CUTCH.—An American spelling of *cultch.*

DECK-HEAD.—The *Crepidula, Slipper-limpet, boat-shell.*

DESIGNATION.—The right to plant oysters on a certain piece of ground *designated* by oyster commissioners or other authority. (Connecticut); also, the plat of ground itself.

DEVIL-FISH.—Cuttle-fishes, chiefly octopods.

DRAG.—I. See *Dredge.* (Norwalk.)

DRAG.—II. To dredge.

DRAG-RAKE.—A large, heavy rake, having teeth crowded and much curved, which is often dragged (principally in search of clams) like a dredge. (New England.)

DREDGE.—"A scoop-net, with a heavy, rectangular iron frame for scraping the sea-bottom. The frame is about three times as long as high, the two longer sides having sharp edges and serving as scrapers. The net is of heavy twine, or of iron chain-work. The rope by which the dredge is manipulated is fastened to the ends of two handles, reaching forward from the ends of the frame."—*Rathbun.*

DRIFT.—The distance gone over while making a single haul of the dredge or dredges.

DRILL.—A small mollusk, the *Urosalpinx cinerea.* See *Borer.*

DRINK.—To give oysters a "drink" is to place them in fresh water, over one or more tides, in order that they may expel the salt water from their systems and imbibe the fresh water. This results in an increase of size and plumpness. This, however, only lasts for a few days. At the end of this time the oysters become lean again. The tissues of oysters, when first taken, are saturated with the ocean brine, and when removed to fresh water, or that which is less salt, the external liquid passes inward more rapidly than the more saline and denser elements within can escape; the effect being simply to cause the oyster to swell. When the water in which the oyster is immersed is too fresh, it loses its flavor. It has been suggested that by immersing the oysters for some days in concentrated brine, and then removing them to ocean water, the plumpness would be gained without the sacrifice of the saltness which is so agreeable to the epicure.

EAST RIVERS.—Oysters grown between New Haven, Connecticut, and New York.

FALL.—A deposit or *set* of spawn, or infant oysters. Used also as a verb. (South of England.)

FANCY OYSTERS.—Superior grades kept at retail, to be opened on the counter and eaten raw.

FATTEN.—To place oysters on floats or in fresh water just before marketing. See *Drink*.

FATTEN.—To bed down for growth; also to plant. Not good usage, because confusing.

FEATHER-EDGE.—The new thin growth added to an oyster-shell each season.

FIRSTS.—Box-oysters. (New Jersey and New York City.)

FIVE-FINGER.—A starfish.

FRY.—The embryo oyster, just setting.

GARVEY.—A small scow, used to plant oysters, and take them up in for market. (Barnegat.)

GRANT.—Stipulated area "granted" by the State for oyster culture. (Massachusetts.)

GRAY-BEARD.—The common hydroid of Northern oyster-beds, *Sertularia argentea*.

GREEN-GILL.—A condition admired abroad, but disliked here. It is due, primarily, to the green sea-weed. Oystermen claim that they are perfectly wholesome.

HAIR.—Hydroids. The "hair" that oystermen assert grows on their oysters under certain circumstances, is an animal growth, which attaches itself to the shell, and is nothing put out by the oyster itself.

HAIR-CLAM.—Adult specimens of the various species of *Arcadæ*. See *Blood Clam*.

HALF-DECK.—The slipper limpet, *Crepidula fornicata*.

HAMPER.—An oyster-basket holding two bushels. (New York.)

HARD-OYSTER.—The Northern "native" oyster.

HEEL.—The umbo of a clam-shell. Behind it is to be found "the print of a clam." This distinguishes the quahaug from other bivalves, according to the fishermen.

HUSK.—To remove the shells from an oyster, or "open" it.

HUSKS.—Oyster-shells.

JAG.—A lot, parcel, or quantity of oysters of indefinite size; *e. g.*, "I sold a *jag* of 75 bushels to A, B & Co."

JINGLE.—Any species of *Anomia*.

LITTLE RED CLAM.—Common name for quahaug, *Venus mercenaria.*

LOADED.—An oyster is said to be *loaded* when it is coated with annelid tubes.

LONDON STOCK.—Oysters culled out for the foreign market; small, round, and cup-shaped. See *Cullins*, etc.

MILKY, OR MILCHY.—To be "in the milk," *i. e.*, ready to spawn.

NATURALS.—Oysters of natural growth; wild, not planted. (New Jersey.)

NIB.—The tender, growing, posterior end of an oyster.

OYSTER.—A mollusk of the family *Ostreidæ* and genus *Ostrea;* also, some allied forms distinguished as "pearl" oysters, etc. They are scattered over the whole world, and through the geological record since Jurassic time. In the United States only one species, *Ostrea Virginiana*, is now recognized as edible; but this appears in market under a long and diverse set of names, derived from the district or bed where the particular variety grew. See particularly the chapter (III.) on the natural history of the oyster, *supra.*

OYSTER CRAB.—The female of the *Pinnotheres ostreum*, found in the gills of oysters from Massachusetts southward, a commensal not a parasite.

PROG.—To search for clams, etc., along the shore in a desultory way. (Connecticut.)

PROGGER.—One who digs clams and searches for other sea-life alongshore, in a desultory and unbusiness-like way. A man who persistently gets his living this way is generally a good-for-nothing fellow, and is said to "follow the creek." (Connecticut.)

QUAHAUG.—The "hard" or "round" clam, *Venus mercenaria.* An Algonquin word, spelled in various ways, and usually wrongly pronounced *ko-hog.*

RABBIT-EAR.—A long, slender oyster. See *Coon-heel.*

RACCOON OYSTERS.—Wild oysters, growing naturally on muddy banks, exposed at low tide; and owing to their luxuriance and crowded condition, long, slender, and shapeless; or very diminutive. (Southern coast.)

RAKE.—An instrument for lifting the oyster from the bed; shaped much like the agricultural implement of the same name, but all iron except the handle, and having tines straight, and from six to twelve inches long, or curved into a half circle. The rake is an ancient device. In 1748, Baron Kalm crossed New York Bay,

and notes the following sentence: "We saw many boats, in which the fishermen were busy catching oysters; to this purpose they make use of a kind of rake with long iron teeth bent inward. These they used either single or two tied together in such a manner that the teeth were turned toward each other." The rake is used in deeper water than the tongs (which see,) and is more serviceable in catching quahaugs than oysters; indeed, it is now rarely used for the latter, except in Buzzard's Bay, Massachusetts. With it the oysterman can alternately push his boat along and then pull the rake toward him, and thus take all the mollusks that lie in his path.

RAZOR-BLADE.—A long, slim oyster. (Connecticut.) See *Coon-heel.*

RED-BEARD.—The red sponge, *Microciona prolifera*, Verrill, commonly growing on the Northern oysters.

SADDLE-ROCK OYSTERS.—Simply a trade name in New York for the largest and finest oysters. The Saddle-Rocks were exhausted long ago.

SAND.—To bury oysters beneath drifting sand or mud.

SANDING.—I. The burying of oysters under storm-drifted sand or mud.

SANDING.—II. In some parts of Rhode Island they say an oyster is *sanded* or *sanded up*, when it is thickly coated.

SCALPS.—A bed of oysters. *Scott.*

SECONDS.—Oysters of second market grade; cullens. (Northern cities.)

SEED.—Infant or young oysters suitable or intended for transplanted growth in artificial beds. See *Set.*

SEEKONKS.—Oysters (mainly seed,) growing in Seekonk River, Rhode Island.

SELECTS.—Oysters of the first quality, *i. e.*, selected; applied wholly to opened stock.

SET.—I. A young oyster. Occasionally "set" is used improperly for *spawn.* See *Spat.*

SET.—II. The appearance of young oysters in a district, as a whole, thus: "The *set* is good in Somerset this year;" *i. e.*, there is an abundance of infant oysters. See *Seed.*

SHANGHAI.—A long, slender oyster. See *Coon-heel.*

SHELLERS.—Persons who open clams for market. (New Jersey.)

SHELLING.—The spreading of shells upon the bottom to catch spawn.

SHIFT TO.—To move half-grown oysters to a new bed for their improvement.

SHOCK.—To open or "shock" clams or oysters. (New England.)

SHOOTS.—The spaces between the concentric ridges on an oyster-shell, marking each season's growth. (New Jersey.)

SHUCK.—I. To open oysters. (Baltimore and Southward.)

SHUCK.—II. An oyster-shell. (South.)

SHUCKER.—One who opens oysters. (South.)

SIDE-OPENER.—An oyster-opener, who rests the oyster in the palm of his left hand alone, while he parts the shell. (Quicker and more laborious than the *sticker's* method; it is followed at Providence, Rhode Island.)

SKIFF.—The peculiar, special oyster-boat used at Keyport, New Jersey. It is shaped like a small, shallow yawl.

SKIFT.—Vernacular for *skiff*.

SINGLE OYSTERS.—In the South "single oysters" means an edible oyster in contradistinction from the raccoon oyster.

SLIPPER-LIMPET.—Mollusks of the genus *Crepidula* (three species.) Also known as *Deckhead, Boat.*

SNAIL-BORE.—Mollusks of the genus *Urosalpinx*, etc. (New Jersey.) See *Drill, Borer*, etc.

SNAPS.—The most inferior oysters sent to market. (Maryland.)

SOFT OYSTER.—The "Virginia plant," or Southern oyster, as distinguished from the "hard" native oyster.

SOUNDS.—Oysters grown in Staten Island Sound, New York; especially an European brand.

SPAT.—Spawn. Generally used to signify the "set" or minute infant oysters, after they have become attached to some support. See *Spawn.*

SPAT.—To emit eggs or spawn.

SPAWN.—The eggs of the oyster (or any other sea animal) in their floating condition; but sometimes the "set" or infant oysters are erroneously called *spawn.* See *Spat, Milky, Set.*

SQUID.—Naked mollusks of the order *Cephalopoda;* they are used as food and as bait.

STABBER.—One who opens oysters by sticking the knife in at the side, without previously breaking the shell. (Massachusetts and Rhode Island.) See *Sticker.*

STALES.—The handles of the oyster-tongs or oyster-rake.

STEM.—The proboscis of a clam. (New Jersey.)

STICKER.—An oyster opener who rests the oyster against the bench while he thrusts the knife between the valves. This is the method in Boston, and obviates the strain across the loins, but takes longer than *side-opening*. (See *Stabber*.)

STICKUP.—A long, thin oyster, growing in mud, etc. (Dennis Creek, New Jersey.) See *Strap-oyster*, etc.

STING-TAIL.—The sting ray *Dasybatis centrura*. (New York.)

STOOLS.—Material spread on the bottom for oyster spawn to cling to. See *Cultch*, etc.

STRAP-OYSTER.—The long, slender form which grows in mud. See *Coon-heel*, etc. (New Jersey.)

STRIKE.—To become tenanted by living oysters; or when infant oysters attach themselves to any object they are said to "strike." See *Set*, etc.

TEA-CLAM.—The quahaug, *Venus mercenaria*, of small size; about one and a quarter inches in diameter. They will go from 1,200 to 1,400 to the barrel. (Keyport, New Jersey.)

TEN-FINGER.—A thief.

TILE-COATING.—At Vannes, France, the coating of spat-collectors is composed as follows: The tiles are first dipped into a solution of hydraulic lime and water; when dry they are again dipped into a very thin mixture of common lime and water; when dry they are ready for use.

TOLERATION.—License to gather oysters or operate beds; paid by every individual annually. (Brookhaven, Long Island.) The money paid is called a *Toleration fee*.

TONGS—An instrument used in gathering oysters from the bottom. Something of an idea of it may be got by supposing two garden-rakes with very long handles, with the tooth-sides of each rake facing each other; let the handles be secured by a loose rivet about two or three feet from the teeth, so that by operating the extreme ends of the handles the whole contrivance shall act as a pair of tongs. The instrument is so constructed that when the tong handles or "stales," as they are called, are held perpendicular to the bottom, the teeth are at an angle of forty-five degrees, and by working the upper end of the stales together above water, at the same time pressing the teeth against the bottom, the oysters are thus raked together, and may be hoisted to the surface and

emptied into the boat. Various patented forms have been made, but in general, those in actual use are made by the local blacksmith and are one of two patterns—iron-headed or wooden-headed—according to intended service. The latter form is the most common. Ordinarily the heads must be of the best oak, and the whole tongs are worth $3.50 to $5. The teeth are about one and a half inches apart and not over one to one and a half inches long. The stales are sawed out of a white-pine board three-quarters of an inch thick. Though seeming so thin, they last as long as the heads. A pair of tongs lasts only about a year. The wooden heads are better, because they do not dig into the sand as do the iron heads, and because they are lighter to work. Tongs are used of from seven to twenty-four feet in length, and the latter, worked as they are, in twenty-one and twenty-two feet of water, require not only considerable skill, but a good allowance of strength, to handle with success. This tong is a very ancient contrivance in America, for Charlevoix, in the middle of the seventeenth century, found them "on the coasts of Acadia."

TRASH.—All cullings, small oysters, refuse, etc., thrown over from the oyster-gathering on to idle ground, and which will be overhauled one or two years later. (Delaware.)

UMBO.—*Pl. umbones*, scientific name of the beak, or boss of a bivalve.

WINKLE.—A mollusk, the *Sycotypus canaliculatus*. (Massachusetts.)

ADDENDA.

NOTE I.—As respects the statement in Chapter III., that an eyeless oyster is sensitive to sight, says *Nature*, February 23d, 1883, p. 399—"In a recent communication to the Vienna Academy, Prof. Grader, of Czernowitz, describes a long series of experiments with regard to the 'skin-vision' of animals, affording exact proof that certain animals, without the aid of visual organs proper, can make not only quantitative but qualitative distinctions of light." By quantitative, is meant the intensity or brilliancy of the light, and by qualitative, the kind of light as indicated by the several colors of the spectrum. The animals experimented on were the earth-worm, and a common newt, *Triton cristatus*. "In one set of experiments, the animals were in the normal state; in another, the anterior end of the worm, and the eyes of the triton were removed."

NOTE II.—As to Dr. Houghton's brandy and ale experiments with oysters, given in Chapter V., Dr. C. L. Dana, in a recent number of the *Medical and Surgical Reporter*, controverts them. He asserts that "American oysters grow hard in ale or beer, instead of dissolving." He disbelieves Dr. Wm. Robert's idea that the oyster digests itself by the ferment of its own diastase. He says: "The oyster does not, and cannot digest itself." He also denies that raw oysters are always more digestible than the cooked. "Oysters roasted in the shell, or simply boiled a short time, will be digested nearly, if not quite as rapidly as the same number of raw." This last statement is simply his opinion, hence is not worthy the consideration due the first and the second averments, which seem based upon experiments.

NOTE III.—De Broca's statement in effect, that though more nutritious than that of Europe, "the American oyster is insipid," appears to smack a little of conceit, like the sentiment of that writer in the early Colonial days, that they had great store of large oysters, which with a pinch of "copper-filings," would be quite as savory as those at home. Probably then, as now, conceit went a good way.

Statement Showing Shipments of Oysters (Pounds) to New York, Philadelphia and Other Points from Stations in New Jersey During the Year 1882.*

STATION (From.)		To New York.	To Philadelphia.	To Other Points.	Total.
Long Reach	Cumb. and Maurice River R. R.	2,284,470	12,377,321	4,299,777	18,961,568
Bridgeton		.....	.....	338,140	338,140
Pleasantville	West Jersey R. R.	13,200	270,753	595,780	879,733
Atlantic City		.....	2,505	2,570	5,075
Somers Point		.....	1,104,755	67,155	1,171,910
Seaville		.....	1,035,750	430,000	1,464,750
Whitings	Tuckerton R. R.	250	.....	737,790	738,040
Barnegat		.....	49,405	3,750	53,155
Manahawkin		.....	77,540	166,650	244,190
West Creek		.....	184,405	446,150	630,555
Tuckerton		.....	433,370	148,100	581,470
Red Bank	New York and Long Branch R. R.	463,955	269,650	679,360	1,412,965
Matawan		.....	.....	4,125	4,125
Hazlett		.....	8,000	764,805	772,805
Total (pounds)		2,761,875	15,812,454	8,684,152	27,258,481
" (bbls.)		11,047	63,250	34,377	109,034

There were also shipped over the Central R. R. of N. J., 3,122 bbls.

*Kindly furnished by Col. I. S. Buckalew, Superintendent of Amboy Division of Penna. R. R. Co.

PART VII.

SPECIFIC STATE INDUSTRIES.

CHAPTER 1.—IRON MINES.

CHAPTER 2.—BLAST FURNACES.

CHAPTER 3.—PAPER MILLS.

CHAPTER 4.—BREWERIES.

CHAPTER 5.—THE DAIRY INTEREST.

CHAPTER I.

IRON MINES.

The total area of our iron-bearing district, included in the counties of Morris, Warren, Sussex, Passaic, Hunterdon, Bergen and Somerset, is nearly 1,200 square miles, or about one-sixth of the entire area of the State. "Although comparatively small, * * * when it is understood that single acres have yielded 100,000 tons of ore, we can get some conception of the possible capacity of such a territory." *

During the past year, as will be seen from our tables given below, fifty-four companies and firms, some of which work several mines each, were engaged in mining iron ore in New Jersey. The total output was 805,672 tons, valued at $3,488,095. The workmen engaged in the mines received in wages $1.50 a day, or a total of $1,524,725. The average number employed was 3,782 men and 77 boys. Only fifteen establishments remained idle during a portion of the year; the average period of idleness for these having been five and four-tenths months. All but eight report an advance in wages, averaging 25 cents a day; although with the increased use of steam drills in mining, the number of workmen employed is being decreased.

The following comparative statistics of the output of our mines at intervals back to 1790 will be interesting in this connection:

1790	10,000 tons	Morse's Geography.
1830	20,000 "	Gordon's Gazeteer.
1855	100,000 "	Dr. Kitchell's Estimate.
1860	164,900 "	U. S. Census.
1864	226,000 "	Report of State Geologist.
1867	275,067 "	" "
1870	362,636 "	U. S. Census.
1871	450,000 "	Report of State Geologist.
1872	600,000 "	" "
1873	665,000 "	" "
1874	525,000 "	" "

* State Geologist's Report for 1881.

1875	390,000 tons		Report of State Geologist.
1879	488,028 "	"	"
1880	754,872 "		U. S. Census.
1881	737,052 "		Report of State Geologist.
1882	805,672 "		

New Jersey is the fourth in the list of the six great iron-producing States (Pennsylvania, Michigan, New York, New Jersey, Ohio, Missouri), and occupied the same relative rank in 1880 as in 1870.

The following are the Census statistics (1880) relating to the production of iron ore in this State:

Number of counties reporting, 6; establishments (mines?), 106; maximum annual capacity, 1,487,829 tons; product, 754,872; value of product, $2,910,442; value of all materials used in regular industry, $584,229; wages paid, $1,606,257; number of men employed—above ground, 1,385; below ground, 3,264; number of boys under 16 years employed—above ground, 93; below ground, 69; total number of employes, 4,811; number of miners, 2,931; number of laborers, 1,754; value of all machinery, $519,954; working capital, $562,915; value of plant, $841,226; value of real estate, $4,797,620; total capital, $6,201,761; royalty paid, $156,878.

Of the total product produced in the United States (7,971,706 tons, valued at $23,167,007), New Jersey's proportion was 9.501 per cent. The product of the mines of Morris County was 568,420 tons; Sussex County, 70,365 tons; Warren County, 50,214 tons. The product of our two largest mines (in Morris County) was—Glendon Hibernia, 85,622 tons ($382,245); and Mt. Hope, 50,379 tons ($264,390.) The average product of all mines was 6,925 tons; average number of hands to a mine, 44; average yearly earnings per man, $339.59; average monthly earnings, $39.84; average number of tons raised per day per man, .74; average per cent. of year employed in mining, 71.03; not employed, 28.18; per cent. of year lost in strikes, .79; cost of labor per ton of ore mined, $2.13; average price per ton of ore at mine, $3.84; cost of material per ton of ore mined, $0.77; interest, royalty and profit per ton, $0.94; per cent. of product paid: for labor, 55.38; material, 20.14; royalty, &c., 24.48; per cent. ratio of tonnage produced to maximum capacity of production, 50.74.

The following table will show in detail the reports from the fifty-four establishments engaged in mining ore during the year:

Office Number.	MONTHS IN OPERATION.			No. of Hours Constituting a Day's Work—May to November.	No. of Hours Constituting a Day's Work—November to May.	Number of Tons of Ore Mined.	Greatest Number of Hands Employed at any one Time During the Year.	AVERAGE NO. OF HANDS EMPLOYED.		WAGES.				When Wages are Paid.	Advance in Wages.	Value of Products.
	Full Time.	Half Time.	Idle.					Males above 16 years.	Children and Youth.	Average Day's Wages For a Skilled Mechanic.	Average Day's Wages For Ordinary Laborer.	Average Day's Wages For Boys.	Total Amount Paid in Wages.			
201	12	.....	.....	10	10	30,000	160	150	6	.....	$1 50	$1 00	$60,000	Monthly.	20 per cent.	$100,000
202	12	.....	.....	10	10	25,000	120	100	10	.....	1 50	1 00	50,000	" "	20 " "	90,000
203	12	.....	.....	10	10	4,000	20	20	.....	.....	1 50	.....	8,500	" "	18 " "	16,000
204	12	.....	.....	10	10	60,000	100	100	.....	.....	1 50	.....	45,000	" "	20 " "	240,000
205	12	.....	.....	10	10	60,000	300	300	.....	.....	1 50	.....	135,000	" "	20 " "	300,000
206	12	.....	.....	10	10	18,000	110	100	3	.....	1 50	1 00	53,500	" "	15 " "	90,000
207	12	.....	.....	10	10	8,400	50	50	.....	.....	1 50	.....	15,500	" "	20 " "	35,700
208	12	.....	.....	10	10	54,000	225	200	10	.....	1 50	1 00	90,000	" "	20 " "	243,000
209	12	.....	.....	10	10	68,702	400	400	.....	.....	1 50	.....	156,500	" "	20 " "	343,500
210	12	.....	.....	10	10	14,657	60	60	.....	.....	1 50	.....	28,000	" "	18 " "	73,280
211	12	.....	.....	10	10	32,025	100	90	.....	.....	1 50	.....	45,000	" "	20 " "	160,000
212	12	.....	.....	10	10	7,200	40	38	.....	.....	1 50	.....	16,500	" "	20 " "	30,800
213	12	.....	.....	10	10	32,400	140	130	.....	.....	1 50	.....	68,500	" "	20 " "	129,600
214	12	.....	.....	10	10	20,000	100	78	2	.....	1 50	1 00	51,000	" "	20 " "	90,000
215	12	.....	.....	10	10	12,000	50	48	.....	.....	1 50	.....	28,000	" "	20 " "	48,200
216	12	.....	.....	10	10	3,600	22	22	.....	.....	1 50	.....	7,500	" "	18 " "	14,400
217	12	.....	.....	10	10	4,100	25	25	.....	.....	1 50	.....	11,000	" "	10 " "	18,200
218	12	.....	.....	10	10	18,000	110	108	2	.....	1 50	1 00	52,000	" "	20 " "	94,000

IRON MINES—Continued.

Office Number.	MONTHS IN OPERATION.			No. of Hours Constituting a Day's Work—May to November.	No. of Hours Constituting a Day's Work—November to May.	Number of Tons of Ore Mined.	Greatest Number of Hands Employed at any one Time During the Year.	AVERAGE NO. OF HANDS EMPLOYED.		WAGES.				When Wages are Paid.	Advance in Wages.	Value of Products.
	Full Time.	Half Time.	Idle.					Males above 16 years.	Children and Youth.	Average Day's Wages For a Skilled Mechanic.	Average Day's Wages For Ordinary Laborer.	Average Day's Wages For Boys.	Total Amount Paid in Wages.			
219	12	.....	.....	10	10	27,000	162	162	.....	.....	$1 50	.....	$62,000	Monthly.	20 per cent.	$108,000
220	12	.....	.....	10	10	17,000	100	100	.....	.....	1 50	.....	40,500	"	20 "	68,000
221	12	.....	.....	10	10	9,600	55	55	.....	.....	1 50	.....	21,800	"	20 "	38,400
222	12	.....	.....	10	10	28,000	70	68	2	.....	1 50	$1 00	27,500	"	20 "	112,000
223	12	.....	.....	10	10	1,440	8	8	.....	.....	1 50	.....	2,500	"	.....	5,400
224	12	.....	.....	10	10	12,000	48	45	2	.....	1 50	1 00	18,000	"	20 per cent.	45,000
225	12	.....	.....	10	10	3,600	30	30	.....	.....	1 50	.....	6,500	"	20 "	12,600
226	4	.....	8	10	10	4,000	60	50	5	.....	1 50	1 00	8,500	"	20 "	16,000
227	12	.....	.....	10	10	15,000	70	65	4	.....	1 50	1 00	32,500	"	20 "	67,000
228	4	.....	8	10	10	2,000	30	30	.....	.....	1 50	.....	4,500	"	.....	8,000
229	4	.....	8	10	10	800	8	7	1	.....	1 50	1 00	1,650	"	.....	2,800
230	7	1	4	10	10	6,425	40	37	.....	$1 62	1 40	.....	8,815	"	20 per cent.	37,700
231	12	.....	.....	10	10	17,573	37	30	3	1 62	1 40	.....	11,055	"	20 "	82,290
232	8	.....	4	10	10	3,200	20	20	.....	.....	1 50	.....	6,000	"	20 "	11,200
233	9	.....	3	10	10	6,500	50	50	.....	.....	1 40	.....	15,500	"	15 "	22,700
234	12	.....	.....	10	10	15,000	50	50	.....	.....	1 50	.....	28,000	"	20 "	52,500
235	6	.....	6	10	10	1,000	8	8	.....	.....	1 50	.....	2,000	"	.....	3,500
236	12	.....	.....	10	10	13,500	58	55	2	.....	1 50	90	30,000	"	20 per cent.	47,000

237	12	.....	.....	10	10	1,200	6	6	.....	.....	1 50	.....	2,300	"	20	"	4,200
238	12	.....	.....	10	10	11,000	54	52	2	.....	1 50	.....	23,000	"	20	"	45,000
239	11	.....	1	10	10	8,922	30	28	2	.....	1 50	90	11,200	"	20	"	33,457
240	4	.....	8	10	10	1,000	15	14	1	.....	1 50	90	1,650	"	.....		3,500
241	12	.....	.....	10	10	2,315	19	19	.....	.....	1 50	.....	4,500	"	20	per cent.	9,250
242	12	.....	.....	10	10	12,917	100	90	4	.....	1 50	90	24,000	"	20	"	51,600
243	11	.....	1	10	10	6,204	50	45	5	.....	1 50	75	10,000	"	20	"	27,000
244	11	.....	1	10	10	4,872	50	45	5	.....	1 50	75	9,500	"	20	"	20,000
245	3	.....	9	10	10	300	10	10	.....	.....	1 50	.....	500	"	.....		1,000
246	12	.....	.....	10	10	17,572	35	30	3	.....	1 40	75	11,055	"	12½	per cent.	82,288
247	6	.....	6	10	10	2,400	30	30	.....	.....	1 45	.....	5,000	"	15	"	13,200
248	12	.....	.....	10	10	8,000	35	35	.....	.....	1 50	.....	15,500	"	20	"	30,000
249	12	.....	.....	10	10	9,500	40	40	.....	.....	1 50	.....	16,500	"	20	"	33,250
250	12	.....	.....	10	10	7,000	65	60	3	.....	1 50	1 00	15,500	"	20	"	20,000
251	12	.....	.....	10	10	30,000	240	240	.....	1 75	1 50	.....	76,000	"	20	"	150,000
252	6	.....	6	10	10	1,200	20	20	.....	.....	1 50	.....	2,800	"	.....		4,500
253	4	.....	8	10	10	300	9	9	.....	.....	1 50	.....	900	"	.....		1,200
254	12	.....	.....	10	10	25,248	120	120	.....	.....	1 50	.....	46,000	"	20	per cent.	100,992
Total for State*.....						805,672	3,964	3,782	77	.....	.....	.....	$1,524,725	.....	.....		$3,488,095

* Fifty-four establishments.

CHAPTER II.

ANTHRACITE BLAST FURNACES.

The twenty blast furnaces in this State, owned by twelve firms and companies, have a total capacity of 247,600 net tons. During the year thirteen of these furnaces were in blast twelve months; three about one-half this time; while four had blown out in 1881. The sixteen in blast turned out a product of 155,533 net tons,* valued at $3,580,664. Value of materials used, $2,341,560. The ten establishments interested in these furnaces reported an invested capital of $6,825,000; employed an average number of 938 workmen, 885 men and 53 boys, who have been paid in wages $340,035, and have been employed from 10 to 12 hours daily. The daily wages of skilled workmen averaged from $1.75 to $2.50; those of ordinary laborers from $1.25 to $1.75, according to establishment. Seven establishments advanced wages 10 and one 15 per cent.

The United States Census returns (1880) gave the following statistics:

Number of establishments, 13; stacks, 20; capital, $3,694,500; average number of employes—males, above 16 years, 1,150; below 16 years, 24; total wages paid, $365,639; total daily capacity of melted metal, 691 tons; materials used—iron ore, 314,199 tons ($1,511,942); fluxing material, 115,592 tons ($88,774); anthracite coal, 225,713 tons ($779,676); coke, 17,000 tons ($108,278); total value of all materials used, $2,488,670; total quantity of all products, 157,414 tons ($3,428,747).

Mr. James M. Swank, the compiler of the *Directory of the Iron and Steel Works of the United States*, edition of 1882, gives the following interesting information about the New Jersey blast furnaces:

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* The production of pig iron (net tons) in the eight years, 1874 to 1881, in New Jersey, according to the American Iron and Steel Association, was—1874, 90,150; 1875, 64,069; 1876, 25,349; 1877, 52,909; 1878, 78,455; 1879, 78,143; 1880, 170,049; 1881, 171,672.

Andover Iron Works, Andover Iron Company, Phillipsburg, Warren County. Three stacks; two, 60x18, and one, 75x18; built in 1848; ore, New Jersey magnetic, from the company's mines; product, all grades of pig iron, with special qualities for plates, sheets, wire, nails and car-wheel chill. Total annual capacity, 50,000 net tons. Brand, "Andover."

Boonton Iron Works, Boonton, Morris County. Two stacks, 70x14 and 60x16; built in 1848, and 1868 respectively; bell and hopper tops; steam and water power. Total annual capacity, 25,000 net tons. Not in blast.

Chester Furnace, Chester, Morris county. One stack, 60x13; built in 1878; Weimer suspended pipe stoves, Weimer tubular boilers and Weimer high-speed blowing engine; product, extra-red short-mill pig iron, made from Chester ores, roasted in the Taylor gas kiln. Annual capacity, 12,000 net tons. Brand, "Jersey."

Franklin Iron Company, Franklin Furnace P. O., Sussex County. One stack, 67x20½; completed in October, 1873, and blown-in January 1st, 1874; closed top; fuel, anthracite and coke; ores, New Jersey, Tilly, Foster and foreign; product, Bessemer pig iron. Annual capacity, 29,000 net tons.

Musconetcong Iron Works, Stanhope, Sussex County. Two stacks, 70x17 and 80x20; built in 1864 and 1869, and blown-in in 1866 and 1871; closed tops; ores, magnetic and some limonite, mined in Morris, Sussex and Warren Counties. Total annual capacity, 40,000 net tons. Specialty, No. 2 foundry and gray forge pig iron, Brand, "Musconetcong."

New Jersey Zinc and Iron Company, Newark, Essex County. Three stacks, each 20x7, built in 1855, 1863 and 1871; open tops; products, spiegeleisen, from zinc residuum. Combined annual capacity, 6600 net tons. One stack not in blast.

Oxford Iron Works, Oxford Iron Company, Oxford, Warren County. Two stacks, 36x10 and 50x18, built in 1742 and 1871, respectively; ore, magnetic, mined near the works. Combined annual capacity, 17,000 net tons. Product is worked up into rails, etc., by the company, only a small quantity of foundry pig iron being made and sold.

Pequest Furnace, Oxford, Warren County. One stack, 58x16, built in 1874; blown-in October 27th, 1874; closed top; ores, New Jersey magnetic and hematite; product, foundry and gray forge pig iron. Estimated annual capacity, 14,500 net tons.

Port Oram Furnace, Port Oram, Morris County. One stack, 60x16, built in 1868, and first blown-in in 1869; closed top; ores, local magnetites; product, high-grade mill pig iron. Annual capacity, 16,000 net tons. Not in blast during the year.

Ringwood Furnaces, Hewitt, Passaic County. One completed stack, 48x13, and one unfinished stack, 65x16; open tops; water power. The former was altered from charcoal to anthracite in 1872. Ore, magnetic, mined at Ringwood. Use the Cooper iron hot-blast arrangement. In blast only part of the year.

Secaucus Iron Company, Secaucus, Hudson County. One stack, 65x17, completed in 1877, and first blown-in in June, 1879; ores, one-half foreign hematites and one-half New York and New Jersey magnetites; fuel, anthracite and coke; product, Bessemer pig iron. Annual capacity, 23,000 net tons.

Warren Furnace, Hackettstown, Warren County. Formerly called Hackettstown Furnace. One stack, 56x16, built in 1874–5, and put in blast in 1875; ores, mainly North Jersey magnetic, with mixture of hematite; product, mostly mill pig iron. Annual capacity, 15,000 net tons.

BLAST FURNACES.

Office Number.	When Wages are Paid.	Number of Months in Operation.	Capital.	Greatest Number of Hands Employed at any one Time During the Year.	AVERAGE NO. OF HANDS EMPLOYED.		WAGES AND HOURS OF LABOR.					Advance in Wages—Per cent.	Value of Materials.	Number of Tons Produced.	Value of Products.
					Males above 16 Years.	Children and Youth.	No. of Hours in the Ordinary Day of Labor.		Average Day's Wages for a Skilled Mechanic.	Average Day's Wages for an Ordinary Laborer.	Total Amount Paid in Wages During the Year.				
							May to Nov.	Nov. to May.							
301	Monthly	8½	$125,000	75	75	.....	10	12	$2 25	$1 60	$25,800	10	$102,975	6,865	$151,030
302	"	12	1,000,000	160	120	15	10	10	2 30	1 60	65,000	10	448,000	32,051	705,122
303	"	12	500,000	100	75	10	10	10	2 30	1 60	32,000	10	280,000	20,000	440,000
304	"	12	500,000	190	150	14	10	10	1 75	1 25	35,000	15	228,000	16,300	358,600
305	"	12	1,000,000	226	210	.....	10	10	2 00	1 75	93,335	10	740,985	44,713	849,587
306	"	12	1,250,000	85	75	10	10	10	2 05	1 60	27,800	10	185,000	13,369	444,225
307	"	6	600,000	45	45	.....	10	10	1 75	1 25	14,500	.....	84,000	6,000	150,000
308	"	12	400,000	64	60	4	10	10	1 75	1 60	21,100	10	135,000	10,095	250,000
309	"	4	600,000	30	30	.....	10	10	.....	1 75	2,100	10	12,600	900	22,500
310	Semi-monthly...	12	850,000	45	45	.....	10	10	2 50	1 75	23,400	.....	125,000	5,240	209,600
	Total for State *.....		$6,825,000	1,020	885	53	.....	.....	.....	.....	$340,035	.....	$3,341,560	155,533	$3,580,664

* Ten establishments, operating 16 furnaces.

CHAPTER III.

PAPER MILLS.

The manufacture of paper, exclusive of that of paper boxes and paper hangings, is carried on in thirty-one mills, operated by twenty-nine firms, whose reports are given in detail in the following table. The capital invested in the business is $2,257,300; while the products manufactured were valued at $2,345,830, of which 55 per cent., or $1,293,260, was paid for the raw materials used, and $325,637, or 14 per cent., for wages to the workmen, of whom the average number employed was 887, (669 men, 146 women and 72 children); the greatest number employed at any one time during the year having been 930. Skilled mechanics received from $2 to $2.75 per day; ordinary laborers, men, $1 to $1.75; women, 50 cents to $1.00. Three firms advanced wages. In eighteen mills payments are made semi-monthly; in six monthly, and in seven weekly. Fourteen mills were in operation during the whole year on full time.

During the Census year there were in operation in the State thirty-two establishments, whose invested capital amounted to $1,830,500. The greatest number of hands employed was 886; average number, 842, (men, 670; women, 139; children 33.) There was paid in wages the sum of $272,936. The total value of materials used was $1,286,182; and of manufactured products, $2,015,569.

The Census returns for 1870 gave the following statistics under paper not specified, and printing and wrapping paper: Number of establishments, 32; number of hands employed, 592; wages paid, $248,459; capital invested, $1,440,700; value of materials used, $941,498; of products manufactured, $1,612,321.

The following tables will show, in detail, the statistics of our paper mills in 1882 and 1880:

PAPER MILLS—(1882.)

Office Number.	MONTHS IN OPERATION. Full Time.	Half Time.	Idle.	NUMBER HOURS CONSTITUTING A DAY'S WORK. May to November.	November to May.	Advance in Wages.	When Wages are Paid.	Number of Tons Made.	Capital.	Greatest Number of Hands Employed at any one Time during the Year.	AVERAGE NUMBER OF HANDS EMPLOYED. Males above 16 years.	Females above 15 years.	Children and Youth.	WAGES. Average Day's Wages for a Skilled Mechanic.	Average Day's Wages for a Male Laborer.	Average Day's Wages for a Woman.	Total Amount Paid in Wages During the Year.	Materials.	Products.
101	12	.....	.....	11	9	7½ per cent.	Monthly.	1,234	$50,000	65	50	15	.....	$2 75	$1 60	$0 90	$30,000	$55,000	$118,230
102	12	.....	.....	10	10	.....	Weekly.	300	1,000	6	5	.....	1	.....	1 75	.....	2,500	10,000	22,500
103	8	4	.....	10	10	.....	Monthly.	90	10,000	10	7	2	.....	2 00	1 25	75	3,000	11,000	26,000
104	12	.....	.....	11	11	.....	Semi-monthly.	250	30,000	14	12	1	.....	2 00	1 50	.....	6,500	8,800	31,600
105	10	.....	2	11	11	.....	Weekly.	400	45,000	19	12	2	7	2 00	1 50	66⅔	10,000	13,500	46,500
106	12	.....	.....	12	12	.....	Semi-monthly.	639	71,800	26	23	3	.....	2 00	1 37½	85	14,787	25,560	66,500
107	11	.....	1	12	12	.....	Weekly.	1,200	15,000	15	12	.....	.....	2 50	1 88	.....	6,000	14,400	48,000
108	12	.....	.....	{ day and night. }	{ day and night. }	10 per cent.	Monthly.	2,000	125,000	40	35	.....	.....	2 00	1 50	.....	15,000	50,000	130,000
109	12	.....	.....	10	10	10 "	"	300	80,000	60	30	18	4	2 50	1 33	1 00	24,000	50,000	90,000
*110	8	4	.....	12	12	.....	"	1,200	300,000	50	35	3	5	2 50	1 25	1 00	14,000	110,000	150,600
*111	11	.....	1	12	12	.....	Semi-monthly.	1,600	300,000	70	45	10	15	2 75	1 25	1 00	26,000	160,000	200,000
112	11	.....	1	12	12	.....	Monthly.	900	50,000	30	24	.....	2	2 50	1 40	.....	15,000	19,500	58,500
113	11	.....	1	12	12	.....	"	250	8,000	18	12	.....	4	2 00	1 50	.....	3,100	7,000	20,000
114	12	.....	.....	12	12	.....	"	210	10,000	12	8	.....	3	2 00	1 25	.....	2,150	12,000	21,000
115	12	.....	.....	12	12	.....	"	1,371	140,000	70	60	2	8	2 25	1 25	62	13,000	100,000	175,000
116	12	.....	.....	12	12	.....	"	462	30,000	20	13	3	2	2 25	1 25	62	7,000	37,000	60,000
117	11	.....	1	12	12	.....	Semi-monthly.	1,200	100,000	38	20	15	.....	.....	1 40	.....	12,000	75,000	160,000
118	8	.....	4	12	12	.....	" "	125	3,000	8	7	.....	1	.....	1 00	.....	1,800	2,500	7,500
119	8	.....	4	12	12	.....	" "	300	5,000	20	16	.....	4	.....	1 50	.....	4,200	7,000	21,000
120	12	.....	.....	12	12	.....	Monthly.	120	3,500	5	3	2	.....	.....	1 25	50	2,000	2,000	7,000
121	11	.....	1	12	11	.....	Weekly.	480	15,000	20	10	7	3	2 00	1 50	1 00	8,000	11,500	33,500
123	12	.....	.....	12	12	.....	Semi-monthly.	160	30,000	20	12	3	2	2 25	1 60	1 00	9,000	30,000	60,000
123	9	.....	3	12	12	.....	" "	675	70,000	28	20	8	.....	2 25	1 50	1 00	8,500	43,000	81,000
124	12	.....	.....	12	12	.....	" "	1,100	400,000	120	76	44	.....	2 50	1 25	1 00	40,000	165,000	275,000
125	12	.....	.....	12	12	.....	" "	450	55,000	30	20	3	4	2 17	1 30	1 00	12,500	52,500	80,000
126	11	.....	1	12	12	.....	Weekly.	900	65,000	36	30	1	5	.....	1 50	1 00	10,000	69,000	100,000
127	11	.....	1	12	12	.....	"	625	75,000	35	34	1	.....	2 00	1 50	1 00	10,500	65,500	120,000
128	12	.....	.....	12	12	.....	"	1,560	150,000	30	30	.....	.....	2 00	1 00	.....	11,500	75,000	115,000
129	8	.....	4	12	12	.....	Semi-monthly.	90	20,000	15	8	4	2	2 00	1 25	1 00	3,600	11,500	22,000
Total for the State, 31 mills								20,191	$2,257,300	930	669	146	72	.....	.....	.....	$325,637	$1,293,260	$2,345,830

* 2 mills.

PAPER MILLS—Continued.

(*U. S. Census*, 1880.)

COUNTIES.	No. of Establishments.	Capital.	Greatest Number of Hands Employed at any one Time during the Year.	AVERAGE NO. OF HANDS EMPLOYED.			Total Amount paid in Wages during the Year.	MATERIALS.									PRODUCTS.								
				Males above 16 years.	Females above 15 years.	Children and Youth.		Tons of Rags.	Tons of Old Paper.	Tons of Cotton Waste.	Tons of Manilla Stock.	Tons of Straw.	Tons of Esparto Grass.	Value of all Chemicals.	Value of all other Materials.	Value of Pulp.	Total Value of all Materials.	Tons of Printing Paper.	Tons of Writing Paper.	Tons of Wrapping Paper.	Tons of Binders' Board.	Tons of Wall Paper.	Pounds of Colored Paper.	Pounds of Tissue Paper.	Pounds of all Other Paper.	Total Value of all Products.
Atlantic	2	$300,000	45	41	4	....	$19,360	.....	125	....	2,260	.....	..	$9,965	$5,400	$2,749	$152,400	.....	....	2,047	.....	....	.....	.....	.....	$200,000
Burlington	1	100,000	34	30	4	....	4,000	.....	18	....	150	180	..	450	1,300	.....	10,150	.....	....	210	.....	....	.....	.....	.....	18,910
Bergen	1	20,000	14	8	4	2	3,600	.....	73	....	60	.....	..	1,200	500	.....	11,100	.....	....	.....	.....	....	.....	.....	180,000	20,000
Camden	1	80,000	32	28	4	....	12,000	.....	.....	....	1,000	.....	..	8,000	3,000	.....	65,000	.....	....	600	.....	....	.....	.....	.....	96,000
Essex	8	255,000	171	126	23	9	57,657	1,088	1,751	148	1,352	1,000	..	31,438	16,023	24,051	283,678	.....	....	1,452	1,969	514	.....	300,000	171,262	427,724
Hunterdon	4	288,000	149	136	8	5	45,430	.....	.....	....	4,134	.....	..	26,642	25,796	5,500	276,212	.....	....	2,645	.....	....	.....	190,776	40,000	422,754
Hudson	2	120,000	86	63	18	4	33,000	60	1,300	....	352	.....	..	8,000	29,920	.....	94,000	.....	....	310	970	....	.....	265,000	.....	163,300
Morris	7	124,000	129	90	17	4	22,466	918	535	50	225	30	..	6,470	23,950	.....	85,069	.....	....	100	200	10	536,000	200,000	1,496,000	147,721
Passaic	2	480,000	174	107	55	8	59,269	1,297	152	389	546	.....	1	21,411	58,794	16,366	224,611	1,089	511	.....	.....	....	.....	.....	.....	380,760
Union	3	35,000	33	26	....	....	9,400	.....	1,200	....	150	.....	..	2,550	5,600	.....	38,500	.....	....	.....	1,070	....	.....	.....	.....	58,400
Warren	1	28,000	19	15	2	1	6,754	.....	.....	....	824	.....	..	4,400	3,000	.....	45,462	.....	....	600	.....	....	.....	.....	.....	80,000
The State	32	$1,830,500	886	670	139	33	$272,936	3,363	5,154	587	11,393	1,210	1	$120,526	$173 283	$48,666	$1,286,182	1,089	511	7,964	4,229	524	536,000	955,776	1,887,362	$2,015,569

CHAPTER IV.

BREWERIES.

One of our most important industries, State and National, is the brewing of malt liquors, the production of which has grown very rapidly during the past few years. During the year ending May 1st, 1875, the number of barrels of beer brewed in the United States, was 8,383,720, and in 1882, 16,616,364; an increase in eight years, of 8,232,644 barrels, or over 255,000,000 gallons. Since 1880, the increase has been over one hundred million gallons. In New Jersey, whose relative rank in the production is eighth, 485,600 barrels were brewed in 1875, and 783,931 barrels in 1882, a difference of 298,331 barrels, or over nine million gallons. A large portion of the beer made here is used outside of the State, but there is also a great quantity imported from other States.

In connection with this statement of the amount of malt liquors made, and the progress of this industry in this State and the country at large, it is proper to note the claim made by those interested, that there has been a corresponding decrease in the consumption of distilled liquors. Dr. T. Dunn English, of Newark, of the United States Lager Beer Brewers' Association, writes on this subject: "The contrast is shown more strikingly by comparing the years in which the United States Census gives us the population. In 1870, there were withdrawn from bond, for consumption, 77,266,380 gallons of distilled liquor, and with this were 1,223,830 gallons of fruit brandy, making 78,490,210 gallons. If to this be added ten per cent. for any possible evasion of revenue, and deducting one-third for use in mechanical and manufacturing industry, we have 57,549,488 gallons. In addition to this there were 1,676,397 gallons imported, which would make a total of 59,225,885 gallons, or 1.55 per head of the population at that time. In 1880, after making similar reductions and additions, we find the amount consumed to have been 47,886,777

gallons, or 0.95 per head. The exports of distilled liquor made here rose, however, from 915,629 gallons in 1870, to 11,418,506 gallons in 1880. In consumption of malt liquors, on the contrary, there was a remarkable increase. In 1870, with the imports added, there were brewed 204,892,851 gallons, or 5.4 gallons per head. In 1880, the amount was 414,771,690 gallons, or 8.26 gallons per head. This shows, in ten years, a decrease in whiskey drinking of 40.64 per cent. per head, and an increase of beer drinking of 52.96 per cent. per head."

The following table from the *British Trade Journal*, gives the quantity of beer (including ale) brewed in various countries in 1880, with the consumption *per capita* of population. As no account is taken of the quantity imported or exported from each country in these figures, it is to be presumed that this element would modify the result as to certain countries:

	Number of Breweries.	Quantity Brewed—Gallons.	Consumption Per Head—Gallons.		Number of Breweries.	Quantity Brewed—Gallons.	Consumption Per Head—Gallons.
Belgium	2,500	180,000,000	33	Austria	2,448	270,000,000	7½
Great Britain	26,214	1,050,000,000	32	Switzerland	400	17,000,000	6
Germany	23,940	900,000,000	22	Sweden	240	20,000,000	5
Denmark	240	30,000,000	12	France	3,100	150,000,000	4 2/3
Netherlands	560	33,000,000	9	Russia	460	50,000,000	0 3/8
Norway	400	16,500,000	8				

Forty-eight establishments were engaged in the beer industry during the year in New Jersey, employing as capital over $4,262,800, and paying $662,886 in wages. The value of the product was $5,798,330, of which $3,179,883 was expended for the materials used. The average number of hands employed was 1,095, including 5 women and 14 children. For further details reference may be made to the following tables giving the statistics of our breweries for 1880, (United States Census returns,) and the relative value of distilled, malt, and vinous liquors made in New Jersey in 1850, 1860, 1870 and 1880. The sales of malt liquors in the several States and principal cities of the United States for a number of years past, are also appended.

BREWERIES. STATISTICS FOR 1882.

Office Number.	Advance in Wages—Per Cent.	When Wages are Paid.	Capital.	Greatest Number of Hands Employed at any one Time During the Year.	AVERAGE NO. OF HANDS EMPLOYED.			WAGES AND HOURS OF LABOR.					MONTHS IN OPERATION.		Value of Materials.	Value of Products.
					Males Above 16 Years.	Females Above 15 Years.	Children and Youth.	Hours in Ordinary Day of Labor. May to November.	Hours in Ordinary Day of Labor. November to May.	Average Day's Wages for a Skilled Mechanic.	Average Day's Wages for an Ordinary Laborer.	Total Amount of Wages Paid During the Year.	On Full time.	Idle.		
1	.....	Weekly.....	$ 80,000	20	20	.....	.....	10	10	$2 60	$2 00	$16,600	12	.....	$50,000	$96,000
2	.....	"	1,500	2	1	.....	.....	10	10	.....	1 50	250	6	6	225	1,200
3	.....	"	8,000	4	4	.....	.....	10	10	.....	1 60	1,000	12	.....	4,700	8,600
4	.....	"	37,000	4	4	.....	.....	10	10	2 40	2 00	2,500	12	.....	13,800	25,568
5	.....	"	5,000	5	4	.....	.....	10	10	.....	1 50	650	6	6	1,000	2,250
6	10	"	120,000	30	25	2	.....	10	10	2 60	2 25	12,500	12	.....	82,500	125,000
7	.....	"	12,000	10	8	1	1	10	10	.....	2 00	2,400	10	2	12,000	21,062
8	.....	"	10,000	5	4	1	.....	10	10	.....	2 00	1,800	10	2	8,800	16,320
9	10	"	150,000	20	20	.....	.....	10	10	2 60	2 00	10,375	12	.....	52,500	94,320
10	.....	"	4,000	5	5	.....	.....	10	10	.....	2 00	1,600	12	.....	480	3,100
11	.....	"	85,000	30	30	.....	.....	10	10	2 25	1 75	16,500	12	.....	40,000	110,000
12	.....	"	500	1	1	.....	.....	10	10	.....	1 50	250	2	9	1,000	1,500
13	10	"	150,000	50	45	.....	.....	10	10	2 50	2 00	20,500	12	.....	90,500	200,000
14	.....	"	12,000	4	4	.....	.....	10	10	.....	1 60	1,500	12	.....	4,400	7,200
15	.....	"	3,500	3	3	.....	.....	10	10	.....	1 60	825	10	2	1,750	3,400
16	.....	"	200,000	45	45	.....	.....	10	10	2 50	2 00	39,000	12	.....	203,500	370,000
17	.....	"	3,000	4	4	.....	.....	10	10	.....	1 60	750	12	.....	1,800	3,500
18	.....	"	3,000	2	2	.....	.....	10	10	.....	1 50	500	6	6	800	1,500

19	10	"	.....	120,000	40	38	.....	.....	10	10	2 45	2 00	13,000	12	.....	75,000	145,000
20	8	"	.....	170,000	43	43	.....	.....	10	10	2 50	2 00	25,000	12	.....	132,800	216,500
21	.....	"	.....	5,000	5	5	.....	.....	10	10	.....	2 00	3,275	12	6	9,500	17,500
22	.....	"	.....	1,500	3	2	1	.....	10	10	.....	1 60	600	6	2	500	1,410
23	.....	"	.....	2,000	3	3	.....	.....	10	10	.....	1 60	750	10	.....	1,300	2,500
24	.....	"	.....	30,000	7	7	.....	.....	10	10	.....	2 00	3,950	12	.....	16,555	36,048
25	8	"	.....	100,000	16	16	.....	.....	10	10	2 50	2 00	13,000	12	.....	75,000	140,000
26	.....	"	.....	50,000	35	35	.....	.....	10	10	.....	2 00	15,928	12	.....	79,640	144,800
27	10	"	.....	250,000	65	65	.....	.....	10	10	2 50	2 00	48,000	12	.....	232,500	425,000
28	.....	"	.....	1,000	1	1	.....	.....	10	10	.....	2 00	600	12	.....	900	2,000
29	.....	"	.....	3,000	4	4	.....	.....	10	10	.....	2 00	2,000	12	.....	6,500	12,000
30	.....	"	.....	11,000	8	8	.....	.....	10	10	.....	2 00	3,067	12	.....	14,800	27,888
31	10	"	.....	250,000	50	50	.....	.....	10	10	2 60	2 00	37,180	12	.....	175,000	338,000
32	8	"	.....	275,000	60	55	.....	.....	10	10	2 50	2 00	16,500	12	.....	130,000	230,000
33	.....	"	.....	5,000	1	1	.....	.....	10	10	.....	2 00	750	12	.....	1,600	2,500
34	5	"	.....	180,000	32	32	.....	.....	10	10	2 40	2 00	23,250	12	.....	115,000	189,008
35	.....	"	.....	300	3	3	.....	.....	10	10	.....	1 60	1,000	12	.....	1,200	4,000
36	10	"	.....	100,000	30	30	.....	.....	10	10	2 50	2 00	24,000	12	.....	125,500	210,528
37	10	"	.....	100,000	26	26	.....	.....	10	10	2 50	2 00	21,000	12	.....	100,000	225,000
38	10	"	.....	650,000	140	140	.....	.....	10	10	2 70	1 90	125,786	12	.....	628,958	1,145,560
39	10	"	.....	300,000	50	50	.....	.....	10	10	2 70	1 90	52,500	12	.....	125,000	240,000
40	.....	"	.....	12,000	10	9	.....	1	10	10	.....	1 50	5,000	12	.....	12,500	20,000
41	10	"	.....	190,000	60	58	.....	2	10	10	2 60	1 50	30,300	12	.....	168,365	282,432
42	10	"	.....	45,000	18	16	.....	1	10	10	2 50	1 60	4,300	12	.....	30,000	55,000
43	.....	"	.....	25,000	5	4	.....	1	10	10	.....	1 60	800	9	3	1,600	3,000
44	10	"	.....	120,000	50	47	.....	2	10	10	2 60	1 50	15,600	12	.....	81,000	145,440
45	10	"	.....	185,000	55	52	.....	2	10	10	2 60	1 60	20,700	12	.....	113,000	196,576
46	10	Semi-weekly.		150,000	30	25	.....	4	10	10	2 50	1 75	14,000	12	.....	100,500	160,960
47	.....	"	.....	.....	4	4	.....	.....	10	10	.....	1 60	1,500	12	.....	4,410	6,600
48	10	"		70,000	18	18	.....	.....	10	10	2 50	1 60	9,550	12	.....	51,500	82,560
Total for State*...				$4,262,800	1,116	1,076	5	14	.....	.....	.....	.....	$662,886	.....	.....	$3,179,883	$5,798,330

* Number of establishments, 48.

BREWERIES—Continued. STATISTICS FOR 1880.

	Number of Establishments.	Capital.	Average Number of Hands Employed.	Total Amount Paid in Wages During the Year.	Value of Materials.	Value of Products.
Atlantic County	1	$12,000	3	$668	$3,551	$6,236
Essex "	19	1,612,800	689	305,933	1,592,798	2,812,300
Hudson "	15	912,500	258	114,653	589,140	1,048,772
Hunterdon "	2	20,000	9	3,293	17,249	30,270
Mercer "	2	10,000	1	168	1,003	1,781
Middlesex "	1	12,000	5	1,847	9,641	17,039
Passaic "	6	592,000	138	59,611	311,265	546,510
Union "	3	89,500	18	7,568	40,101	69,825
Total for the State	49	$3,260,800	1,121	$493,741	$2,564,748	$4,532,733

BREWERIES—Continued. COMPARATIVE STATISTICS.

		Number of Establishments.	Capital.	HANDS EMPLOYED. Total Number of Hands Employed.	Men.	Children.	Wages Paid.	Value of Materials.	Value of Products.
1850.....Liquors.....	Distilled.....	68	$409,655	.....	265	.....	.....	.....	* 1,250,530
	Malt.....								†34,750
1860.....Liquors.....	Distilled.....	56	311,200	.....	171	.....	$52,212	$431,763	$604,587
	Malt.....	32	1,116,500	.....	277	.....	98,892	632,512	1,425,425
	Vinous.....	1	3,000	.....	2	.....	480	6,000	12,000
1870.....Liquors.....	Distilled.....	56	187,930	153	147	6	16,887	167,360	454,734
	Malt.....	46	2,942,300	528	522	6	329,139	1,659,113	3,219,484
	Vinous.....	1	219	1	1	.....	.....	690	990
1880.....Liquors.....	Distilled.....	19	102,045	.....	14	.....	2,900	27,550	41,890
	Malt.....	49	3,260,800	.....	1,121	.....	493,741	2,564,748	4,532,733
	Vinous.....	1	50,000	.....	27	.....	7,000	50,000	60,000

* Gallons of whiskey. † Barrels of ale.

SALE OF MALT LIQUOR IN THE UNITED STATES FROM MAY 1st, 1875 TO 1882.*

STATES AND TERRITORIES.		1875.	1877.	1878.	1879.	1880.	1881.	1882.	Increase 1882, Compared with 1881.	Decrease 1882, Compared with 1881.	Total Increase Eight Years.	Total Decrease Eight Years.
Alabama	Barrels	401	263	.....	.....	80	4	.....	.....	4	.....	401
Arizona	"	527	804	713	720	1,461	3,065	3,806	741	.....	3,279	.....
Arkansas	"	95	129	119	72	37	.....	.....	.....	.....	.....	95
California	"	302,287	365,243	377,768	385,150	376,874	411,509	424,486	12,977	.....	122,199	.....
Colorado	"	23,516	23,900	23,900	21,166	50,048	69,715	84,434	14,719	.....	60,918	.....
Connecticut	"	52,503	53,528	53,528	51,988	64,572	72,464	99,376	26,912	.....	46,873	.....
Dakota	"	1,823	4,834	4,616	4,531	6,013	7,750	14,846	7,096	.....	13,023	.....
Delaware	"	5,646	4,897	7,841	9,563	9,388	11,734	14,282	2,548	.....	8,636	.....
District of Columbia	"	21,573	34,037	27,506	29,126	42,030	34,856	39,496	4,640	.....	17,923	.....
Georgia	"	5,530	7,710	7,330	7,710	11,720	9,826	2,870	.....	6,956	.....	2,660
Idaho	"	915	779	936	1,504	1,926	1,979	2,747	768	.....	1,832	.....
Illinois	"	536,619	569,798	579,808	608,627	766,730	870,175	1,004,789	134,614	.....	468,170	.....
Indiana	"	181,053	187,640	182,358	193,259	247,930	276,854	335,804	58,950	.....	154,751	.....
Iowa	"	180,653	179,988	185,276	169,030	223,713	247,983	292,391	44,408	.....	111,738	.....
Kansas	"	23,592	29,718	20,995	24,706	32,437	28,926	23,133	.....	5,793	.....	459
Kentucky	"	114,070	103,491	127,416	144,972	174,534	181,745	225,127	43,382	.....	111,057	.....
Louisiana	"	30,910	45,581	36,352	47,407	57,325	51,832	57,192	5,360	.....	26,282	.....
Maine	"	11,527	11,030	.....	.....	.....	.....	.....	.....	.....	.....	11,527
Maryland	"	191,548	205,576	208,228	195,048	214,442	253,711	301,507	47,796	.....	109,959	.....
Massachusetts	"	479,597	526,367	602,062	561,872	649,062	736,523	816,783	80,250	.....	337,186	.....
Michigan	"	191,274	210,713	200,324	212,231	272,694	278,230	330,740	52,510	.....	139,466	.....
Minnesota	"	88,567	102,313	101,904	113,529	142,334	173,384	211,704	38,320	.....	123,137	.....
Mississippi	"	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
Missouri	"	397,033	476,391	447,686	582,400	727,869	803,427	1,017,446	214,019	.....	620,413	.....
Montana	"	3,967	3,912	4,677	5,516	7,088	9,096	12,449	3,353	.....	8,482	.....
Nebraska	"	22,867	22,858	27,100	29,270	40,903	45,270	53,933	8,663	.....	31,066	.....
Nevada	"	12,990	14,095	12,116	13,969	15,435	13,482	11,660	.....	1,822	.....	1,330
New Hampshire	"	139,482	121,794	122,213	108,283	175,151	203,497	246,130	42,633	.....	106,648	.....
New Jersey	"	485,600	505,708	502,574	519,867	612,389	665,537	783,931	118,394	.....	298,331	.....
New Mexico	"	1,190	750	110	91	283	387	1,607	1,220	.....	417	.....
New York	"	2,889,777	3,354,439	3,564,778	3,846,569	4,445,149	4,855,429	5,534,594	680,165	.....	2,645,817	.....
North Carolina	"	81	.....	.....	4	90	19	26	7	.....	.....	55
Ohio	"	480,114	895,740	988,515	955,644	1,194,382	1,291,203	1,566,451	275,248	.....	1,086,337	.....
Oregon	"	7,257	10,029	13,362	16,159	20,367	24,893	24,263	.....	630	17,006	.....
Pennsylvania	"	964,634	1,095,097	1,036,295	1,030,584	1,284,887	1,398,154	1,689,714	291,560	.....	725,080	.....
Rhode Island	"	18,975	22,605	25,210	27,831	50,260	57,842	68,600	10,758	.....	49,625	.....
South Carolina	"	1,835	1,038	778	372	1,253	8,052	10,154	2,102	.....	8,319	.....
Tennessee	"	1,541	107	6,980	7,107	7,808	8,735	11,044	2,309	.....	9,503	.....
Texas	"	14,057	16,306	10,051	7,718	5,812	2,970	3,117	147	.....	.....	10,940
Utah	"	6,829	8,754	9,400	11,476	13,123	15,138	18,015	2,877	.....	11,186	.....
Vermont	"	1,195	304	4,858	8,605	.....	.....	.....	.....	.....	.....	1,195
Virginia	"	14,878	17,013	10,694	15,694	17,187	20,110	25,470	5,360	.....	10,592	.....
Washington	"	5,253	7,647	7,965	7,231	8,666	11,335	13,375	2,040	.....	8,122	.....
West Virginia	"	26,526	25,155	23,122	24,158	31,517	36,290	47,228	10,938	.....	20,702	.....
Wisconsin	"	440,614	472,309	509,544	584,673	791,783	926,297	1,185,097	258,800	.....	744,453	.....
Wyoming	"	2,792	4,794	4,060	4,505	5,122	6,028	5,547	.....	481	2,755	.....
Totals		8,383,720	9,752,030	10,181,158	10,589,937	12,800,900	14,125,466	16,616,364	2,506,584	15,686	8,261,313	28,669

* Fiscal Years—Net Increase 1882 over 1881, 2,490,898 Barrels. Net Increase 1882 over 1875, 8,232,644 Barrels.

SALES OF MALT LIQUORS IN THE PRINCIPAL CITIES OF THE UNITED STATES, FOR THE SIX FISCAL YEARS ENDING MAY 1st, 1882.

CITIES.		1877.	1878.	1879.	1880.	1881.	1882.	Increase 1882 Over 1881.	Total Increase in Five Years.
Baltimore, Md.	Barrels.	180,023	178,084	172,896	200,175	255,307	295,782	40,475	115,759
Boston, Mass.	"	476,615	540,843	505,140	580,422	641,503	718,000	76,497	241,385
Brooklyn, N. Y.	"	419,012	463,891	519,356	602,967	652,159	793,877	141,718	374,865
Buffalo, N. Y.	"	182,076	178,253	197,348	204,308	227,141	266,568	39,427	84,492
Chicago, Ill.	"	324,706	346,192	375,549	458,804	524,147	645,052	120,905	320,346
Cincinnati, O.	"	478,362	520,783	495,483	584,331	641,238	775,520	134,282	297,158
Cleveland, O.	"	131,670	144,030	140,852	153,176	178,265	219,080	40,815	87,410
Detroit, Mich.	"	116,721	102,740	114,819	130,775	152,624	170,034	17,410	53,313
Milwaukee, Wis.	"	263,639	333,551	411,245	577,992	681,454	920,680	229,226	657,041
New York City	"	1,712,219	1,894,731	2,067,759	2,384,884	2,627,526	3,060,698	433,172	1,348,479
Newark, N. J.	"	374,447	355,283	343,685	362,333	420,767	498,436	77,669	123,989
Philadelphia, Pa.	"	668,467	646,739	645,803	765,884	832,553	1,022,998	190,445	354,531
Pittsburg, Pa.	"	93,063	82,126	85,669	134,552	160,950	200,119	39,169	107,056
Portsmouth, N. H.	"	121,794	118,173	118,283	145,124	170,293	212,030	41,737	90,236
Rochester, N. Y.	"	88,357	107,278	155,030	175,497	222,106	252,716	30,610	164,359
San Francisco, Cal.	"	257,441	271,126	257,730	257,070	279,543	291,404	11,861	33,963
St. Louis, Mo.	"	421,026	472,567	528,424	627,275	711,578	929,650	218,072	508,624
Toledo, O.	"	64,148	76,301	86,529	103,428	124,219	146,804	22,585	82,656
Troy, N. Y.	"	104,583	95,614	98,441	112,126	129,113	146,919	17,806	42,336

CHAPTER V.

THE DAIRY INTEREST.

The creamery business is not managed as well in New Jersey as in New York, Massachusetts, or in some Western States, and needs stimulating. In order to encourage the formation of co-operative creamery associations, which, if properly managed, will bring more money * to our farmers than the selling of milk in New York or Philadelphia, considerable space was devoted to this subject in our preceding report. With the same object in view, great efforts were made this year to obtain complete statistics from all our butter and cheese factories, of which there are twenty-nine in this State, thirteen being operated by co-operative associations of farmers, and the rest by individual firms. Thirteen are located in Sussex, four in Hunterdon, three in Somerset, two in Monmouth, two in Gloucester, and one each in Burlington, Mercer, Middlesex, Salem and Warren Counties. Returns, some incomplete, were received from only sixteen of these establishments, in thirteen of which there were made during the year 287,185 pounds of butter and 801,594 pounds of cheese. In nine,

* In the report of the U. S. Department of Agriculture, (1882), are given the market prices of farm products for 1881, "representing, as nearly as practicable, the state of the market at the beginning of each month." The quotations for butter and cheese, per pound, in cents, according to this authority, were:

Butter (Western): January, 14 to 28; February, 14 to 27; March, 18 to 26; April, 19 to 27; May, 13 to 20; June, 10 to 22; July, 10 to 19; August, 10 to 19; September, 10 to 25; October, 12 to 28; November, 13 to 30; December, 14 to 35,

Butter (State): January, 22 to 34; February, 22 to 34; March, 18 to 34; April. 14 to 32; May, 18 to 24; June, 18 to 25; July, 17 to 23; August, 17 to 24; September, 22 to 31; October, 22 to 36; November, 25 to 36; December, 31 to 42.

Cheese (State factory): January, 8½ to 13; February, 8½ to 13¾; March, 8 to 13¼; April, 8½ to 13½; May, 8½ to 13; June, 6½ to 10; July, 7 to 10; August, 7½ to 10¾; September, 9 to 12; October, 9 to 13; November, 9 to 13; December, 8 to 12½.

Cheese (Western factory): January, 8½ to 12½; February, 8½ to 13½; March, 8 to 12¾; April, 7 to 12; May, 8 to 12; June, 3½ to 9¼; July, 3 to 9½; August, 3 to 10; September, 3 to 11; October, 3 to 11½; November, 3 to 12; December, 3 to 11.

in which there was produced in 1881 a product of 104,427 pounds of butter and 286,285 pounds of cheese, the result this year was 211,642 pounds of butter and 564,560 pounds of cheese.

In 1880, according to the United States Census returns, there were eleven butter and cheese factories in New Jersey, two in Somerset and nine in Sussex Counties. The following statistics were reported: Capital (real and personal) invested, $42,170; average number of hands employed—male, 301; female, 1; children, 1; total amount paid in wages, $8,395; number of pounds of milk used, 9,683,992; pounds of cheese made, 503,218; pounds of butter made, 358,402; value of materials used, $85,491; buttermilk and skimmed milk sold, $3,314; all products, $123,063.

Our own returns from seventeen establishments, for four of which, no reports having been received this year, the figures for 1881 are used, show a product of 368,470 pounds of butter and 986,828 pounds of cheese. The total value of all the products of sixteen of these factories was $202,315.48. The following table will give further details.

In this connection are also presented the statements, kindly furnished by our railroad officials, showing the quantity of milk transported over the New Jersey roads during the year:

MILK TRANSPORTED OVER THE RAILROADS.

Quantity of Milk Consigned to Philadelphia and Camden, via Camden Station of Pennsylvania Railroad (Amboy and Burlington County Division.)

1882.	Philadelphia.	Camden.	Philadelphia and Camden.
	Quarts.	Quarts.	Quarts.
January	187,520	108,940	296,460
February	184,120	106,260	290,380
March	228,620	123,840	352,460
April	258,440	129,660	388,100
May	296,820	150,920	447,740
June	309,820	184,260	494,080
July	298,680	153,240	451,920
August	275,760	155,180	430,940
September	254,400	125,060	379,460
October	229,480	113,720	343,200
November	204,340	98,600	302,940
December	194,060	98,600	292,660
Total	2,922,060	1,548,280	4,470,340

Total number of dairies shipping milk to the Camden station..... 163
" " " stations " " " " " 26
" " " creameries " " " " " 3
" " " 20 and 40-quart cans shipped..... 110
" " " pounds of milk received..... 11,175,850 (5,587 tons)
" " " one-horse milk vehicles transported over Camden and Philadelphia ferry..... 9,057
" " " two-horse milk vehicles transported over Camden and Philadelphia ferry..... 1,029

The greatest distance milk is received from on the Burlington County division is Sharon station, 46 miles; on the Amboy division, Newtown, 35 miles.

Quantity of Milk Shipped to Jersey City and Local Points, over the Central Railroad of New Jersey.

1882.	From Middle Valley.	From High Bridge.	From Annandale.	From Lebanon.	From White House.	From Flemington.	From Neshanic.	From Three Bridges.
	No. Cans.	No. Cans.	No. Cans.	No. Cans.	No. Cans.	No. Cans.	No. Cans.	No. Cans.
January	225	172	1,798	3,111	2,159	1,215	58	276
February	292	169	1,298	2,719	2,025	1,036	7	243
March	424	205	1,111	3,433	2,701	1,170	.....	314
April	464	129	1,090	3,608	2,615	1,098	.....	325
May	590	69	1,373	3,520	2,969	1,418	.....	393
June	606	62	1,594	3,657	3,173	1,160	.....	396
July	611	58	1,670	4,823	3,895	1,064	.....	418
August	573	46	1,733	5,322	4,009	912	.....	375
September	504	36	1,547	4,830	3,821	864	.....	336
October	505	42	1,789	5,391	3,583	749	.....	316
November	441	45	1,674	5,233	2,904	612	24	248
December	401	34	1,778	4,963	2,446	618	197	258
	5,636	1,067	18,455	50,610	36,300	11,916	286	3,898

Total..... 128,168 cans of 40 quarts, or 1,281,680 gallons.

MILK TRANSPORTED OVER THE RAILROADS—Continued.

Quantity of Milk Carried to Points on the United Railroads of New Jersey Division During Year 1882.

To Philadelphia, Market Street Wharf	734,700	Gallons.
" Camden	379,100	"
" Jersey City	213,550	"
" Burlington	3,200	"
" Sea Side Park	900	"
" Barnegat Pier	900	"
" Bordentown	400	"
" South Amboy	300	"
" Elizabeth	200	"
" New Brunswick	200	"
" Newark	100	"
" Sea Girt	100	"
" Toms River	100	"
Total	1,333,750	"

From West Jersey Railroad.

To Camden	267,800	Gallons.

Over the Northern Railroad of New Jersey, from Spring Valley, Rockland County, N. Y.

To Jersey City	16,605½	Gallons.
" Englewood, Bergen County, N. J.	5,120	"

From Blauveltville, Rockland County, N. Y.

To Jersey City	30	"
Total	21,755½	"

Over the Delaware, Lackawanna and Western Railroad.

To Newark	17,333	Cans.*
" Hoboken	108,685	"
Total	126,018	"

* Forty-quart cans.

CREAMERIES.

Office Number.	County.	No. of Persons Interested.	Capital Invested.	Total No. of Cows Contributing.	Av. No. of Cows Contributing.	Pounds of Milk Received.	Average Price Paid Per Pound.	Pounds of Butter Made.	Pounds of Cheese Made.	Average Pounds of Milk to One Pound of Butter.	Average Pounds of Milk to One Pound of Cheese.	Value of Butter Sold.	Value of Cheese Sold.	Value of Cream Sold.	No. of Hands Employed.	Total Amount Paid For Labor.	Value of all Products.
1	Hunterdon.	52	$2,500	250	200	1,028,026	.012	29,958	71,962	34	14	$10,485 47	$3,598 10	.....	2	$853 00	$13,379 39
2	"	48	6,400	400	300	1,155,466	.017⅜	28,496	65,654	40	13½	8,585 52	4,048 62	.....	2	1,000 00	12,833 62
3	"	56	6,000	300	225	1,058,482	.013	22,171	66,300	44	14	8,314 00	4,000 00	.....	2	900 00	12,314 00
4	"	35	5,000	600	400	1,173,575	.011	27,049	77,690	40	17	9,000 00	5,000 00	$500 00	3	1,100 00	14,525 00
5	Mercer.....	23	6,000	.....	.....	365,991	.019⅜	7,759	19,250	.....	13	.....	.....	100 40	2	668 00	4,145 29
6	Somerset....	42	10,000	350	225	1,200,100	.012	29,475	85,300	40	13½	9,210 00	4,630 00	.....	3	1,670 00	13,968 00
7	"	2	3,000	250	200	.....	.....	10,000	20,000	25	12½	.....	.....	.....	3	1,000 00	8,500 00
8	Salem	60	2,500	500	400	2,000,000	.0125	60,000	150,000	33	13	.....	.....	.....	3	1,620 00	.....
9	Monmouth.	46	6,000	350	200	849,087	.012	16,980	69,364	50	12½	5,773 20	4,161 84	688 20	2	1,030 00	10,679 74
10*	"	39	6,000	500	.....	1,518,973	.....	28,434	125,185	.....	.....	.....	.....	.....	2	.....	19,000 00
11*	Burlington.	50	7,500	350	250	344,370	.....	10,331	27,549	33⅓	12½	3,099 30	1,928 43	175 00	3	526 00	5,202 73
12	Sussex.....	1	.....	205	.....	366,213†	†.02¾	1,184	3,016	.....	.....	564 30	120 65	.....	3	729 00	11,413 59
13	"	2	7,500	450	400	1,484,810	.0133	30,933	123,734	24	.....	9,775 80	1,460 00	92 25	5	1,500 00	21,460 80
14	"	20	5,000	600	400	2,086,476	.....	8,500	21,574	.....	12	2,125 00	862 96	313 66	2	1,650 00	36,245 96
15	"	1	2,000	150	.....	432,642	.01¼	14,680	27,750	26	.....	4,536 31	750 00	736 90	1	200 00	6,037 36
16	"	1	.....	200	100	.....	.....	.....	.....	.....	12	.....	.....	.....	2	700 00	.....
17	"	2	1,000	700	500	2,770,000	.....	.....	.....	.....	.....	.....	.....	.....	...	.....	.....
18	"	1	.....	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	700 00	.....
19*	"	1	2,500	400	309	50,640‡	.....	25,320	.....	.....	.....	.....	.....	.....	5	625 75	6,300 00
20*	"	3	4,500	500	.....	270,000	.....	17,200	32,500	.....	.....	4,300 00	2,000 00	.....	3	600 00	6,300 00

* From report of 1881. † Quarts. ‡ Quarts of Cream.

PART VIII.

STATISTICS OF THE WEALTH AND INDUSTRY OF NEW JERSEY.

(FROM THE RETURNS OF THE TENTH UNITED STATES CENSUS, 1880.)

I.—GENERAL STATISTICS OF MANUFACTURES:

SUMMARY BY COUNTIES.
SPECIFIED INDUSTRIES.
COMPARATIVE STATISTICS FOR 1850, 1860, 1870 AND 1880.

II.—SPECIAL STATISTICS OF MANUFACTURES:

BOOTS AND SHOES.
BRICK YARDS AND TILE WORKS.
COTTON MANUFACTURE.
FLOURING AND GRIST MILLS.
LEATHER, TANNED.
LEATHER, CURRIED.
SHIPBUILDING.
WOOLEN MANUFACTURES.

III.—MISCELLANEOUS STATISTICS:

COMMERCIAL FISHERIES.
PRODUCTIONS OF AGRICULTURE.
STATISTICS OF OCCUPATIONS.

I. General Statistics of Manufactures.

In the report for 1881 were presented tables of the General Statistics of the Manufactures of this State, compiled from the returns made to the United States Census Department, in 1880. The figures given at the time were, however, merely preliminary and subject to revision. This year, through the courtesy of Col. C. W. Seaton, Superintendent, and the labor of Mr. F. R. Williams, Chief of the Division of Manufacturing Statistics, United States Census Office, we are enabled to present corrected statistics.

REMARKS ON THE STATISTICS OF MANUFACTURES.

These tables include every establishment of mechanical or manufacturing industry in the State of New Jersey which was returned at the Tenth Census as having had, during the census year, a product of $500 or more in value, excepting fishery products, gas, petroleum refining, and mining and quarrying.

The statistics of cotton goods include: (1) specific mills, *i. e.*, mills which manufacture cotton into a fabric known and sold under that name; and (2) special mills, working raw cotton, waste, or cotton yarn into hose, webbing, tapes, fancy fabrics or mixed goods, or other fabrics which are not sold as specific manufactures of either cotton or wool.

Dyeing and finishing textiles do not include the statistics of establishments connected with cotton, woolen or silk factories, but only the operations of independent dye-works, bleacheries and print-works, the values of the products reported being merely the values added to the fabrics by the processes of these establishments.

The statistics of iron and steel manufacture embrace blast-furnaces, bloomaries and forges, rolling-mills, and steel-works of all kinds.

Shipbuilding includes the building and repairing of iron and wooden vessels of all classes, boats and canal-boats, and the manufacture of blocks and spars, marine engines, oakum, oars and sails.

SUMMARY BY COUNTIES.

COUNTIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount paid in Wages during the Year.	Materials.	Products.
			Males above 16 Years.	Females above 15 Years.	Children and Youth.			
Atlantic	66	$588,600	268	119	41	$113,802	$419,669	$664,569
Bergen	186	2,026,303	1,811	376	265	757,490	2,186,434	3,553,579
Burlington	333	3,001,130	2,047	765	272	829,882	2,930,077	4,471,952
Camden	373	7,728,516	4,693	1,552	499	2,398,668	6,335,659	11,009,206
Cape May	36	60,250	105	.....	.....	31,478	89,655	164,411
Cumberland	303	3,319,155	3,054	1,494	717	1,409,901	2,730,908	5,111,023
Essex	1,568	28,817,405	26,509	6,142	2,985	15,335,849	47,724,375	76,772,350
Gloucester	165	1,907,286	1,329	69	208	590,128	1,045,803	2,357,652
Hudson	802	15,366,125	10,435	3,748	1,203	6,039,847	53,004,058	66,348,124
Hunterdon	374	1,973,625	1,113	198	49	418,215	2,039,828	3,104,070
Mercer	589	7,952,795	7,525	1,197	1,241	3,467,554	8,618,127	14,601,850
Middlesex	278	4,943,270	4,045	2,517	541	1,979,250	5,391,913	9,587,883
Monmouth	277	900,558	842	182	64	267,028	1,259,801	1,806,395
Morris	243	2,223,092	1,511	221	36	502,880	1,878,737	3,075,191
Ocean	72	225,010	214	21	10	55,139	220,755	359,041
Passaic	413	14,378,492	12,091	6,906	3,294	7,705,223	16,535,229	29,833,832
Salem	178	993,366	1,126	360	45	372,247	1,210,197	1,867,120
Somerset	141	793,975	882	333	2	414,570	1,740,436	2,539,524
Sussex	185	1,321,826	700	65	24	271,852	1,457,629	2,239,124
Union	300	3,813,665	4,547	780	550	2,425,742	4,936,878	10,099,789
Warren	247	3,892,155	1,940	54	106	696,300	3,524,111	4,808,602
Total for the State*	7,128	$106,226,593	86,787	27,099	12,152	$46,083,045	$165,280,179	$254,375,236

* Not including statistics of fishery products, gas, petroleum refining, and mining and quarrying.

SPECIFIED INDUSTRIES.

MECHANICAL AND MANUFACTURING INDUSTRIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	Value of Materials.	Value of Products.
			Males above 16 Years.	Females above 15 Years.	Children and Youth.			
Agricultural implements	40	$208,300	204	.....	2	$61,972	$95,437	$242,984
Artificial feathers and flowers	5	5,300	32	2	7	7,500	575	14,100
Awnings and tents	2	600	8	.....	.....	1,700	2,900	6,100
Bagging, flax, hemp and jute	3	380,000	281	272	139	195,007	335,560	574,835
Bags, paper	5	14,550	15	27	.....	8,429	28,550	50,275
Baskets, rattan and willow-ware	18	13,825	42	28	15	15,135	17,035	46,099
Belting and hose, leather	8	42,700	37	.....	5	17,134	78,296	112,145
Billiard tables and materials	1	1,000	2	.....	2	1,250	650	3,500
Blacking	1	8,000	2	.....	.....	500	1,200	3,000
Blacksmithing	744	482,961	922	.....	17	332,229	409,608	1,207,951
Bookbinding	5	21,200	35	11	21	26,904	36,650	69,350
Boot and shoe findings	3	12,500	7	4	1	2,457	13,271	19,530
Boots and shoes	398	1,153,390	2,795	834	128	1,422,681	3,069,894	5,262,671
Boots and shoes, rubber	3	600,000	546	438	15	275,997	1,419,849	2,356,465
Boot and shoe uppers	4	18,100	11	6	2	16,072	30,940	51,000
Boxes, cigar	4	3,650	8	7	8	4,140	9,200	18,166
" fancy and paper	16	135,200	104	422	69	147,754	184,650	477,600
" wooden packing	15	232,300	135	15	22	73,324	214,577	376,990
Brass and copper, rolled	3	366,000	91	.....	45	49,600	223,000	304,500
" castings	21	501,350	560	4	10	261,309	222,249	641,596
Bread and other bakery products	330	737,700	752	45	95	384,798	1,818,174	2,798,311
Brick and tile	107	1,731,300	2,575	26	148	665,482	559,037	1,672,533
Bridges	2	185,709	175	.....	.....	52,484	298,448	415,291
Bronze castings	1	60,000	90	6	6	37,000	75,000	124,000
Brooms and brushes	33	52,750	102	33	11	51,705	76,930	176,342
Buttons	25	211,600	544	261	171	331,130	297,500	797,205
Card cutting and designing	4	4,800	27	.....	4	9,550	4,690	18,350
Carpentry	319	750,865	2,615	6	35	1,227,686	3,135,190	3,995,361
Carpets, other than rag	2	103,000	120	65	58	48,000	109,425	179,500
" rag	45	26,375	52	1	.....	14,841	33,350	73,208
Carriage and wagon materials	26	341,775	292	.....	2	139,219	192,086	498,306
Carriages and sleds, children's	1	25,000	7	1	1	5,000	8,000	17,000
Carriages and wagons	129	1,024,740	1,298	15	28	585,752	755,429	1,808,593
Celluloid and celluloid goods	5	1,209,000	452	174	109	242,498	388,262	1,251,540
Cement	4	215,300	76	.....	.....	34,045	79,650	140,700
Charcoal	23	19,075	50	.....	.....	10,625	11,750	31,105
Cheese and Butter	11	42,170	30	1	1	8,395	85,491	123,063
Cigar moulds	1	800	3	.....	3	1,820	2,210	7,820
Clocks	1	30,000	35	25	5	30 000	10,000	47,000
Clothing, men's	186	1,096,709	1,191	1,974	74	988,216	2,870,279	4,737,525
" women's	5	22,200	11	41	1	13,325	47,800	79,300
Coal tar	1	275,000	63	.....	.....	30,000	190,000	300,000
Coffee and spices, roasted & ground	7	116,000	33	3	.....	19,079	240,060	319,888
Coffins, burial cases & und'kers goods	34	151,770	74	1	7	47,583	67,015	166,470
Combs	2	6,500	13	2	1	4,800	4,800	10,800
Confectionery	57	195,550	223	44	35	112,252	592,942	883,325
Cooperage	27	190,300	338	.....	13	123,788	405,421	697,374
Coppersmithing	1	30,000	27	.....	3	20,000	100,000	175,000
Cordage and twine	5	381,400	114	67	43	71,745	630,943	756,521
Cork cutting	2	50,200	43	.....	20	15,900	50,400	77,400
Corsets	9	104,100	53	340	74	115,698	213,880	371,633
Cotton goods	24	3,961,145	1,262	2,809	765	1,309,997	1,284,819	5,039,519
Crucibles	2	950,000	575	.....	.....	211,000	482,000	800,000
Cutlery and edge tools	38	345,311	591	3	90	306,275	261,038	723,640
Dentists' materials	3	3,800	2	.....	.....	600	950	2,400
Dentistry, mechanical	34	71,800	33	6	10	18,658	46,234	155,217
Drugs and chemicals	41	8,830,750	1,215	27	30	598,742	3,528,204	4,993,965
Dyeing and cleaning	13	118,350	131	28	42	65,700	83,275	178,200
Dyeing and finishing textiles	18	1,473,000	1,788	249	161	925,612	1,642,933	3,365,769
Dye woods, stuffs and extracts	6	119,000	75	.....	.....	26,383	200,814	249,352
Electric lights	1	200,000	60	.....	15	35,000	50,000	150,000
Electro-plating	2	3,000	7	.....	.....	2,800	3,500	11,000
Engraving and dye-sinking	15	80,075	70	7	9	49,984	17,422	101,928
Engraving, steel	1	500,000	100	.....	50	30,000	35,000	70,000
Explosives and fire-works	2	65,000	39	40	30	24,000	37,400	88,000
Fancy articles	16	191,500	342	44	172	294,619	172,533	569,800
Felt goods	6	313,000	250	21	15	86,170	516,195	685,386
Fertilizers	21	1,045,500	782	40	21	338,000	1,853,700	2,423,805
Files	9	72,600	202	8	52	102,350	83,262	214,551
Flax, dressed	1	500	2	.....	.....	400	950	2,100
Flour and grist-mill products	481	3,879,083	934	.....	2	285,626	7,303,244	8,459,944
Food preparations	3	2,500	6	.....	.....	1,594	11,200	15,500
Foundry and machine-shop products	188	7,431,421	7,746	102	357	3,432,453	6,138,852	11,282,748
Foundry supplies	5	15,500	11	.....	.....	6,198	7,600	20,660
Fruit-jar trimmings	1	150,000	230	93	25	104,501	318,708	485,503

SPECIFIED INDUSTRIES—Continued.

MECHANICAL AND MANUFACTURING INDUSTR	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	Value of Materials.	Value of Products.
			Males above 16 years.	Females above 16 Years.	Children and Youth.			
Fruits & vegetables, canned & pr's'v'd	32	$767,806	612	1,208	225	$212,678	$965,637	$1,417,086
Furnishing goods, men's	2	7,000	4	68	4	7,400	12,500	62,000
Furniture	77	340,350	323	3	20	149,834	193,660	480,798
" chairs	8	28,575	91	15	12	34,300	25,575	74,450
Furs, dressed	4	35,200	37	13	7	18,785	47,315	96,495
Gas machines and meters	1	40,000	11	.....	1	5,000	20,000	37,500
Glass	27	2,728,021	2,763	46	770	1,300,038	1,088,346	2,810,170
" cut, stained and ornamented	6	45,000	44	.....	5	27,090	41,212	84,893
Gloves and mittens	1	400	.....	8	.....	800	1,000	3,600
Glue	4	14,500	11	.....	.....	5,410	8,400	18,810
Gold and silver, leaf and foil	3	4,000	6	.....	.....	1,380	11,580	16,918
" " reduced and refined	4	60,000	20	.....	1	9,350	368,386	424,500
Grease and tallow	8	39,200	29	.....	1	12,418	160,740	218,187
Gunpowder	1	55,000	30	.....	.....	11,442	70,216	91,560
Hairwork	2	9,750	.....	5	1	1,249	2,500	8,100
Hammocks	1	10,000	19	1	.....	7,800	30,000	50,000
Handles, wooden	3	10,775	8	.....	1	3,510	2,690	11,500
Hardware	35	507,450	392	33	51	217,090	540,793	965,986
" saddlery	37	870,200	856	139	150	441,972	779,958	1,609,555
Hat and cap materials	5	31,500	47	7	1	25,964	31,666	82,490
Hats and caps	79	1,343,900	4,094	1,271	202	2,113,581	2,103,082	6,152,447
High explosives	1	21,000	35	1	.....	17,821	149,312	274,000
Hosiery and knit goods	8	804,570	320	604	146	239,761	258,033	861,181
House furnishing goods	1	1,900	2	.....	.....	1,200	1,000	3,700
Ink	5	62,700	43	1	4	25,950	64,385	142,919
Instruments, professional & scientific	6	5,050	13	.....	.....	4,480	2,750	16,900
Iron and steel	40	9,099,050	4,711	.....	81	1,808,448	6,556,383	10,341,896
" bolts, nuts, washers and rivets	4	160,050	196	.....	13	85,263	334,853	452,862
" forgings	9	391,941	349	.....	33	150,190	524,352	775,514
" pipe, wrought	2	59,500	7	.....	.....	3,350	1,925	6,700
" railings, wrought	9	23,675	23	.....	4	13,489	53,692	80,874
" work, architectural, ornamental	1	6,000	25	.....	.....	9,000	18,000	30,000
" doors and shutters	1	10,000	90	.....	12	40,000	75,000	150,000
Ivory and bone work	3	7,100	29	6	22	13,900	12,800	37,500
Jewelry	68	2,555,899	1,781	264	189	1,114,946	1,967,054	4,079,677
" and instrument cases	1	1,000	4	2	2	1,900	3,000	8,000
Kaolin and ground earths	2	80,000	56	2	.....	28,300	61,216	142,000
Kindling wood	28	54,700	92	2	15	43,958	93,315	181,698
Labels and tags	1	90,000	70	.....	50	70,000	100,000	300,000
Lamps and reflectors	5	47,975	33	1	21	20,470	15,466	55,160
Lapidary work	6	5,400	25	.....	4	9,900	8,200	29,506
Lard, refined	1	25,000	28	.....	.....	15,000	150,000	175,000
Lasts	1	20,000	8	.....	1	4,900	2,950	15,000
Leather board	1	10,000	6	.....	.....	1,350	3,000	5,000
" curried	56	1,983,746	1,283	27	78	762,687	7,090,270	8,727,128
" tanned	55	1,810,050	1,227	4	69	716,599	5,262,747	6,748,094
Lime	24	129,300	124	.....	.....	35,324	82,105	163,254
Lime and cement	2	7,100	8	.....	.....	2,580	2,900	6,500
Liquors, distilled	19	102,045	14	.....	.....	2,900	27,550	41,890
" malt	49	3,260,800	1,121	.....	.....	493,741	2,564,748	4,532,733
" vinous	1	50,000	27	.....	.....	7,000	50,000	60,000
Lock and gunsmithing	10	7,300	9	.....	1	3,275	3,400	14,400
Looking glass and picture frames	19	160,130	245	39	37	104,196	243,650	394,000
Lumber, planed	11	162,000	136	.....	27	58,739	152,230	254,285
" sawed	284	1,657,395	760	.....	8	179,693	989,979	1,627,640
Malt	1	10,000	4	.....	.....	800	13,500	16,875
Mantels, slate, marble & marbleized,	1	2,500	6	.....	.....	1,458	1,000	3,550
Marble and stone work	85	411,860	503	1	41	308,683	286,512	811,996
Masonry, brick and stone	58	193,930	640	.....	10	256,943	376,400	789,050
Matches	1	6,000	4	15	5	1,840	1,470	3,600
Mattresses and spring beds	9	28,550	63	7	8	20,216	58,976	101,900
Millinery and lace goods	1	6,000	6	28	.....	4,000	5,580	11,580
Mineral and soda waters	19	76,200	89	.....	6	35,709	93,670	178,847
Mixed textiles	10	1,577,870	521	906	343	526,770	829,038	1,906,680
Models and patterns	8	7,575	14	.....	.....	6,543	2,437	17,477
Mucilage and paste	1	400	1	.....	.....	50	1,500	2,700
Musical instruments and materials	4	26,000	28	5	.....	13,900	10,600	30,000
" organs and materials	5	354,022	409	2	.....	160,900	215,168	467,000
" pianos and materials	2	10,200	6	.....	1	4,500	6,000	13,000
Needles and pins	2	4,500	22	1	2	8,700	4,409	16,000
Oil cloth, enameled	2	190,000	130	.....	30	71,627	603,200	722,000
" floor	8	625,000	384	.....	14	180,132	878,169	1,173,258
Oil, essential	2	1,500	1	.....	.....	200	2,500	3,250
" linseed	1	14,000	1	.....	.....	450	9,000	9,500
" lubricating	1	3,000	3	.....	.....	1,135	2,035	6,047

SPECIFIED INDUSTRIES—Continued.

INDUSTRIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount paid in Wages during the Year.	Value of Materials.	Value of Products.
			Males above 16 Years.	Females above 15 Years.	Children and Youth.			
Oil, vegetable	1	$250,000	30	.....	.....	$15,000	$200,000	$300,000
Painting and paper hanging	162	463,675	759	15	24	334,326	571,597	1,252,546
Paints	13	761,000	164	8	10	71,204	428,165	598,338
Paper, not specified	32	1,830,500	670	139	33	272,936	1,286,182	2,015,569
Patent medicines and compounds	12	308,500	113	50	5	62,076	133,550	639,125
Paving materials	1	3,000	6	.....	.....	3,000	6,000	30,000
Pencils, lead	1	100,000	47	24	99	35,000	35,000	100,000
Pens, steel	1	150,000	22	162	16	70,000	27,000	120,000
Photographic apparatus	1	3,000	6	2	.....	3,000	500	5,000
Photography	45	86,550	83	19	9	50,047	50,574	172,682
Photographing materials	1	7,000	8	.....	.....	1,800	14,500	21,000
Pickles, preserves and sauces	3	16,000	17	8	3	6,953	44,460	62,412
Pipes, tobacco	2	3,400	17	2	.....	3,600	1,100	7,800
Plastering	11	31,000	64	.....	2	25,192	20,605	63,996
Plumbing and gas-fitting	125	404,175	482	.....	28	245,492	448,268	912,352
Pocket-books	1	1,000	.....	12	.....	1,000	6,000	10,000
Printing and publishing	93	865,475	859	82	120	477,224	418,758	1,224,519
" materials	1	12,000	12	.....	.....	5,500	6,300	30,000
Pumps	5	5,500	11	.....	.....	3,300	3,650	11,075
Refrigerators	1	500	4	.....	.....	1,000	1,000	3,000
Roofing and roofing materials	19	39,260	69	.....	1	28,200	82,141	149,150
Rubber and elastic goods	14	864,000	678	282	94	335,826	1,486,366	2,089,030
" vulcanized	3	226,200	335	150	10	154,700	391,200	767,200
Saddlery and harness	194	709,878	854	69	29	354,896	875,211	1,579,404
Sand and emery paper and cloth	1	500	3	.....	1	2,000	1,800	4,000
Sash, doors and blinds	67	806,925	763	31	28	322,674	622,071	1,150,115
Saws	3	235,000	197	6	58	120,643	114,462	279,909
Screws	1	12,000	9	.....	.....	3,640	2,423	9,000
Sewing machines and attachments	8	1,152,755	2,836	75	400	1,519,947	1,484,902	4,640,852
Shipbuilding	93	943,070	930	.....	.....	548,807	649,194	1,384,629
Shirts	34	516,300	439	2,180	204	662,086	1,196,329	2,106,069
Shoddy	1	35,000	10	5	15	25,000	80,734	137,500
Silk and silk goods	106	6,952,325	4,696	5,360	2,493	4,177,745	9,678,536	17,122,230
Silversmithing	2	108,000	41	4	.....	30,000	13,000	60,000
Silverware	1	20,000	6	.....	2	3,000	2,500	9,000
Slaughtering and meat packing	31	1,775,200	572	.....	10	374,278	19,349,435	20,719,640
Smelting and refining	2	151,800	300	.....	2	156,000	8,137,500	8,370,100
Soap and candles	15	1,197,700	246	8	176	187,383	1,116,321	1,743,380
Spectacles and eye-glasses	2	5,000	6	6	5	4,400	4,695	13,000
Sporting goods	2	16,000	24	11	.....	15,000	7,100	45,600
Springs, steel, car and carriage	4	136,393	122	.....	1	56,148	236,680	333,272
Stationery goods	9	60,500	74	4	18	29,048	21,740	78,900
Steam fittings and heating apparatus	1	40,000	72	.....	.....	24,300	22,000	60,000
Stereotyping and electrotyping	1	50,000	7	.....	.....	3,000	4,000	20,000
Stone and earthenware	49	2,057,200	2,054	458	668	1,101,511	1,030,598	2,598,757
Straw goods	3	54,800	33	192	.....	30,150	145,800	251,900
Sugar and molasses, refined	4	2,110,000	692	.....	5	476,216	20,794,961	22,841,258
Surgical appliances	2	4,000	4	5	.....	4,624	3,500	16,100
Taxidermy	1	10,000	5	100	20	9,000	10,000	25,000
Thread, linen	1	500,000	200	730	.....	260,000	750,000	1,200,000
Tin, copper and sheet iron ware	165	656,310	808	38	88	361,274	796,999	1,404,655
Tobacco, chewing, smoking & snuff	6	1,293,000	990	1,994	181	923,350	3,492,949	5,063,949
" cigars	283	479,595	761	71	70	332,276	800,106	1,508,810
Tools	3	31,550	46	.....	.....	23,450	10,950	38,700
Toys and games	7	8,500	50	22	12	11,716	12,737	34,247
Trunks and valises	15	991,800	1,313	160	250	650,822	1,349,855	2,453,923
Type-founding	1	1,000	.....	.....	.....	.....	400	1,200
Umbrellas and canes	8	101,800	198	.....	41	64,448	65,513	180,300
Upholstery	30	34,500	48	8	8	23,637	58,731	105,580
" materials	3	62,500	45	76	15	39,600	75,000	126,000
Varnish	17	430,000	84	.....	3	56,630	551,007	840,774
Vinegar	6	16,225	13	.....	1	3,440	29,750	42,390
Watch and clock materials	3	14,500	16	4	2	6,300	7,500	20,651
" " repairing	23	29,750	30	.....	1	17,701	18,900	74,060
" cases	2	153,000	326	17	77	137,342	517,225	659,817
Wheelbarrows	1	100,000	48	.....	.....	17,000	14,009	36,000
Wheelwrighting	364	386,673	569	3	24	205,125	260,302	697,470
Whips	1	70,000	32	11	.....	24,000	25,000	90,000
Window blinds and shades	4	154,300	70	3	20	36,300	104,000	226,500
Wire	6	228,000	421	2	100	259,875	714,360	1,053,200
" work	7	298,800	209	38	8	102,649	184,880	368,000
Wood, turned and carved	34	114,525	211	8	34	86,094	102,525	231,420
Woodenware	1	1,500	3	.....	3	2,000	3,500	6,500
Woolen goods	27	2,530,125	1,827	997	539	996,384	3,162,955	4,984,007
Worsted goods	2	45,000	90	35	55	22,200	70,417	119,000
Zinc	1	125,000	29	.....	.....	45,373	141,548	200,000
All industries*	7,128	$106,226,593	85,787	27,099	12,152	$46,083,045	$165,280,179	$254,375,236

* Not including statistics of fishery products, gas, petroleum refining, and mining and quarrying.

SUMMARY OF COMPARATIVE STATISTICS OF MANUFACTURES FOR 1850, 1860, 1870 AND 1880.*

COUNTIES.	Census Year.	Number of Establishments.	Capital.	Total No. of Hands Employed.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount paid in Wages During the Year.	Materials.	Products.
					Males above 16 Years.	Females above 16 Years.	Children and Youth.			
Atlantic	1850	.....	$287,395	424	.....	.....	.....	.....	.....	$346,765
	1860	42	317,400	251	251	.....	.....	$81,306	$487,720	730,239
	1870	86	381,500	469	355	78	36	136,324	433,575	799,464
	1880	66	588,600	428	268	119	41	113,802	419,669	664,569
Bergen	1850	.....	402,880	493	.....	.....	.....	.....	.....	1,012,165
	1860	59	789,650	933	806	127	.....	285,474	394,716	1,264,812
	1870	180	1,357,200	1,401	1,110	139	152	507,661	4,163,487	5,325,072
	1880	186	2,026,303	2,452	1,811	376	265	757,490	2,186,434	3,553,579
Burlington	1850	.....	1,329,867	2,050	.....	.....	.....	.....	.....	2,091,256
	1860	249	1,527,667	2,267	2,017	250	.....	699,264	1,503,868	2,771,762
	1870	339	2,277,075	3,283	2,555	573	155	1,240,405	2,896,937	4,884,438
	1880	333	3,001,130	3,084	2,047	765	272	829,882	2,930,077	4,471,952
Camden	1850	.....	1,533,216	1,497	.....	.....	.....	.....	.....	1,514,055
	1860	169	2,171,755	2,528	1,843	685	.....	702,958	1,462,247	3,139,270
	1870	329	3,507,295	3,836	2,842	500	494	1,470,517	5,902,246	8,330,013
	1880	373	7,728,510	6,744	4,693	1,552	499	2,398,668	6,335,659	11,009,206
Cape May	1850	.....	1,200	4	.....	.....	.....	.....	.....	2,400
	1860	39	79,450	99	84	15	.....	26,544	51,756	91,803
	1870	27	88,550	122	119	.....	3	29,830	147,012	218,640
	1880	36	60,250	105	105	.....	.....	31,478	89,655	164,411
Cumberland	1850	.....	616,895	965	.....	.....	.....	.....	.....	916,782
	1860	281	1,142,950	2,231	1,992	239	.....	651,964	923,348	2,090,099
	1870	295	2,573,800	4,184	2,602	1,125	457	1,357,766	3,716,878	6,314,577
	1880	302	3,919,155	5,265	3,054	1,494	717	1,409,901	2,730,908	5,111,023
Essex	1850	.....	6,076,092	16,706	.....	.....	.....	.....	.....	16,293,198
	1860	770	13,846,605	21,790	15,852	5,938	.....	6,617,952	15,029,087	27,927,514
	1870	1,198	22,606,662	22,156	17,344	3,333	1,479	11,537,270	29,255,662	52,108,958
	1880	1,568	28,817,405	35,636	26,509	6,142	2,985	15,335,849	47,724,275	76,772,350
Gloucester	1850	.....	518,100	588	.....	.....	.....	.....	.....	605,877
	1860	147	465,713	906	882	24	.....	233,296	602,506	1,013,094
	1870	166	1,386,310	1,255	1,174	.....	81	426,616	1,002,491	1,798,168
	1880	165	1,907,286	1,606	1,329	69	208	590,128	1,045,803	2,357,652
Hudson	1850	.....	1,082,300	1,254	.....	.....	.....	.....	.....	2,305,696
	1860	279	3,345,690	3,310	3,098	212	.....	1,171,857	3,479,927	6,760,241
	1870	333	11,718,400	5,624	4,909	383	332	3,280,526	17,229,652	24,256,017
	1880	802	15,366,125	15,386	10,435	3,748	1,203	6,039,847	53,004,058	66,348,124
Hunterdon	1850	.....	413,215	517	.....	.....	.....	.....	.....	753,605
	1860	267	899,190	998	846	152	.....	297,840	1,152,374	1,881,345
	1870	614	2,136,681	2,273	1,878	261	134	677,657	3,025,765	4,754,685
	1880	374	1,973,625	1,360	1,113	198	49	418,215	2,039,828	3,101,070
Mercer	1850	.....	1,133,445	1,296	.....	.....	.....	.....	.....	1,786,081
	1860	277	2,581,880	3,880	2,633	1,247	.....	896,976	2,900,202	4,750,020
	1870	475	5,022,782	5,100	4,007	535	558	2,092,349	4,981,541	8,881,074
	1880	589	7,952,795	9,963	7,525	1,197	1,241	3,467,554	8,618,127	14,601,850
Middlesex	1850	.....	1,139,450	1,593	.....	.....	.....	.....	.....	2,162,980
	1860	143	2,331,250	2,498	1,788	710	.....	621,060	1,771,291	3,435,767
	1870	259	4,231,320	3,513	2,555	535	423	1,349,701	2,623,086	5,372,583
	1880	278	4,943,270	7,103	4,045	2,517	541	1,979,250	5,391,913	9,587,832
Monmouth	1850	.....	478,620	961	.....	.....	.....	.....	.....	765,867
	1860	124	524,245	574	523	51	.....	184,109	514,713	908,114
	1870	352	1,735,225	2,192	1,492	615	85	463,160	1,580,685	2,605,176
	1880	277	900,558	1,088	842	182	64	267,028	1,259,801	1,806,395
Morris	1850	.....	1,151,137	1,133	.....	.....	.....	.....	.....	1,210,680
	1860	199	2,063,600	2,148	1,938	210	.....	751,692	2,166,152	3,739,682
	1870	280	1,783,100	1,851	1,626	147	78	847,035	2,800,775	4,644,951
	1880	243	2,223,092	1,768	1,511	221	36	502,880	1,878,737	3,075,191
Ocean	1850	.....	288,350	332	.....	.....	.....	.....	.....	188,677
	1860	44	124,500	96	94	2	.....	30,840	151,523	223,100
	1870	69	424,210	331	287	23	21	122,213	469,177	717,107
	1880	72	225,010	245	214	21	10	55,139	220,755	359,041
Passaic	1850	.....	2,993,850	4,583	.....	.....	.....	.....	.....	4,213,699
	1860	173	3,442,018	5,092	3,392	1,700	.....	1,333,340	3,086,475	6,288,842
	1870	218	8,176,400	9,632	5,934	2,300	1,398	3,882,440	11,850,780	19,958,728
	1880	413	14,378,492	22,291	12,091	6,906	3,294	7,705,223	16,535,229	29,833,532
Salem	1850	.....	346,790	456	.....	.....	.....	.....	.....	637,742
	1860	154	300,400	455	404	51	.....	115,338	407,636	662,197
	1870	289	1,359,377	1,056	840	123	93	293,629	1,563,365	2,277,791
	1880	178	993,366	1,531	1,126	360	45	372,247	1,210,197	1,867,120

* The statistics for 1880 do not include the returns of fishery products, gas, petroleum and mining and quarrying.

SUMMARY OF COMPARATIVE STATISTICS OF MANUFACTURES FOR 1850, 1860, 1870 AND 1880—Continued.

COUNTIES.	Census Year.	Number of Establishments.	Capital.	Total No. of Hands Employed.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	Materials.	Products.
					Males above 16 Years.	Females above 15 Years.	Children and Youth.			
Somerset	1850	.....	$426,113	631	.....	.....	.....	.....	.....	$641,727
	1860	169	766,150	602	540	62	.....	$171,756	$893,056	1,277,927
	1870	264	1,210,690	1,072	851	145	76	322,571	1,514,662	2,551,709
	1880	141	793,975	1,217	882	333	2	414,570	1,740,436	2,539,524
Sussex	1850	.....	787,320	580	.....	.....	.....	.....	.....	603,519
	1860	124	587,960	394	390	4	.....	108,744	627,608	954,043
	1870	249	868,669	661	619	25	17	168,861	997,157	1,455,104
	1880	185	1,321,826	799	700	65	24	271,852	1,457,629	2,239,124
Union	1850	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1860	188	1,713,425	3,533	2,484	1,049	.....	891,520	2,211,154	3,882,842
	1870	315	3,570,450	2,754	2,599	130	25	1,384,293	3,440,423	5,986,512
	1880	300	3,813,665	5,877	4,547	780	550	2,425,742	4,936,878	10,099,789
Warren	1850	.....	1,178,495	1,248	.....	.....	.....	.....	.....	1,650,865
	1860	276	1,499,550	1,442	1,341	101	.....	403,510	1,611,741	2,523,391
	1870	358	3,191,023	2,787	2,417	228	142	1,047,585	3,811,489	5,996,965
	1880	247	3,892,155	2,100	1,940	54	106	696,300	3,524,111	4,808,602
Total for the State.	1850	4,207	22,293,258	37,830	29,068	8,762	.....	9,364,740	22,011,871	39,851,256
	1860	4,173	40,521,048	56,027	43,198	12,829	.....	16,277,337	41,429,100	76,306,104
	1870	6,636	79,606,719	75,552	58,115	11,198	6,239	32,648,409	103,415,245	169,237,732
	*1880	7,128	106,226,593	126,038	86,787	27,099	12,152	46,083,045	165,280,179	254,375,236

II. SPECIAL STATISTICS OF MANUFACTURES.

BOOTS AND SHOES.

COUNTIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	MACHINES.			MATERIALS.					PRODUCTS.					
			Males above 16 Years.	Females above 15 Years.	Children and Youth.		Number of Sewing Machines.	Number of Pegging Machines.	Number of Screwing and Nailing Machines.	Number Sides Sole Leather.	Number Sides Upper Leather.	Pounds of other Leather.	Value of all other Materials.	Total Value of all Materials.	Number of Pairs of Boots.	Value.	Number of Pairs of Shoes.	Value.	Value of Unspecified Products.	Total Value of all Products.
Atlantic	3	$12,400	47	30	3	$25,000	36	....	.....	4,225	7,600	4,800	$7,650	$45,840	.....	.....	64,400	$82,500	.....	$82,500
Bergen	1	5,000	20	12	.....	14,000	6	....	.....	1,200	6,000	.....	2,000	19,700	.....	.....	24,000	36,000	.....	36,000
Burlington	23	80,320	367	170	21	207,144	123	....	.....	31,463	178,538	76,250	45,673	407,452	.....	.....	1,220,247	702,106	.....	702,106
Camden	14	59,850	173	79	4	91,595	76	....	3	12,010	52,470	15,000	9,950	139,962	.....	.....	302,932	289,600	$1,000	290,600
Cumberland	7	67,900	246	147	11	139,420	102	2	5	22,030	103,100	18,400	32,702	297,127	.....	.....	378,173	526,578	1,000	527,578
Essex	18	457,075	800	229	68	564,086	195	1	7	93,351	205,536	160,533	97,047	1,160,620	33,203	116,574	1,194,160	1,836,754	1,075	1,954,403
Gloucester	1	7,000	10	5	1	6,535	2	....	.....	485	1,160	400	2,565	9,065	250	1,500	3,000	9,000	7,500	18,000
Hunterdon	1	6,000	6	2	.....	2,200	5	....	.....	190	150	1,000	460	2,800	200	700	1,600	4,800	600	6,100
Mercer	6	110,200	457	12	.....	83,304	91	1	4	22,790	132,179	244,200	67,601	390,860	6,500	15,000	521,507	492,899	.....	507,899
Middlesex	8	103,000	160	73	4	78,045	110	....	3	9,030	72,992	27,100	17,292	219,075	3,000	9,000	235,187	321,600	.....	330,600
Sussex	1	30,000	85	43	5	50,300	43	....	.....	4,400	43,000	30,000	7,000	110,000	.....	.....	132,763	172,500	.....	172,500
Union	2	25,500	21	7	.....	16,640	9	....	.....	2,035	8,850	.....	3,590	35,360	100	800	25,000	54,600	6,200	61,000
Total for State	85	$964,245	2,392	809	117	1,278,269	798	4	22	203,209	811,575	577,683	$293,530	$2,837,861	43,253	143,574	4,102,969	$4,528,337	$17,375	$4,689,286

BRICK YARDS AND TILE WORKS.

COUNTIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	MATERIALS.			PRODUCTS.						
			Males above 16 Years.	Females above 15 Years.	Children and Youth.		Number of Cords of Wood.	Value of all other Material.	Total Value of all Materials.	Number of Thousand of Common Brick.	Number of Thousand of Fire Brick.	Number of Thousand Pressed Brick.	Value of Tile.	Value of Drain Pipe.	Value of all Other Products.	Total Value of all Products.
Atlantic	2	$3,500	2	.....	.....	$400	60	$75	$225	25	.....	.....	$100	.....	$1,450	$1,825
Bergen	4	118,000	186	.....	2	44,000	2,250	29,000	38,300	20,000	.....	.....	.....	.....	.....	107,250
Burlington	15	58,900	127	.....	12	30,775	1,957	24,782	32,077	9,045	145	30	8,510	$25,000	2,500	92,226
Camden	6	118,500	119	.....	17	24,441	120	21,781	22,201	7,267	.....	30	2,000	12,000	500	57,667
Cumberland	6	24,500	56	.....	4	9,360	870	850	3,555	2,330	.....	.....	200	.....	.....	18,100
Essex	1	1,000	1	.....	.....	312	.....	500	500	.....	100	.....	.....	.....	.....	1,500
Gloucester	2	2,300	10	.....	.....	1,520	75	2,800	3,050	140	.....	.....	6,694	.....	100	7,970
Hunterdon	6	25,100	36	2	1	8,550	890	4,200	7,462	2,400	.....	.....	10,000	1,400	500	27,020
Mercer	10	219,500	316	.....	45	101,250	576	55,685	58,125	11,850	.....	4,140	3,500	20,000	30,000	214,800
Middlesex	21	930,200	1,203	24	58	334,468	1,735	272,627	280,587	57,975	17,268	400	26,675	29,400	86,700	850,710
Monmouth	11	34,700	92	.....	3	13,291	1,289	6,705	11,504	6,750	.....	.....	2,775	.....	500	40,125
Morris	3	18,800	48	.....	2	8,700	800	2,300	6,100	3,500	.....	.....	1,000	.....	2,000	21,000
Ocean	3	16,500	49	.....	.....	9,150	1,000	410	2,460	2,450	.....	.....	.....	.....	.....	13,900
Passaic	5	43,600	130	.....	.....	14,975	1,043	5,500	7,989	4,875	.....	.....	.....	5,000	.....	33,250
Salem	2	9,000	20	.....	.....	4,500	508	3,250	5,032	1,150	.....	10	5,000	.....	.....	13,500
Somerset	3	20,000	67	.....	.....	12,240	1,120	2,540	7,440	4,600	.....	.....	.....	.....	.....	26,250
Union	4	80,000	108	.....	1	46,750	335	70,100	71,700	4,200	.....	.....	63,000	50,000	.....	143,000
Warren	3	2,200	5	.....	3	800	105	210	730	330	.....	.....	.....	.....	.....	2,440
Total for the State	107	$1,731,300	2,575	26	148	$665,482	14,683	$503,315	$559,037	138,887	17,513	4,610	$129,454	$142,800	$124,250	$1,672,533

COTTON MANUFACTURES.

COUNTIES.	Number of Establishments.	Capital.	SPINDLES.			LOOMS.							OPERATIVES.	
			Frame.	Mule.	Total.	Print cloth, 26 to 32 in.	30 in. and less.	Over 30, not over 37 in.	Over 37, not over 45 in.	Over 45 in.	Fancy.	Total.	Male, 15 and over.	Male, under 15.
SPECIFIC COTTON MANUFACTURES.														
Atlantic	1	$150,000	5,504	6,616	12,120	196	....	....	....	....	..	196	33	20
Bergen	3	130,000	8,364	.....	8,364	.....	....	....	....	....	12	12	50	24
Burlington	2	175,000	1,000	8,732	9,732	.....	....	....	....	....	..	.....	56	32
Camden	2	750,000	20,756	33,344	54,100	1,006	335	....	....	....	..	1,341	244	100
Cumberland	1	600,000	13,972	17,312	31,284	.....	....	192	509	....	..	701	70	30
Essex	3	1,318,000	14,260	55,000	69,260	.....	....	....	....	96	..	96	246	52
Hunterdon	1	40,000	3,672	.....	3,672	.....	....	....	....	....	..	.....	9	.....
Mercer	1	77,000	2,064	960	3,024	.....	....	....	....	....	..	.....	33	11
Morris	1	39,250	3,925	.....	3,925	.....	....	74	....	36	..	110	.....	.....
Passaic	2	528,500	9,180	27,560	36,740	32	....	223	20	449	..	724	265	105
The State	17	$3,807,750	82,697	149,524	232,221	1,234	335	489	529	581	12	3,180	1,006	374
COTTON MANUFACTURES: SPECIAL MILLS.*														
The State	7	$153,395	.....	.....	.....	.....	....	....	....	152	12	164	62	12
Total for the State	24	$3,961,145	82,697	149,524	232,221	1,234	335	489	529	733	24	3,344	1,068	386

*See remarks on page 379.

COTTON MANUFACTURES—Continued.

OPERATIVES.						COTTON CONSUMED.			GOODS MANUFACTURED.				
Female, 16 and over.	Female, under 16.	Mechanics, Watchmen and Laborers, 15 and over.	Mechanics, Watchmen and Laborers, under 15.	Clerks.	Employes, Total.	Bales.	Pounds.	Cost.	Pounds.	Yards.	Wages and Salaries of all Employed.	Value of Production at Wholesale.	Total Value of Materials.
57	9	9	....	5	133	768	381,564	48,498	299,452	2,320,449	$25,441	$98,585	$54,165
77	11	7	....	1	170	1,338	619,468	79,154	541,416	.....	26,472	145,155	83,667
109	12	10	3	....	222	850	390,000	57,000	357,000	.....	58,000	287,000	166,100
531	22	42	....	12	951	7,264	3,505,397	397,507	2,840,013	14,980,608	244,293	888,770	488,966
243	60	14	....	5	422	2,900	1,415,000	184,600	1,095,000	5,298,000	77,100	383,000	201,600
881	101	48	2	12	1,342	3,054	1,390,193	308,089	315,646	781,680	428,255	1,580,997	566,938
33	7	....	....	2	51	637	307,034	34,426	263,479	.....	9,947	56,317	37,000
35	4	7	....	....	90	723	322,458	37,889	274,090	.....	13,753	65,781	40,039
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
325	103	37	....	6	841	3,535	1,450,532	172,259	1,420,468	9,600,000	273,700	1,042,670	379,700
2,291	329	174	5	43	4,222	21,069	9,781,646	1,319,422	7,406,564	32,980,737	1,156,961	4,548,275	2,018,175
518	45	20	....	1	658	.....	.....	.....	.....	.....	153,036	491,244	266,644
2,809	374	194	5	44	4,880	21,069	9,781,646	1,319,422	7,406,564	32,980,737	$1,309,997	$5,039,519	$2,284,819

FLOURING AND GRIST MILLS.

COUNTIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	Number of Runs of Stone.	Daily Capacity—Bushels.	MATERIALS.						Total Value of all Products.
			Males above 16 Years.	Females above 15 Years.	Children and Youth.				Number of Bushels of Wheat.	Value.	Number of Bushels of other Grain.	Value.	Value of Mill Supplies.	Total Value of all Materials.	
Atlantic	4	$11,500	8	.....	.....	$2,600	8	500	18,700	$28,080	42,000	$25,140	$600	$53,820	$61,863
Bergen	25	160,400	41	.....	.....	12,822	50	2,370	5,905	8,001	377,805	204,635	4,789	217,425	263,214
Burlington	35	401,295	93	.....	.....	32,031	102	7,509	327,051	409,313	709,469	426,742	13,437	849,492	986,596
Camden	7	103,500	26	.....	.....	9,468	22	1,455	176,833	229,750	88,166	49,150	3,850	282,750	319,109
Cape May	7	21,100	9	.....	.....	2,040	14	298	21,709	25,116	43,083	20,844	1,075	47,035	56,716
Cumberland	21	241,646	46	.....	.....	18,135	53	3,195	174,696	214,405	345,740	175,230	3,460	393,095	455,187
Essex	13	89,500	40	.....	.....	17,738	32	3,245	64,700	55,795	558,200	282,200	8,265	346,260	418,073
Gloucester	20	209,350	31	.....	.....	11,165	55	4,155	174,547	223,705	249,222	138,788	5,320	367,813	427,065
Hudson	1	4,000	2	.....	.....	1,000	2	120	.....	.....	23,000	9,200	800	10,000	12,000
Hunterdon	63	363,800	85	.....	.....	27,028	174	7,351	248,763	324,401	663,932	332,670	9,739	666,810	778,586
Mercer	24	243,000	57	.....	.....	18,654	76	5,835	230,048	286,944	398,154	210,408	7,765	505,117	585,324
Middlesex	16	74,400	29	.....	.....	8,398	44	2,744	103,422	121,351	197,831	107,897	5,601	234,849	273,337
Monmouth	37	315,200	63	.....	.....	16,669	89	5,560	179,907	223,105	387,725	226,385	5,740	455,230	517,118
Morris	38	247,100	57	.....	.....	14,733	108	5,510	87,070	115,959	530,065	284,835	5,890	406,684	464,933
Ocean	8	42,500	15	.....	.....	4,015	19	1,206	21,580	28,325	96,249	60,014	385	88,724	101,813
Passaic	11	54,100	24	.....	.....	9,640	26	1,455	10,280	14,037	141,151	80,053	2,358	96,448	123,540
Salem	18	191,400	51	.....	2	14,805	62	6,000	221,500	259,651	396,825	205,590	10,455	475,696	548,773
Somerset	31	356,800	73	.....	.....	20,780	99	6,045	194,641	254,052	717,204	386,002	11,800	651,854	756,583
Sussex	40	231,200	68	.....	.....	14,401	110	5,954	47,622	62,035	574,160	311,291	5,660	378,986	435,865
Union	9	67,700	27	.....	.....	5,757	24	1,630	17,350	21,495	131,430	82,300	4,550	108,345	130,320
Warren	53	448,992	89	.....	.....	23,747	163	7,915	238,545	319,671	637,764	335,652	11,488	666,811	743,929
Total for the State	481	$3,879,083	934	.....	2	$285,626	1,332	80,046	2,564,869	$3,225,191	7,309,175	$3,955,026	$123,027	$7,303,244	$8,459,944

LEATHER, TANNED.

COUNTIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	TANNING.								
							MATERIALS.						PRODUCTS.		
			Males above 16 Years.	Females above 15 Years.	Children and Youth.		Number of Tons Hemlock Bark.	Number of Tons Oak Bark.	Value of Sumac and Other Material.	Number of Hides.	Number of Skins.	Total Value of all Materials.	Number of Sides of Leather.	Number of Skins.	Total Value of Products.
Bergen	1	$400	.....	.....	.....	.....	.....	8	.....	100	50	$450	200	50	$650
Cumberland	1	7,000	4	.....	.....	$1,860	.....	150	.....	867	816	6,213	1,734	816	9,237
Essex	27	1,652,350	1,142	3	66	680,973	16,922	12,183	$53,123	334,056	1,600,000	4,952,176	668,112	1,600,000	6,345,856
Gloucester	1	6,000	2	.....	.....	700	.....	50	.....	500	380	4,100	1,000	380	5,400
Hudson	3	35,500	25	.....	1	12,495	100	600	2,800	15,500	124,544	112,724	31,000	124,544	143,742
Hunterdon	4	5,609	4	.....	.....	1,150	.....	180	.....	1,400	750	7,820	2,800	750	10,350
Monmouth	2	13,500	7	.....	.....	2,300	.....	325	.....	2,150	850	16,850	4,300	850	21,750
Mercer	1	500	1	.....	.....	100	.....	10	.....	100	50	650	200	50	800
Morris	1	5,000	1	.....	.....	200	.....	16	.....	200	200	1,460	400	200	2,000
Salem	3	29,000	9	.....	.....	3,171	.....	325	.....	3,094	1,472	21,989	6,188	1,472	31,589
Somerset	1	1,400	.....	.....	.....	.....	.....	10	.....	100	60	600	200	60	820
Sussex	4	25,300	9	.....	.....	2,200	10	450	.....	3,400	1,750	21,960	6,800	1,750	32,750
Union	2	17,000	19	1	2	10,300	300	70	5,000	6,600	50,000	106,000	13,200	50,000	130,300
Warren	4	11,500	4	.....	.....	1,150	.....	298	.....	1,600	2,725	9,755	3,200	2,725	12,850
Total for State	55	$1,810,050	1,227	4	69	$716,599	11,332	14,675	$60,923	369,667	1,783,674	$5,262,747	737,334	1,783,647	$6,748,094

LEATHER, CURRIED.

COUNTIES.	Number of Establishments.	Capital.	AVERAGE NUMBER OF HANDS EMPLOYED.			Total Amount Paid in Wages During the Year.	CURRYING.						
							MATERIALS.				PRODUCTS.		
			Males above 16 Years.	Females above 15 Years.	Children and Youth.		Number of Sides of Leather.	Number of Skins.	Number of Gallons of Oil.	Total Value of all Materials.	Number of Sides of Leather.	Number of Skins.	Total Value of Products.
Bergen	1	$600	1	.....	.....	$50	150	20	50	$500	150	20	$905
Camden	1	15,000	2	.....	.....	240	5,000	.....	1,200	17,450	5,000	.....	21,250
Cumberland	1	3,663	2	.....	.....	500	836	427	175	5,475	836	427	6,624
Essex	32	1,863,183	1,207	25	77	729,112	760,443	1,523,230	253,020	6,744,728	760,443	1,523,230	8,300,722
Gloucester	1	4,000	1	.....	.....	400	700	240	175	3,875	700	240	5,040
Hudson	2	42,500	27	1	1	15,595	30,000	124,544	1,920	143,162	30,000	124,544	176,700
Hunterdon	4	7,400	5	.....	.....	1,350	2,700	750	900	10,575	2,700	750	15,400
Monmouth	2	2,500	2	.....	.....	400	600	300	275	3,555	600	300	4,600
Mercer	1	500	1	.....	.....	100	200	50	60	830	200	50	1,050
Morris	1	6,000	1	.....	.....	400	400	200	100	2,020	400	360	3,000
Salem	3	4,000	3	.....	.....	1,000	925	470	440	5,450	925	470	8,300
Somerset	1	1,400	1	.....	.....	100	200	60	60	860	200	60	1,800
Sussex	1	3,000	2	.....	.....	600	1,000	500	300	7,300	1,000	500	10,000
Union	2	19,000	24	1	.....	11,300	13,200	50,000	3,500	133,800	13,200	50,000	156,000
Warren	3	11,000	4	.....	.....	1,550	2,450	2,525	688	10,660	2,450	2,525	15,737
Total for State	56	$1,983,746	1,283	27	78	$762,697	818,804	1,703,316	262,863	$7,090,270	818,804	1,703,316	$8,727,128

WOOLEN MANUFACTURES.

COUNTIES.	Number of Establishments.	Capital.	MACHINES.				LOOMS.						KNITTING AND SEWING MACHINES.		SPINDLES.		AVERAGE NUMBER OF HANDS EMPLOYED.				Wages and Salaries of all Employed During the Year.	Total Value of all Materials.	Value of Production at Wholesale.
			Number of Sets of Cards.	Daily Capacity of same in Pounds Scoured Wool.	Number of Combing Machines of American Manufacture.	Daily Capacity of same in Pounds Scoured Wool.	Number of Broad Looms on Woolen Goods.	Number of Narrow Looms on Woolen Goods.	Number of Hand Looms.	Number of Brussels Power Looms.	Number of Ingrain Power Looms.	Number of Tapestry Looms.	Number of Knitting Machines.	Number of Sewing Machines.	Number of Woolen Spindles.	Number of Worsted Spindles.	Total.	Male.	Female.	Children.			
WOOLEN GOODS.																							
Atlantic	1	$3,000	1	75	.....	.....	.....	6	2	.....	.....	.....	.....	.....	200	.....	3	2	1	....	$150	$600	$1,200
Bergen	2	11,000	3	140	.....	.....	2	2	4	.....	.....	.....	.....	.....	475	.....	13	9	3	1	2,640	18,060	25,200
Camden	3	570,000	19	3,700	.....	.....	95	74	21	.....	.....	.....	2	3	5,880	.....	369	235	91	43	116,909	401,084	754,500
Cumberland	1	116,625	4	500	.....	.....	.....	38	.....	.....	.....	.....	.....	.....	1,200	.....	100	47	47	6	30,080	118,092	175,000
Essex	4	541,000	30	3,080	.....	.....	109	.....	.....	.....	.....	.....	.....	1	4,292	.....	528	296	117	115	171,537	580,597	869,837
Gloucester	1	18,000	2	600	.....	.....	.....	2	70	.....	.....	.....	.....	2	400	.....	146	110	27	9	35,000	64,425	128,000
Hunterdon	1	2,000	1	50	.....	.....	3	314	.....	.....	.....	.....	.....	.....	160	.....	5	5	....	....	350	973	1,600
Mercer	5	559,000	19	4,375	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8,384	.....	585	226	232	127	177,150	707,035	896,297
Morris	2	14,500	2	120	.....	.....	.....	5	1	.....	.....	.....	.....	.....	560	.....	9	8	1	....	1,300	4,412	6,539
Passaic	3	428,000	19	3,700	.....	.....	106	1	.....	.....	.....	.....	.....	6	4,000	.....	771	411	138	222	326,927	435,580	707,075
Somerset	2	225,000	32	9,900	.....	.....	279	.....	.....	.....	.....	.....	.....	1	5,528	.....	785	457	328	....	294,766	892,010	1,333,000
Sussex	1	30,000	3	700	.....	.....	15	2	.....	.....	.....	.....	.....	1	360	.....	37	15	12	10	18,000	11,087	50,000
Warren	1	12,000	1	125	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	280	.....	12	6	....	6	1,575	28,000	35,759
Total for State	27	$2,520,125	136	27,065	.....	.....	609	444	98	.....	.....	.....	2	14	31,719	.....	3,363	1,827	997	539	$996,384	$3,162,955	$4,984,007
HOSIERY AND KNIT GOODS.																							
Atlantic	1	$500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	1	.....	.....	12	4	8	4	$2,200	$1,700	$5,200
Bergen	1	18,000	1	170	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	37	14	14	9	6,490	10,677	23,600
Camden	1	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	8	4	2	2	800	3,600	5,000
Essex	1	104,570	7	1,250	.....	.....	.....	.....	.....	.....	.....	.....	60	36	.....	.....	226	95	68	63	55,391	69,919	201,631
Hudson	2	16,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	50	16	2,160	.....	255	101	150	4	27,800	54,064	108,750
Middlesex	1	662,500	15	2,750	.....	.....	.....	.....	.....	.....	.....	.....	220	22	.....	.....	520	100	360	1	145,280	114,083	510,000
Union	1	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,888	.....	12	2	2	8	1,800	4,000	8,000
Total for State	8	$804,570	23	4,170	.....	.....	.....	.....	.....	.....	.....	.....	343	75	6,048	.....	1,070	320	604	101	$239,761	$258,043	$861,181

WOOLEN MANUFACTURES—Continued.

COUNTIES.	Number of Establishments.	Capital.	MACHINES.				LOOMS.						KNITTING AND SEWING MACHINES.		SPINDLES.		AVERAGE NUMBER OF HANDS EMPLOYED.				Wages and Salaries of all Employed During the Year.	Total Value of all Materials.	Value of Production at Wholesale.
			Number of Sets of Cards.	Daily Capacity of same in Pounds Scoured Wool.	Number of Combing Machines of American Manufacture.	Daily Capacity of same in Pounds Scoured Wool.	Number of Broad Looms on Woolen Goods.	Number of Narrow Looms on Woolen Goods.	Number of Hand Looms.	Number of Brussels Power Looms.	Number of Ingrain Power Looms.	Number of Tapestry Looms.	Number of Knitting Machines.	Number of Sewing Machines.	Number of Woolen Spindles.	Number of Worsted Spindles.	Total.	Male.	Female.	Children.			
CARPETS.																							
Burlington	1	$3,000	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	.....	.....	.....	.....	11	6	5	....	$2,000	$7,000	$10,000
Passaic	1	100,000	5	1,000	5	400	6	.....	30	9	23	26	.....	.....	840	1,232	232	114	60	58	46,000	102,425	169,500
Total for State	2	$103,000	5	1,000	5	400	6	.....	30	9	33	26	.....	.....	840	1,232	243	120	65	58	$48,000	$109,425	$179,500
FELT GOODS.																							
Essex	1	$50,000	1	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	6	....	....	$2,750	$9,050	$18,600
Union	1	150,000	6	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	181	170	10	1	60,000	408,300	514,630
Passaic	4	113,000	8	1,310	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	99	74	11	14	23,420	98,845	152,156
Total for State	6	$313,000	15	5,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	286	250	21	15	$86,170	$516,195	$685,386

SHIP-BUILDING, INCLUDING REPAIRING WOODEN VESSELS.

COUNTIES.	No. of Establishments.	No. of Dry Docks.	No. of Sets of Railway.	Capital.	Greatest Number of Hands Employed.	Males above 16 Years.	WAGES AND HOURS OF LABOR. Average Day's Wages for a Skilled Mechanic.	Average Day's Wages for an Ordinary Laborer.	Total Amount Paid in Wages During the Year.	PRINCIPAL MATERIALS. Feet of Yellow Pine.	Feet of White Pine.	Feet of Whit Oak.	Number of Knees.	Total Feet of Lumber, including other kinds, but not including Knees.	Pounds of Iron.	Pounds of Yellow Metal and Brass.	Yards of Duck.	Pounds of Manila Rope.	Pounds of Hemp Rope.	Total Value of all Materials.	Products.
Atlantic	3	....	....	$1,300	18	4	$2 00	$1 50	$2,030	.....	4,000	15,500	40	20,080	7,550	80	860	580	.....	$4,020	$6,400*
Burlington	12	....	2	12,220	86	21	2 00	1 50	10,878	20,000	24,450	65,500	192	114,950	29,880	.....	1,040	450	.....	12,770	25,620†
Camden	13	2	2	484,400	359	266	2 75	1 50	161,355	384,500	849,500	781,500	685	2,149,500	1,582,044	137,200	21,000	14,970	19,600	209,649	438,576‡
Cape May	7	....	....	2,700	62	24	2 00	1 50	11,110	57,000	25,550	96,300	395	181,950	72 500	500	4,890	5,660	10,150	17,870	30,200§
Cumberland	7	....	2	83,400	131	85	2 00	1 50	39,510	377,300	104,600	447,500	1,160	973,400	210,900	9,200	11,930	17,797	28,166	86,670	131,700‖
Essex	2	....	....	2,000	18	18	3 00	1 00	5,780	.....	.....	.....	.....	.....	.....	.....	29,000	.....	.....	11,000	22,500
Hudson	27	13	1	269,500	425	364	3 00	1 50	239,392	562,000	433,000	495,700	1,268	1,806,500	353,509	64,978	790	5,310	.....	226,289	543,766¶
Gloucester	1	....	....	300	6	2	2 00	1 50	1,000	2,000	1,500	6,000	35	9,500	6,000	.....	200	120	.....	1,500	2,500
Middlesex	6	....	7	44,400	48	39	2 25	1 25	21,815	69,000	48,000	85,000	160	202,000	48,000	.....	18,000	600	400	33,321	63,750
Mercer	1	....	2	6,000	27	27	2 25	1 50	16,360	.....	28,700	36,900	150	65,600	7,065	.....	.....	.....	.....	9,000	31,000
Monmouth	6	....	2	20,900	78	33	2 00	1 25	14,700	35,000	138.000	133,000	25	306,000	71,500	.....	.....	950	.....	14,800	36,000
Ocean	2	....	....	600	6	3	2 00	1 00	1,436	.....	1,000	2,400	.....	5,600	2,060	.....	230	110	.....	11,000	2,800**
Union	6	1	2	15,370	48	44	2 25	2 00	23,441	321,000	9,000	109,000	530	444,900	64,440	.....	.....	1,200	.....	21,205	49,017††
Total for the State..	93	16	20	$943,070	1,312	930	.....	.....	$548,807	1,827,800	1,665,300	2,274,300	5,620	6,279,900	2,455,448	211,958	87,940	47,687	58,316	$649,194	$1,384,629‡‡

* White Cedar, 500 ft. † White Cedar, 1,200 ft. ‡ Cedar, 1,000 ft.; Spruce, 111,000 ft.; Mis., 22,000. § Spruce, 4,000 ft.; Cedar, 1,100 ft. ‖ Spruce, 42,000 ft. Mis., 2,000 ft. ¶ Cedar 30,800 ft.; Spruce, 120,000 ft.; Mis., 165,000 ft. ** Cedar, 2,200 ft. †† Cedar, 5,900 ft. ‡‡ Cedar, 42,700 ft.; Spruce, 277,000 ft.; Mis., 189,000 ft.

III. MISCELLANEOUS STATISTICS.

COMMERCIAL FISHERIES OF NEW JERSEY.*

New Jersey produced, in 1880, $3,176,589 worth of fishery products, taking the sixth place in the list of fish-producing States. In some of the special fisheries it takes a higher rank. Its oyster products, valued at $2,080,625, are exceeded only by those of Maryland and Virginia. Its crab fisheries, from which the fishermen realized $162,612, are more extensive than those of any other State, while its quahaug (hard clam) fisheries are second only to those of New York. In the menhaden fisheries it stands fifth on the list, the oil, scrap and compost produced in 1880 being valued at $148,286. Its river fisheries are of minor importance, the total yield being only 2,752,000 pounds, netting the fishermen $91,435.

The following is a summary of the fishery interests of the State:

Persons employed	6,220
Fishing vessels	590
Fishing boats	4,065
Capital dependent on the fishery industries	$1,492,202
Pounds of sea products (including oyster meats)	62,399,486
Value of same	$3,085,154
Pounds of river products	2,752,000
Value of same	$91,435
Total value of products to the fishermen	$3,176,580

* Extract from United States Census Bulletin on "Commercial Fisheries of the Middle States," prepared by Mr. R. E. Earll and Col. Marshall McDonald, special agents.

Table Showing in Detail the Number of Persons Employed, the Amount of Capital Invested, and the Quantities and Values of the Products.

PERSONS EMPLOYED.

Fishermen	5,659
Shoresmen	419
Factory hands	142
Total	6,220

APPARATUS AND CAPITAL.

Apparatus Specified.	Number.	Value.
Vessels	* 590	$545,900
Boats	4,065	223,963
Pound-nets	27	19,800
Fykes, pots and baskets	3,417	15,966
Gill-nets	852	25,203
Purse-seines	20	8,000
Drag-seines	415	30,570
Minor apparatus, including outfit for vessels and boats		132,800
Factories and other shore property		470,000
Additional cash capital		20,000
Total		$1,492,202

*10,445.90 tons.

PRODUCTS.

Products Specified.	Pounds Taken.	Value to Fishermen.
Grand total	65,151,486	$3,176,589
Sea Fisheries.		
Bluefish	3,635,000	$82,125
Clams (hard)	3,132,280	195,767
Clams (soft)	660,280	33,014
Cod	1,667,000	31,256
Crabs	1,470,300	162,612
Lobsters	156,800	5,880
Menhaden	† 29,134,600	147,186
Oysters	‡ 13,825,000	2,080,625
Squeteague	4,430,000	132,900
All other species	⁂ 4,288,326	213,789
Total	62,399,486	$3,085,154

† Including 70,000 pounds, valued at $900, used for food.

‡ An allowance of 7 pounds of meats is made for each bushel of oysters.

⁂ Including 300,000 pounds of alewives, 25,000 pounds of drum, 80,000 pounds of

PRODUCTS—Continued.

Products Specified.	Pounds Taken.	Value to Fishermen.
River Fisheries.		
Alewives (commonly called herring)	* 1,200,000	$17,335
Shad	† 750,000	35,000
Sturgeon	300,000	15,000
All other species	‡ 502,000	24,100
Total	2,752,000	$91,435

bonito, 200,000 pounds of butter-fish, 20,000 pounds of croakers, 551,000 pounds of eels, 75,000 pounds of flounders, 50,000 pounds of moon-fish, 5,000 pounds of mullet, 530,000 pounds of perch, 50,000 pounds of scup, 160,000 pounds of sea-bass, 114,000 pounds of shad, 275,000 pounds of sheepshead, 5,000 pounds of smelt, 200,000 pounds of Spanish mackerel, 230,000 pounds of spot, 375,000 pounds of striped bass, 130,000 pounds of tautog, 9,000 pounds of terrapin, 5,000 pounds of tom-cod, 15,000 pounds of whiting or king-fish, and 884,226 pounds of mixed fish, including 550,000 pounds of refuse fish for fertilizers.

* In addition to these, 300,000 pounds of alewives, valued at $2,250, were taken by the sea fishermen.

† In addition, 114,000 pounds of shad, valued at $5,700, were taken by the sea fishermen.

‡ Including 135,000 pounds of catfish, 100,000 pounds of perch, 67,000 pounds of striped bass, and 200,000 pounds of mixed fish.

PRODUCTIONS OF AGRICULTURE.

COUNTIES.	Number of Farms.	Improved Land, Acres.	Value of Farms.	Value of Implements.	Value of Live Stock on Farms June 1st, 1880.	Value of Orchard Products in 1880.	Value of all Farm Products in 1879.	Cost of Building and Repairing Fences in 1879.	Cost of Fertilizers purchased in 1879.	Irish Potatoes, Bushels.	Sweet Potatoes, Bushels.	Tobacco, Pounds.	Hay, Tons.	Wool, Pounds.
Atlantic	1,139	28,008	$2,078,780	$51,697	$148,711	$11,991	$247,184	$5,404	$15,419	28,733	32,524	.....	1,609	14
Bergen	1,710	69,163	13,011,720	397,370	665,928	29,694	1,301,324	41,731	65,613	186,058	1,641	250	17,613	1,545
Burlington	2,512	195,744	18,331,720	710,561	1,592,943	48,419	3,593,297	99,995	260,522	419,489	297,857	94,487	61,535	67,322
Camden	950	56,985	5,717,348	249,390	429,344	16,368	1,321,849	28,084	155,923	344,181	209,262	.....	14,283	3,847
Cape May	547	30,064	1,436,430	49,140	125,132	9,979	231,693	4,769	9,509	31,376	25,760	.....	6,452	139
Cumberland	2,230	104,246	7,052,453	289,638	497,097	108,614	1,188,461	19,702	94,681	116,389	123,585	.....	25,250	8,858
Essex	997	29,061	7,767,450	133,271	362,089	26,153	816,123	32,002	26,756	105,341	.....	3,300	12,157	209
Gloucester	2,034	119,107	9,017,002	385,516	727,786	32,832	1,955,159	33,791	168,495	353,518	977,422	570	27,300	13,837
Hudson	145	2,728	2,380,900	39,024	41,327	900	334,989	10,786	36,409	7,375	.....	.....	405	.....
Hunterdon	3,153	210,851	14,572,673	765,004	1,571,263	130,282	2,648,558	83,515	82,623	115,823	665	590	42,222	87,936
Mercer	1,542	105,851	10,830,607	438,844	873,275	41,086	1,623,081	52,188	108,470	110,041	21,466	69,810	28,990	30,553
Middlesex	2,085	116,325	11,931,840	418,756	791,355	32,744	1,486,147	47,249	84,667	146,707	21,555	.....	33,528	12,334
Monmouth	2,567	160,561	18,183,342	686,542	1,421,434	148,119	2,814,198	104,630	165,854	796,388	106,751	.....	42,780	51,802
Morris	2,554	143,594	14,419,617	401,973	989,062	58,188	1,859,463	71,157	55,282	200,247	206	1,700	38,115	28,393
Ocean	831	38,499	2,738,300	85,527	199,532	9,878	373,326	10,522	17,815	27,867	18,479	.....	6,051	3,299
Passaic	906	35,787	4,292,788	88,822	298,384	12,047	564,405	25,406	26,034	92,515	59	318	12,513	2,691
Salem	1,825	136,917	9,291,818	427,464	892,819	23,005	1,802,814	43,659	103,269	119,153	248,398	560	34,905	23,629
Somerset	2,046	155,629	12,226,585	504,699	945,442	20,623	1,670,871	78,075	69,449	63,513	536	.....	39,792	35,096
Sussex	1,992	180,846	9,801,524	291,946	1,052,293	40,521	1,674,239	51,743	10,077	94,788	54	400	40,059	23,158
Union	757	29,800	4,573,345	111,631	269,190	11,121	590,455	24,162	23,393	79,538	85	.....	10,497	1,351
Warren	1,785	146,531	11,239,591	394,270	967,006	47,536	1,553,120	34,237	21,349	124,753	426	330	22,934	45,097
Total for the State	34,307	2,096,297	$190,895,833	$6,921,085	$14,861,412	$860,090	$29,650,756	$902,807	$1,601,609	3,563,793	2,086,731	172,315	518,990	441,110

NOTE.—For Cereals and Live Stock and its Productions, see Annual Report, 1881.

GENERAL STATISTICS OF AGRICULTURE FOR 1880, 1870, 1860, 1850—NEW JERSEY.

	1880.*	1870.*	1860.	1850.
Total number of farms	34,307	30,652	27,646	23,905
Average size, acres	85	98	108	115
Total land in farms, acres	2,929,773	2,989,511	2,983,525	2,752,946
Improved land in farms, acres	2,096,297	1,976,474	1,944,441	1,767,991
Unimproved land in farms, acres	833,476	1,013,037	1,039,084	984,955
Per cent. unimproved land to total	28.4	33.9	34.9	35.7
Value of farms	$190,895,833	$257,523,376	$180,250,338	$120,237,511
" farming implements and machinery	$6,921,085	$7,887,991	$5,746,567	$4,425,503
" live stock	$14,861,412	$21,443,463	$16,134,693	$10,679,291
" orchard products	$860,090	$1,295,282	$429,402	$607,268
" all farm productions	$29,650,756	$42,725,198†	.....	.....
Barley, bushels	4,091	8,283	24,915	6,492
Buckwheat, bushels	466,414	353,983	877,386	878,934
Indian corn "	11,150,705	8,745,384	9,723,336	8,759,704
Oats "	3,710,573	4,009,830	4,539,132	3,378,063
Rye "	949,064	566,775	1,439,497	1,255,578
Wheat "	1,901,739	2,301,433	1,763,218	1,601,190
Wool, pounds	441,110	336,609	349,250	375,396
Hay, tons	518,990	521,975	508,726	435,950
Hops, pounds	.....	19,033	3,722	2,138
Tobacco "	172,315	40,871	149,485	310
Potatoes, Irish, bushels	3,563,793	4,705,439	4,171,690	3,207,236
" sweet "	2,086,731	1,550,784	1,034,832	508,015
Horses,‡ number	86,940	79,708	79,707	69,955
Mules and asses,‡ number	9,267	8,853	6,362	4,089
Working oxen‡ "	2,022	3,830	10,067	12,070
Milch cows† "	152,078	133,331	138,818	118,736
Other cattle‡ "	69,786	60,327	89,909	80,455
Sheep‡ "	117,020	120,067	135,228	160,488
Swine‡ "	219,069	142,563	236,089	250,370
Butter,‡ pounds	9,513,835	8,266,023	10,714,447	9,487,210
Cheese‡ "	66,518	38,229	182,172	365,756
Milk,§ gallons	15,472,783	5,373,323	.....	.....

* In all comparisons of values between 1870 and 1880, it should be borne in mind that in the former year gold was at an average premium of 25.3 per cent.—U. S. CENSUS REPORT.

† Including betterments and additions to stock.

‡ On farms.

§ Sold off farms.

STATISTICS OF OCCUPATIONS.

"The number of persons of the two sexes between 10 and 15 years of age unaccounted for, is substantially equal to the number of children attending school, who do not, through any considerable portion of the year, pursue any gainful occupation. There is, of course, a residue, consisting of invalid children, of vagrants, of inmates of institutions of charities and corrections, etc.

"Between 16 and 59 the number of males unaccounted for is made up chiefly of the following classes: First, those students who are pursuing courses of instruction, beyond the age of 16; secondly, those who are affected by permanent bodily or mental infirmities, disqualifying them from participating in the industry of the country; thirdly, the members of the criminal and pauper classes. The number of men of this period of life, not disabled, who are not returned as of some occupation, by reason of inherited wealth or of having retired from business, is hardly important enough in this country to be mentioned. The number of females between 16 and 59 not accounted for in these tables is, naturally, vastly larger. That body is made up of the three classes just mentioned when speaking of the males of this period of life, and of the far greater classes of women—wives, mothers or grown daughters, keeping house for their families or living at home without any special avocation.

"The explanation of the number of persons, 60 years and upward, returned without occupation, is so manifest as not to require to be even alluded to.

"These tables embrace only gainful and reputable occupations. They do not seek to account for those persons, in whatever sphere of life, who have no recognized avocation for which they receive compensation in the shape of wages, salary or profits All persons, moreover, whose means of livelihood are criminal, or, in the general judgment of mankind, shameful, are excluded. * * *

"Instances where the numbers in the tables of occupations fall below those in the tables of manufactures, are principally confined to the returns of factory operatives. In the main the explanation of discrepancies is found in the fact that women and children employed in factories are omitted in large numbers. Thus, omissions may take place either through the failure of the enumerators to ask the questions relating to occupations concerning such persons, assuming that they

have no avocation outside of their homes, or from the indisposition of the persons themselves, or the heads of families to speak of them as in employment; especially in the case of children, who are part of the time in school and part of the time in the mill, would the mother or father be likely to give a preference to the former over the latter mode of statement, particularly when, as in tens of thousands of cases the country over, the child comes within the period of life respecting which there is *a legal requirement* of school attendance." *

	Population 10 Years and Over.	Persons Engaged in all Occupations.	Persons Engaged in Agriculture.	Persons Engaged in Professional and Personal Service.	Persons Engaged in Trade and Transportation.	Persons Engaged in Manufacture and Mechanical and Mining Industries.
UNITED STATES.						
Total	36,761,607	17,392,099	7,670,493	4,074,238	1,810,256	3,837,112
Male	18,735,980	14,744,942	7,075,983	2,712,943	1,750,892	3,205,124
Female	18,025,627	2,647,157	594,510	1,361,295	59,364	631,988
Between 10 and 15 years—Male	.....	825,187	584,867	127,565	26,078	86,677
" " " —Female	.....	293,169	135,862	107,830	2,547	46,930
" 16 " 59 "	.....	15,269,226	6,324,053	3,662,151	1,727,020	3,556,002
60 and over	.....	1,004,517	625,711	176,692	54,611	147,503
Native	.....	13,897,452	6,857,664	3,076,768	1,351,695	2,611,325
Foreign	.....	3,495,647	812,829	997,470	458,561	1,225,787
NEW JERSEY.						
Total	865,591	396,879	59,214	110,722	66,382	160,561
Male	426,451	330,103	58,819	75,763	63,874	131,647
Female	439,140	66,776	395	34,959	2,508	28,914
Between 10 and 15 years—Male	.....	9,957	1,878	1,988	978	5,113
" " " —Female	.....	4,338	6	823	132	3,377
" 16 " 59 "	.....	361,648	49,849	102,276	63,091	146,432
60 and over	.....	20,936	7,481	5,635	2,181	5,639
Native	.....	283,613	51,572	72,337	50,008	109,696
Foreign	.....	113,266	7,642	38,385	16,374	50,865

	United States.	New Jersey.
Per cent. of population 10 years and over engaged in gainful occupations	47.3	45.8
" " total occupied engaged in agriculture	43.6	14.8
" " " " " professional and personal service	23.4	27.9
" " " " " trade and transportation	10.5	16.9
" " " " " manufacture, &c	20.0	40.4
Per cent. of total occupied, native born	79.9	71.5
" " " engaged in agriculture, native born	89.4	87.0
" " " " professional, &c., service, native born	75.5	65.3
" " " " trade and transportation, "	74.3	75.3
" " " " manufacture, &c., "	68.0	68.3
Per cent. of total occupied, males	84.7	82.9
" " " engaged in agriculture, males	90.2	98.1
" " " " professional, &c., service, males	66.5	68.4
" " " " trade and transportation, "	96.1	96.2
" " " " manufacture, &c., "	83.5	82.0

* Compendium Tenth U. S. Census.

NUMBER OF PERSONS ENGAGED IN THE PRINCIPAL OCCUPATIONS, IN NEW JERSEY.

AGRICULTURE.

Laborers	22,672
Farmers and Planters	33,578
Gardeners, Nurserymen and Vine Growers	2,113
Stock Raisers, Drovers and Herders	115
Others	736
Total	59,214

PROFESSIONAL AND PERSONAL SERVICE.

Artists and Teachers of Art	297
Barbers and Hairdressers	1,457
Boarding and Lodging-House-keepers	465
Clergymen	1,654
Clerks and Copyists (not specified)	1,378
Dentists	325
Domestic Servants	29,777
Engineers (Civil)	288
Hotel and Restaurant Keepers and Employes	3,419
Journalists	427
Laborers	52,707
Launderers and Launderesses	2,479
Lawyers	1,557
Livery Stable Keepers and Hostlers	1,158
Musicians and Teachers of Music,	883
Officers, Soldiers and Sailors (U. S. Army)	198
Officials and Employes (Civil) of Government	2,875
Physicians and Surgeons	1,595
Teachers	4,606
Watchmen (Private) and Detectives	578
Others	2,599
Total	110,722

TRADE AND TRANSPORTATION.

Trade:

Agents (not specified)	571
Clerks, Salesmen and Accountants in Stores	16,075
Commercial Travellers, Hucksters and Peddlers.	2,653
Banking, Brokerage of Money and Stocks	1,571
Insurance	855
Saloon Keepers and Bar Tenders,	2,674
Traders and Dealers	17,943

Transportation:

Draymen, Hackmen, Teamsters, &c.	5,163
Express Co. Employes and Officials	821
Railroad Co. Employes and Officials	7,234
Street Railroad Co. Employes and Officials	523
Telegraph Co. Employes and Officials	932
Trading and Transportation Co. Employes and Officials	374
Sailors, Steamboatmen, Canalmen Pilots and Watermen	6,061
Others	2,959
Total	66,382

MANUFACTURING, MECHANICAL AND MINING.

Apprentices to Trades	1,889
Bakers	2,135
Blacksmiths	4,928
Bleachers, Dyers and Scourers	659
Bookbinders and Finishers	517
Boot and Shoemakers	6,832
Brass Founders and Workers	607
Brewers and Malsters	534
Brick and Stone Masons, Marble and Stone Cutters	4,720
Brick and Tile Makers	1,470
Broom and Brush Makers	314
Butchers	3,587
Cabinet Makers and Upholsterers,	1,510
Carpenters and Joiners	12,354
Carriage, Car and Wagon Makers,	1,013
Cigar Makers and Tobacco Workers	2,187
Clerks and Book-keepers in Manufacturing Establishments	615
Clock and Watch Makers and Repairers	517
Confectioners	698
Coopers	918
Cotton, Silk and Woolen Mills Operatives	18,940
Curriers, Tanners, Dressers and Finishers of Leather	1,459
Engineers and Firemen	3,702
Fishermen and Oystermen	2,529
Glass Works Operatives	2,751
Gold and Silver Workers and Jewellers	2,880
Gun and Locksmiths	328
Harness, Saddle and Trunk Makers	2,490
Hat and Cap Makers	4,198
Iron and Steel Works and Shops Operatives	4,842
Lumbermen, Raftsmen and Wood Choppers	174
Machinists	5,397
Manufacturers and Officials in Manufactory Co.	2,658
Millers	1,076
Miners	3,696
Painters and Varnishers	5,058
Paper Mill Operatives	747
Photographers	265
Piano and Organ Makers and Tuners	472
Plasterers	410
Plumbers and Gas Fitters	177
Potters	2,461
Printers	2,460
Quarrymen	441
Rubber Factory Operatives	1,219
Saw Mill Operatives	394
Ship Carpenters, Caulkers, Riggers and Smiths	889
Shirt, Collar and Cuff Makers	1,284
Steam Boiler Makers	694
Tailors, Tailoresses, Milliners and Dress Makers	14,843
Tinners	1,748
Tool and Cutlery Makers	739
Wheelwrights	1,237
Wire Makers and Workers	989
Wood Turners, Carvers and Workers	523
Employes in Manufactory Co. (not specified)	2,805
Mill and Factory Operatives (not specified)	1,105
Others	13,677
Total	160,561
All Occupations	396,879

PART IX.

JAIL STATISTICS.

JAIL STATISTICS.

The Legislature of this State enacted at its last session (1882) the following law (Chap. 123 of Session Laws), which requires the keepers of our twenty-three county jails to keep a record of all the prisoners delivered to their charge, and to report, monthly, to the chief of this bureau such statements concerning them as may be required:

An act providing for the record and report of jail statistics.

1. *Be it enacted by the Senate and General Assembly of the State of New Jersey*, That the keeper of each county jail in this State shall keep in a book, which shall be furnished by such county, and remain in such jail as property of the same, a record of all prisoners delivered to his charge, which said record shall contain the date of entrance, name, offence, term of sentence, fine, age, sex, nativity, color, trade or occupation, degree of education and religious instruction, number of previous convictions, whether married or single, temperate or intemperate, and whether parents be living or dead, how committed and by whom, the date of discharge, and such other items of information in relation to such prisoners and their offences, as the chief of the bureau of statistics of labor and industries may require.

2. *And be it enacted*, That on or before the fifth day of every month, a certified copy of such record kept during the previous month, or so much thereof as may be required, shall be transmitted by the keeper of such jail to the chief of the bureau of statistics of labor and industries; and that a statement showing the total expense incurred in keeping the prisoners shall accompany such report, which report shall be made in the form prescribed by the chief of the bureau of statistics of labor and industries.

3. *And be it enacted*, That for every neglect of such keeper to comply with the requirements of this act, he shall forfeit the sum of fifty dollars, to be recovered by an action of debt in the name of the people of this state.

4. *And be it enacted*, That this act shall take effect immediately.

Approved March 23d, 1882.

In April the various keepers of the county jails were notified of the act in question and its requirements, and furnished suitable blanks on which to make their monthly reports to this bureau. As very few of our jails were provided with proper books of record, the boards of chosen freeholders, through their respective directors, were also

solicited to comply with the provisions of the law requiring the county to supply such books. This was done in all cases as soon as practicable, and the keepers of the jails, which (except those in Essex, Hudson, Mercer, Passaic and Union counties, where "wardens" have been appointed), are under the care of the different sheriffs, have cheerfully performed their part of the duty imposed, although no extra compensation had been provided for the additional labor, by reporting to this bureau the required monthly statements of criminal statistics, beginning with the month of May, 1882. We are thus enabled to give a summary of the statistics furnished for the six months ending with October 1st, 1882.

Although not as perfect as desirable, these statistics are certainly of great value, and promise to become still more valuable in the future. The propriety of their publication will hardly be questioned. They will supply a want long felt; for, outside of Massachusetts, where very comprehensive and nearly complete statistics of crime are available, little has been done in this country to collect this kind of information. The compiler of the *American Almanac*, in the edition for 1881, observes on this subject:

> There is hardly any inquiry more frequently made than where to find statistics of crime and pauperism in the United States; and there is none, perhaps, to which a more thoroughly unsatisfactory answer must be made. Only a few States publish any returns whatever regarding the number even of criminals convicted in the courts, and of those few, some report only the convictions of crime in the higher courts, while others include all who were imprisoned or convicted on summons before petty magistrates. After careful examination of all the State documents, the conclusion is compelled that *no compilation from them of the aggregate or comparative statistics of crime in this country can be made.*

So far as our own State is concerned the publication of our "jail statistics," even if they will have no other value, will do much to draw attention of the public to jails and their inmates, which are far more numerous than is generally supposed. For, as Mr. A. S. Meyrick, in his excellent report as "delegate from New Jersey to the National Conference of Charities and Corrections," at Boston, July, 1881, says:

> In New Jersey we have no provision for any inspection of the jails whatever, except by the chosen freeholders of the counties, and their grand juries, both of which are selected, in nearly every case, for other purposes, and with no reference at all to this important duty. Each is too numerous and too transient a body

for decisive action or personal responsibility, and every member of each is likely to have some personal interest in making the examination perfunctory, and covering up rather than bringing to light the abuses and extravagances of the system. The average good citizen knows less about the jail of his county than any other place in it. He never visits it unless compelled to do so. Its population and their condition and treatment are as unknown to him as the races beyond the deluge.

The interrogatories (in the preparation of which material assistance was rendered by Mr. A. S. Meyrick, of Kingston,) addressed to the keepers of the jails were intended to draw out the necessary facts to form as complete an exhibit of our jail statistics as possible, and were, in substance, as follows:

Number of persons received in the jail during the month; discharged; died; escaped; recaptured; average daily number of prisoners; total number of males received during the month; of females; of children under sixteen years of age; number convicted of crimes; committed for trial; committed as witnesses; employed in productive labor; the whole number of days' board of inmates; the total expense to the county of keeping the inmates; average daily expense of each inmate; average daily earnings of each prisoner; religious instruction received, and the number of volumes in the library, if any; the crimes charged; age and nativity of prisoners; by whom committed or sentenced; term of sentence; number of previous convictions; religious persuasion; habits (temperate or intemperate); degree of education; color; social condition (single, widowed, married or divorced); trade or occupation; for what reason or by whom discharged.

These inquiries were answered more or less fully, and the result is given below:

To the inquiry "What religious instruction do the prisoners receive?" the answer "none" has been returned from Camden, Cape May, Gloucester, Hunterdon, Monmouth, Ocean, Salem, Somerset, Sussex and Warren counties. In the Atlantic county jail there is "a bible in each of the ten cells." In Bergen county jail: "Preaching every Sabbath." Burlington: "Church services." Cumberland: "Prayer meetings each Sunday." Essex (Newark): "Christian temperance each Friday P. M., and services each Sunday P. M." Caldwell: "Services each Sunday." Hudson (Jersey City): "Catholic and Protestant." Snake Hill: "Protestant and Catholic services each Sunday." Mercer: "Protestant religious services every Sun-

day afternoon." Middlesex: "Catholic and Protestant services." Morris: "Services by the Young Men's Christian Association on Sundays." Passaic: "Services every Sunday." Union: "Protestant services."

The only jails which contain libraries are those at Caldwell, Essex county, composed of "magazines, books and religious papers by voluntary subscriptions;" at New Brunswick, Middlesex county, where the "religious library contains eighty volumes;" at Paterson, Passaic county, sixty volumes; and at Elizabeth, Union county, forty volumes.

In only two of the jails, the penitentiaries at Snake Hill, Hudson county, and at Caldwell, Essex county, do the prisoners seem to be employed in productive labor, and the number there employed for the six months ending October 31st, 1881, was, respectively, 1,117 and 513. The average earnings of each prisoner employed at Snake Hill are "estimated at $1 per day;" and at Caldwell, from "$125 to $150 per month for all." Mr. T. T. Speer, the warden at the latter place, wrote on this subject as follows:

"In replying to question, 'Average earnings of each prisoner?' I have said $125 to $150 per month for all. This will need explanation. We do no contract work, but crack stone for county roads, which we sell. The sales each year will run from $1,500 to $1,800. The stone cracking is a punishment, and the only labor outside of farm work that we do here."

The statistics as reported from the twenty-three jails, are given in detail in the following tables:

Table No. 1 shows that the number of prisoners in our county jails during the past six months was 7,533, of whom 5,851 were reported as males, 1,230 females, 321 children under sixteen years of age. There were committed as witnesses, 67. The deaths were 5. The number escaping was 38; escaping and recaptured, 12. The total expense of boarding these inmates was nearly $73,000. As a few counties have not fully reported this item, it is impossible to give the exact amount. The average daily cost of each prisoner varied considerably, having been comparatively low at the Newark jail. In most of the counties the authorities pay the keepers a stated price (daily or weekly) for boarding the prisoners. Where wardens have charge of the jails, (except that at Jersey City), they are salaried officials, and the counties pay the expenses of keeping the prisoners, etc.

Table No. 2 gives the ages and nativity of 6,958 prisoners; while in Table No. 3 the ages of prisoners, classified according to crimes, is shown.

In Table No. 4 may be found the data showing the terms of sentence, religious belief, habits, degree of education, color, social condition, and number of previous convictions of the prisoners.

In Tables Nos. 5, 6 and 7 the different crimes have been classified, and the number of commitments under each shown, although the finer technical distinctions have not been observed in making the classification, and most of the crimes include a few cases of attempts to commit them. So far as reported, the number sentenced or committed by the different tribunals is given in Table No. 8, and in Table No. 9 the number of discharges, whether by expiration of sentence or otherwise.

TABLE No. 1—SUMMARY.

	COUNTIES.																							Total for Six Months.
	Atlantic.	Bergen.	Burlington.	Camden.	Cape May.	Cumberland.	Essex—Newark.	Essex—Caldwell.	Gloucester.	Hudson—Jersey City.	Hudson—Snake Hill.	Hunterdon.	Mercer.	Middlesex.	Monmouth.	Morris.	Ocean.	Passaic.	Salem.	Somerset.	Sussex.	Union.	Warren.	
Total commitments	42	80	324	694	12	81	1,844	412	30	1,246	793	23	296	685	146	147	8	776	46	67	25	342	51	7,533
Males	42	69	239	473	15	68	1,483	288	28	884	515	17	234	570	127	104	6	561	32	64	19	256	49	5,851
Females	....	9	58	165	1	5	250	22	2	247	129	1	45	95	7	18	2	150	3	7	....	34	2	1,230
Children under sixteen	....	3	12	10	....	4	109	22	....	83	17	....	10	14	2	5	....	39	1	6	....	15	1	321
Committed as witnesses	4	....	3	13	....	....	11	.....	....	14	.....	....	4	13	1	2	....	1	....	....	....	1	....	67
Deaths	....	....	.....	.....	....	....	.....	.....	....	4	1	....	.....	.....	.....	.....	....	.....	....	....	....	.....	....	5
Escaped	....	....	6	7	....	....	.....	4	....	4	3	4	2	2	3	.....	....	.....	3	....	....	.....	....	38
Escaped and recaptured	....	....	.....	3	....	....	.....	1	....	3	1	....	1	1	.....	.....	....	.....	1	....	....	1	....	12

TABLE No. 1.

COUNTIES.	LOCATION OF JAIL.	Number in Jail May 1st, 1882.	NUMBER RECEIVED IN 1882.						NUMBER FROM APRIL 30TH TO OCTOBER 31ST, 1882.										
			May.	June.	July.	August.	September.	October.	Total in Jail.	Discharged.	Died.	Escaped.	Escaped and Recaptured.	Males Received in Jail.	Females Received in Jail.	Children under Sixteen Received in Jail.	Total Convicted of Crime.	Committed for Trial.	Committed as Witnesses.
Atlantic	Mays Landing	7	3	3	11	4	5	9	42	13	....	....	....	42	....	....	7	39	4
Bergen	Hackensack	12	3	15	10	16	12	12	80	65	....	....	....	69	9	3	7	8	....
Burlington	Mount Holly	27	40	39	54	34	30	100	324	218	....	6	....	239	58	12	9	44	3
Camden	Camden City	56	90	148	101	86	117	96	694	625	....	7	3	473	165	10	96	124	13
Cape May	Cape May Court House	2	2	3	....	2	3	....	12	4	....	....	....	15	1	....	3	9	....
Cumberland	Bridgeton	8	15	14	11	13	9	11	81	56	....	....	....	68	5	4	41	31	....
Essex	Newark	111	232	270	330	295	314	292	1,844	1,667	....	....	....	1,483	250	109	450	659	11
"	Caldwell*	102	49	46	36	51	64	64	412	270	....	4	1	288	22	22	102	....	....
Gloucester	Woodbury	1	8	3	5	7	4	2	30	22	....	....	....	28	2	....	22	13	....
Hudson	Jersey City	115	153	157	227	165	211	218	1,246	1,117	4	4	3	884	247	83	444	629	14
"	Snake Hill†	154	111	90	92	136	97	113	793	541	1	3	1	515	129	17	848	....	....
Hunterdon	Flemington	5	3	1	3	4	4	3	23	8	....	4	....	17	1	....	3	15	....
Mercer	Trenton	17	32	51	37	47	64	48	296	235	....	2	1	234	45	10	45	105	4
Middlesex	New Brunswick	15	95	80	118	108	137	132	685	640	....	2	1	570	95	14	41	116	13
Monmouth	Freehold	10	21	15	25	29	20	26	146	118	....	3	....	127	7	2	25	47	1
Morris	Morristown	24	17	16	26	18	9	37	147	112	....	....	....	104	18	5	38	52	2
Ocean	Toms River	1	1	1	1	2	1	1	8	7	....	....	....	6	2	....	3	2	....
Passaic	Paterson	65	107	111	133	138	104	118	776	437	....	....	....	561	150	39	63	267	1
Salem	Salem City	10	11	3	7	....	7	8	46	19	....	3	1	32	3	1	13	17	....
Somerset	Somerville	1	21	4	10	12	12	7	67	56	....	....	....	64	7	6	18	27	....
Sussex	Newton	....	2	7	5	6	2	3	25	23	....	....	....	19	....	....	....	4	....
Union	Elizabeth	52	34	62	42	61	49	42	342	293	....	....	1	256	34	15	169	74	1
Warren	Belvidere	....	7	12	15	4	10	3	51	40	....	....	....	49	2	1	11	14	....

* Included in Newark Jail returns. All prisoners are sent from Newark Jail.

† Two hundred and twenty-five of the prisoners were transferred from Jersey City Jail.

TABLE No. 1—Continued.

COUNTIES.	LOCATION OF JAIL.	AVERAGE DAILY NUMBER IN JAIL.						Number Employed in Productive Labor, May 1st to October 31st.	Whole Number of Days' Board of Prisoners.	Total Expense to County of Keeping Prisoners.	AVERAGE DAILY COST OF KEEPING EACH PRISONER.					
		May.	June.	July.	August.	September.	October.				May.	June.	July.	August.	September.	October.
Atlantic	Mays Landing	.....	.....	.....	.....	.....	.....	.....	134	$866 40	$0 43	$0 43	$0 43	$0 48	.....	$0 46
Bergen	Hackensack	8	10	14	15	14	14	.....	2,224	1,100 84	45	45	45	45	$0 45	45
Burlington	Mount Holly	16	35	30	34	30	19	.....	*1,707	865 00	35	35	35	30	30	30
Camden	Camden City	55	60	48	51	65	60	.....	10,369	3,732 10	32	32 1-10	33	36	39	40
Cape May	Cape May Court House	4	3	4	4	4	4	.....	776	346 46	50	50	50	50	58	60
Cumberland	Bridgeton	7	8	8	8	10½	13	.....	1,757	702 80	40	40	40	40	40	40
Essex	Newark	95	101	120	135	164	147	.....	23,953	6,302 24	11 1-9	12 1-15	11	10⅜	9½	9¾
"	Caldwell	92	90	90	112	110	140	513	20,597	11,128 20	55 17-30	63⅓	48 1-30	57 30-31	54 36-37	46 23-42
Gloucester	Woodbury	3	5	6	8	7	....	.....	819	406 55	45	45	45	45	45	45
Hudson	Jersey City	107	132	155	173	194	196	.....	29,204	8,607 30	30	30	30	30	30	30
"	Snake Hill	183	204	196	241	246	240	1,117	37,330	22,275 95	51 4-10	72 7-10	67 6-10	40 5-10	41 5-10	44
Hunterdon	Flemington	2½	1	3	2½	3	3	.....	351	290 60	45	45	45	45	45	45
Mercer	Trenton	15	31	32	40	40	45	.....	6,331	1,529 45	27⅙	27 1-15	25 18-31	22 4-5	25 11-30	22⅓
Middlesex	New Brunswick	23	....	.....	.....	.....	....	18	5,515	2,005 50	35 5-7	35 5-7	35⅓	35	35⅓	35⅓
Monmouth	Freehold	12	13	.....	.....	.....	24	.....	†377	1,199 55	.....	.....	.....	.....	.....	30
Morris	Morristown	1	16	21	20	20	21	.....	3,541	1,344 45	33	56 6-100	48	35	35	35
Ocean	Toms River	1	1	1	.....	.....	....	.....	169	56 40	40	40	40	40	40	40
Passaic	Paterson	57	60	55	60	50	53	.....	8,242	3,081 64	32	31½	42½	37½	53⅛	37½
Salem	Salem City	.....	....	.....	.....	.....	8	.....	‡473	§3,600 00	40	40	40	40	40	40
Somerset	Somerville	4	8	4	2	1	10	.....	1,127	475 15	45	45	45	45	45	45
Sussex	Newton	.....	....	.....	.....	.....	....	.....	‖10	‖5 74	.....	.....	.....	.....	.....	50
Union	Elizabeth	49	40	38	39	53	53	.....	8,322	2,106 00	26 8-10	26	32 6-10	15 5-10	21 5-10	28 7-10
Warren	Belvidere	.....	....	5½	8	7	4	.....	¶754	¶377 50	50	50	50	50	50	50

* For five months—not including July. † Return for month of May. ‡ For four months—not including June and August. § Estimated averaged at $60 a month. ‖ Only for October. ¶ For four months—not including May and June.

TABLE No. 2.

JAIL OR PENITENTIARY. COUNTIES.	Total Number.	Number Under 20 Years of Age.	20 Years and Less than 30.	30 Years and Less than 50.	50 Years and Over.	Number Born in United States.	Number Foreign Born.
Atlantic	39	10	12	9	1	19	4
Bergen	80	9	44	22	3	39	41
Burlington	313	17	132	124	38	104	209
Camden	640	50	299	269	50	289	351
Cumberland	72	9	28	23	8	60	12
Cape May	14	2	3	6	2	14	.....
Essex, (Newark)	1,733	285	565	683	199	942	791
Gloucester	28	3	14	7	.....	20	8
Hudson, (Jersey City)	978	185	311	394	69	420	558
Hudson, (Snake Hill)*	639	97	167	264	104	256	383
Hunterdon	18	1	6	11	.....	15	3
Mercer	279	42	91	105	22	174	105
Middlesex	670	97	271	220	68	343	327
Monmouth	145	14	65	58	9	101	44
Morris	123	10	37	51	16	62	61
Ocean	8	.....	5	3	.....	7	1
Passaic	711	115	212	301	72	375	336
Salem	36	5	15	12	4	31	5
Somerset	66	20	26	12	3	45	21
Sussex	25	3	8	12	4	15	10
Union	290	95	91	101	23	178	112
Warren	51	11	20	14	5	37	14
Total	6,958	1,080	2,422	2,701	700	3,546	3,396
Caldwell, (Essex county)†	310	42	110	126	37	188	122

*Two hundred and thirty-seven of these are included in Jersey City Jail Returns.
†Included in Newark Jail Returns.

TABLE No. 3.

CRIME.	Total Number.	Number Under 20 Years of Age.	20 Years and Less than 30.	30 Years and Less than 50.	50 Years and Over.	Number Born in United States.	Number Foreign Born.
Assault, Assault and Battery, &c.	786	111	331	280	61	319	273
Drunk, Drunk and Disorderly	1,445	86	507	675	199	436	570
Disorderly, Disorderly Persons and Conduct	510	134	146	192	38	175	210
Breaking and Entering	97	39	46	9	3	32	30
Larceny	516	154	211	132	16	211	118
Vagrants and Tramps	435	58	122	186	69	93	168

TABLE No. 4.

JAIL OR PENITENTIARY.	TERM OF SENTENCE.								RELIGIOUS BELIEF.	
	Five Days or Less.	Over Five Days but Not Exceeding One Month.	Over One Month but Not Exceeding Two.	Over Two Months but Not Exceeding Three.	Over Three Months but Not Exceeding Four.	Over Four Months but Not Exceeding Five.	Over Five Months but Not Exceeding Twelve.	Over One Year.	Protestant.	Catholic.
Atlantic County	.....	3	.....	.....	.....	1	9	.....	20	17
Bergen "	6	20	10	12	5	1	1	.....	43	37
Burlington "	240	72	25	29	1	.....	.....	.....	96	188
Camden "	10	464	12	6	.....	.....	5	8	287	351
Cape May "	.....	.....	.....	.....	4	.....	2	.....	10	2
Cumberland "	27	10	8	1	.....	.....	3	.....	61	11
Essex County (Newark)	23	887	17	154	5	.....	67	55	*654	1,054
Gloucester County	13	4	.....	.....	.....	.....	.....	.....	27	2
Hudson County (Jersey City)	7	251	46	62	.....	.....	5	.....	319	432
Hunterdon County	.....	.....	2	1	.....	.....	.....	.....	3	1
Mercer "	7	133	5	1	.....	.....	.....	.....	138	141
Middlesex "	298	175	43	46	13	4	.....	.....	227	362
Monmouth "	21	46	2	4	2	1	8	1	74	71
Morris "	35	20	4	2	4	.....	1	.....	55	49
Ocean "	1	.....	.....	.....	1	.....	.....	.....	.....	.....
Passaic "	6	338	7	15	1	.....	1	.....	320	284
Salem "	2	2	.....	.....	.....	.....	1	7	33	3
Somerset "	12	13	.....	2	.....	.....	.....	.....	30	36
Sussex "	10	3	.....	.....	.....	.....	.....	.....	17	8
Union "	22	114	8	8	.....	.....	4	5	109	181
Warren "	2	15	.....	.....	1	2	.....	.....	†24	7
Total ‡	742	2,570	189	343	37	9	107	76	2,547	3,237
Hudson County Penitentiary §	.....	179	130	256	7	6	58	93	200	436
Essex " " ‖	.....	97	13	79	67	8	39	7	90	220

* Also none, 15; Hebrew, 7; Buddhist, 1. † Also none, 11. ‡ Exclusive of Hudson County (Snake Hill Penitentiary. § Partly included in Jersey City Jail returns. ‖ Included in Newark Jail returns.

TABLE No. 4—Continued.

HABITS.				DEGREE OF EDUCATION.						COLOR.		SOCIAL CONDITION				NUMBER OF PREVIOUS CONVICTIONS.					
Temperate.	Moderate Drinker.	Intemperate.	Confirmed Drunkard.	Cannot Read.	Can Read but not Write.	Can Read and Write.	Common School Education.	High School.	Classical.	White.	Colored.	Single.	Widowed.	Married.	Divorced.	Once.	Twice.	Three.	Four.	Five.	Six or over.
14	14	11	....	9	....	23	11	2	1	35	4	20	....	17	..	4	1	....	1	....	....
40	18	22	....	19	23	13	25	..	..	72	8	52	5	23	..	....	....	....	....	....	....
29	120	111	35	72	121	99	51	..	..	285	12	100	17	176	..	63	153	74	7	....	....
45	85	295	213	85	120	313	118	6	2	520	117	313	118	194	15	115	104	63	36	25	16
6	6	1	....	1	2	6	4	..	..	8	4	19	....	4	..	4	....	....	....	1	....
26	13	27	7	20	13	46	10	3	..	59	13	31	2	38	..	11	6	5	1	1	3
398	685	552	98	377	156	44	1,095	55	6	1,642	91	879	196	657	1	109	67	23	40	25	123
15	.....	14	....	4	....	18	7	..	..	27	2	14	2	13	..	1	....	....	....	....	....
25	561	197	195	100	96	266	60	11	..	964	14	413	42	295	1	7	18	4	9	3	12
2	9	7	....	2	2	10	4	..	..	14	4	9	2	5	..	7	2	....	....	....	....
84	93	97	5	55	27	160	130	1	..	241	38	168	13	98	4	47	16	7	23	....	30
81	58	408	86	219	37	282	129	3	..	589	81	386	26	257	..	100	87	54	87	53	254
30	.....	175	....	53	....	106	3	2	..	121	24	62	3	80	..	18	10	8	1	....	1
30	.....	44	1	7	27	21	49	1	..	94	10	33	7	46	1	17	4	2	1	1	11
2	.....	.....	....	.....	....	1	1	..	..	4	1	5	....	2	..	....	....	1	....	....	....
222	201	156	25	131	167	123	168	15	..	699	12	272	29	298	5	5	3	3	6	5	12
18	8	7	3	13	5	13	4	..	..	16	20	23	....	13	..	4	....	1	....	....	2
28	28	15	....	7	20	44	.....	..	..	56	10	55	....	10	..	10	4	....	....	....	....
6	9	10	....	3	7	12	3	..	..	24	1	11	....	14	..	2	....	....	1	1	1
112	.....	178	....	77	9	.....	204	..	..	261	29	182	9	99	..	62	25	13	8	6	2
21	.....	30	....	12	12	10	17	..	..	31	1	33	....	18	..	13	3	1	....	....	....
1,234	1,908	1,957	668	1,266	844	1,600	2,093	99	9	5,762	496	3,080	471	2,357	27	599	503	259	221	121	467
152	113	334	40	86	90	457	7	..	1	623	16	357	75	207	..	30	23	18	14	15	10
145	.....	155	10	64	102	108	51	5	..	292	13	218	20	72	..	24	24	13	9	4	4

TABLE No. 5.

CRIMES AGAINST THE PERSON.	COUNTIES.																						Total.
	Atlantic.	Bergen.	Burlington.	Camden.	Cape May.	Cumberland.	Essex—Newark.	Gloucester.	Hudson—Jersey City.	Hudson—Snake Hill.	Hunterdon.	Mercer.	Middlesex.	Monmouth.	Morris.	Ocean.	Passaic.	Salem.	Somerset.	Sussex.	Union.	Warren.	
Assault, assault and battery, &c	7	19	8	59	5	14	309	4	237	53	3	38	92	33	41	1	132	10	13	2	58	9	1,147
Desertion of family, non-support, &c	....	.....	....	3	....	.....	46	....	.....	.....	....	.....	.....	.....	.....	....	7	.....	.....	....	1	....	57
Murder, manslaughter, homicide and accessory to murder	....	.....	....	5	....	.....	3	....	.....	.....	....	.....	.....	1	.....	....	2	.....	.....	1	5	....	17
Rape and attempt to rape	2	1	....	3	....	2	2	....	4	.....	1	1	3	1	.....	1	1	.....	.....	2	2	....	26
Robbery, highway robbery, larceny from the person, &c	2	1	1	4	2	.....	14	....	16	1	1	.....	7	1	.....	....	.....	.....	2	....	2	....	54
Threats	....	.....	....	1	....	.....	.....	5	19	.....	....	.....	69	1	3	....	.....	.....	.....	4	1	....	103
Miscellaneous	...	.....	....	.....	....	1	5	....	3	1	....	1	.....	2	3	....	4	3	.....	1	2	....	26

TABLE No. 6.

CRIMES AGAINST PROPERTY.	COUNTIES.																						Total.
	Atlantic.	Bergen.	Burlington.	Camden.	Cape May.	Cumberland.	Essex—Newark.	Gloucester.	Hudson—Jersey City.	Hudson—Snake Hill.	Hunterdon.	Mercer.	Middlesex.	Monmouth.	Morris.	Ocean.	Passaic.	Salem.	Somerset.	Sussex.	Union.	Warren.	
Arson, &c	.....	.....	1	2	.....	.....	2	.....	4	.....	.....	.....	2	.....	.....	.....	1	.....	3	.....	.....	.....	15
Breaking and entering, &c	5	.....	.....	8	1	.....	104	.....	10	10	3	6	22	2	.....	.....	17	3	.....	.....	13	3	207
Burglary	.....	4	1	.....	.....	.....	6	.....	10	.....	.....	.....	.....	.....	.....	2	3	.....	2	2	.....	4	34
Embezzlement	.....	.....	2	1	.....	.....	11	.....	11	2	.....	1	1	.....	.....	.....	1	.....	.....	.....	1	.....	31
False pretences	3	.....	.....	.....	.....	1	3	1	4	.....	.....	.....	.....	3	.....	.....	4	1	1	.....	.....	3	24
Larceny	17	26	15	61	2	8	111	8	142	51	5	42	50	24	21	.....	75	5	13	2	36	5	719
Malicious mischief	.....	.....	.....	.....	.....	.....	26	.....	5	1	.....	7	6	.....	.....	.....	3	.....	9	.....	1	.....	58
Misdemeanor	.....	.....	.....	.....	.....	.....	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	17
Miscellaneous	.....	.....	.....	1	.....	.....	5	.....	.....	.....	.....	.....	2	1	.....	.....	1	.....	.....	1	.....	.....	11

TABLE No. 7.

CRIMES AGAINST PUBLIC ORDER AND DECENCY.	COUNTIES.																							Total.
	Atlantic.	Bergen.	Burlington.	Camden.	Cape May.	Cumberland.	Essex—Newark.	Gloucester.	Hudson—Jersey City.	Hudson—Snake Hill.	Hunterdon.	Mercer.	Middlesex.	Monmouth.	Morris.	Ocean.	Passaic.	Salem.	Somerset.	Sussex.	Union.	Warren.		
Adultery	.....	.....	.....	1	.....	.....	1	.....	6	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		9
Bastardy	.....	.....	.....	2	.....	.....	1	.....	3	.....	.....	.....	1	1	1	.....	3	1	.....	.....	.....	1		14
Breach of the peace	.....	.....	.....	.....	.....	.....	153	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....		159
To keep the peace	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		8
Common drunkards	.....	.....	.....	.....	.....	.....	26	.....	.....	13	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		40
Drunkenness	.....	1	114	.....	.....	27	379	13	61	.....	.....	.....	.....	.....	41	.....	234	3	5	.....	37	1		916
Drunk and disorderly	.....	.....	50	437	.....	.....	9	.....	149	177	.....	124	269	60	.....	.....	.....	2	7	.....	57	2		1,343
Habitual drunkard	.....	.....	.....	.....	.....	.....	3	.....	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		24
Disorderly conduct	.....	.....	.....	.....	.....	12	24	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	2	6	.....		46
Disorderly	.....	11	27	11	.....	2	1	.....	77	26	.....	6	2	1	.....	1	198	.....	.....	.....	5	2		370
" person	.....	.....	.....	.....	.....	.....	206	.....	.....	156	.....	.....	7	.....	.....	.....	.....	.....	.....	8	4	.....		381
" house	.....	.....	1	6	.....	.....	12	.....	1	.....	.....	.....	4	2	5	.....	5	.....	.....	.....	.....	.....		36
Fornication	.....	.....	.....	3	.....	1	7	1	.....	.....	.....	1	.....	.....	.....	.....	2	.....	.....	.....	1	1		17
Lewdness	.....	.....	.....	.....	.....	.....	5	.....	3	4	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....		14
Riotous conduct	.....	.....	.....	.....	.....	.....	.....	.....	15	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	4	.....		21
Smuggling	.....	.....	.....	.....	.....	.....	.....	.....	10	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....		11
Tramps	.....	8	55	.....	.....	2	1	.....	29	81	.....	16	5	.....	4	.....	.....	.....	.....	.....	.....	.....		201
Trespass	.....	.....	.....	.....	.....	1	.....	.....	6	.....	.....	.....	7	.....	.....	.....	.....	.....	.....	.....	1	12		27
Vagrancy	.....	7	26	.....	.....	.....	186	.....	16	35	.....	17	64	.....	.....	.....	11	.....	.....	4	16	.....		382
Vagrants and tramps	.....	.....	.....	.....	.....	.....	1	.....	15	.....	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....		43
Violating city ordinance	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11	.....		17
Miscellaneous	.....	2	3	12	.....	.....	.....	13	14	3	.....	2	4	6	3	1	1	3	1	.....	4	1		73
Perjury	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	1	5	.....	.....	.....	.....	.....	.....	.....	.....	.....		8

TABLE No. 8.

COMMITTED OR SENTENCED BY.	COUNTIES.																				
	Atlantic.	Bergen.	Burlington.	Camden.	Cumberland.	Essex—Newark.	Essex—Caldwell.	Gloucester.	Hudson—Jersey City.	Hudson—Snake Hill.	Hunterdon.	Mercer.	Middlesex.	Monmouth.	Morris.	Passaic.	Salem.	Somerset.	Sussex.	Union.	Warren.
Justices	34	45	259	593	17	867	157	24	642	429	16	42	219	121	76	102	21	59	21	270	42
Recorder	.....	.....	.....	.....	1	.....	.....	.....	231	90	.....	.....	328	.....	.....	370	.....	.....	.....	.....	.....
Special Sessions	.....	.....	.....	2	.....	22	130	1	8	24	.....	4	87	.....	19	20	.....	.....	.....	.....	3
Quarter Sessions	3	19	6	9	.....	.....	2	1	78	95	.....	.....	23	22	32	19	5	.....	.....	14	1
Oyer and Terminer	5	.....	.....	.....	7	53	.....	.....	.....	.....	5	.....	13	3	.....	.....	9	3	.....	.....	3
Mayor	.....	.....	48	36	48	.....	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
Bench warrant	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Capias	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	11	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mayor and Common Council	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Pleas, Circuit and Supreme Courts	.....	.....	.....	.....	.....	8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Police Justices	.....	.....	.....	.....	.....	772	30	.....	.....	.....	.....	216	.....	.....	.....	.....	.....	.....	.....	.....	.....
United States Commissioner	.....	.....	.....	.....	.....	1	.....	.....	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Township	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Grand Jury	2	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Requisition	.....	.....	.....	.....	.....	1	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
United States Court	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prosecutor	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Surrendered by bondsmen	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sheriff	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....
Coroner	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....
Order of court	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2

TABLE No. 9.

WHY OR BY WHOM DISCHARGED.	COUNTIES.																					
	Atlantic.	Bergen.	Burlington.	Camden.	Cumberland.	Essex—Newark.	Essex—Caldwell.	Gloucester.	Hudson—Jersey City.	Hudson—Snake Hill.	Hunterdon.	Mercer.	Middlesex.	Monmouth.	Morris.	Ocean.	Passaic.	Salem.	Somerset.	Sussex.	Union.	Warren.
Served out time	2	12	204	443	26	525	167	9	176	564	3	81	282	40	49	5	163	2	3	8	112	19
Gave bail or bonds	14	19	14	85	14	191	.....	.....	134	.....	11	37	17	15	22	.....	.....	7	28	9	55	9
Sent to State Prison	.....	1	7	19	2	49	.....	4	40	.....	3	7	23	6	1	1	3	8	3	.....	8	2
" Reform School	.....	.....	2	1	.....	16	.....	.....	16	.....	1	3	6	1	3	.....	1	1	.....	.....	1	.....
" Industrial School	.....	.....	.....	.....	.....	3	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
Paid fine and costs	2	8	14	38	7	10	47	12	14	4	1	5	2	12	32	.....	1	8	.....	1	35	2
Board of Freeholders	.....	.....	8	.....	1	2	52	.....	15	.....	.....	74	15	2	4	.....	.....	.....	.....	.....	20	1
Court of Common Pleas	.....	.....	2	2	.....	2	.....	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" Quarter Sessions	.....	5	2	11	.....	.....	.....	.....	74	21	.....	12	49	3	1	.....	4	.....	.....	.....	10	.....
" Oyer and Terminer	.....	.....	.....	.....	8	50	.....	.....	.....	.....	.....	6	19	.....	.....	.....	2	3	.....	.....	.....	3
Common Council	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....
Justices	1	9	6	2	4	334	2	13	223	26	.....	1	162	2	13	.....	33	1	5	5	8	1
Special Sessions	.....	.....	.....	22	.....	150	.....	.....	35	.....	.....	12	4	.....	1	.....	2	.....	.....	.....	9	.....
Habeas corpus	.....	.....	.....	2	.....	.....	.....	.....	3	2	.....	2	.....	.....	.....	.....	.....	.....	1	.....	1	1
Sheriff	1	.....	3	1	.....	.....	.....	.....	5	.....	.....	.....	7	.....	4	.....	.....	.....	.....	1	.....	.....
District Attorney	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sent to Asylum	.....	.....	.....	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	1
" Penitentiary	.....	.....	.....	.....	.....	317	.....	.....	225	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Died	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
District, Circuit and Supreme Courts	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Supreme Court Commissioner	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Common Council or Township	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U. S. District Court	.....	.....	.....	.....	.....	1	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
U. S. Commissioner	.....	.....	.....	.....	.....	.....	.....	.....	11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....
Grand Jury	.....	.....	.....	.....	.....	.....	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
County Physician	.....	.....	.....	.....	.....	.....	.....	.....	14	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
Court of Pardons	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Requisition	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Recorder	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	104	.....	.....	.....	128	.....	.....	.....	.....	.....
Suspension of sentence	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....

TABLE No. 10.

General Statement of the Hudson County Penitentiary, Showing the Cost of Maintaining the Institution for the Year Commencing May 1st, 1881, and Ending April 30th, 1882; Also Showing the Labor Performed and the Number of Inmates.

MONTHS.	Number of Employes.		Number of Inmates.			Number of Inmates Committed.			Number of Inmates Discharged.			Cost of Provisions.	Cost of Clothing.	Cost of Sundries.	Cost of Coal.	Cost of Repairs	Salaries of 15 Officers and Employes.	Total Monthly Cost.	Average Monthly Cost.	Total Daily Cost.	Average Daily Cost per Inmate.
	Female.	Male.	Male.	Female.	Total.	Male.	Female.	Total.	Male.	Female.	Total.										
May	1	15	115	27	158	50	13	63	49	13	62	$879 50	$252 25	$109 87	$147 00	.....	$919 66	$2,309 37	$14 62	$74 49	40¾
June	1	15	122	34	172	54	20	74	47	13	60	901 11	202 19	124 36	147 00	.....	919 66	2,294 26	13 34	76 47	44¼
July	1	15	121	29	166	40	9	49	41	14	55	706 71	195 79	136 70	147 00	.....	919 66	2,161 60	13 02	69 72	42
August	1	15	122	29	167	54	12	46	33	12	45	888 21	135 82	297 09	147 00	$55 74	929 66	2,393 28	14 30	77 20	46¼
September	1	15	118	24	158	42	12	54	46	17	63	790 89	187 92¾	206 75	147 00	20 00	919 66	2,255 23¾	14 26	75 16	47⅛
October	1	15	138	26	180	59	8	67	39	6	45	780 91	145 96	133 39	180 00	3 00	919 66	2,159 92	11 99	69 67	38⅜
November	1	16	126	26	169	43	12	55	55	12	67	864 31	129 38	135 17	180 00	.....	959 66	2,271 52	13 44	75 71	44¾
December	1	16	154	28	199	69	14	83	41	12	53	1,184 07	92 08	473 09	180 00	.....	962 66	2,890 91	14 53	93 25	46¾
January	1	16	124	23	164	21	9	30	57	14	65	1,009 72	321 09	196 48	180 00	38 40	929 66	2,675 35½	16 31	86 30	53
February	1	17	120	22	160	27	6	35	33	7	40	773 94	95 65	80 37	180 00	.....	987 81	2,117 77	13 23	75 63	47¼
March	1	17	119	26	163	48	16	64	48	16	64	851 75	156 86	197 80	180 00	.....	1,012 66	2,743 67	16 88	88 50	54½
April	1	17	115	39	172	48	23	71	52	10	62	866 35	242 71	366 34	.....	480 13	985 66	3,121 09	18 14	104 03	60½
Totals	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	$10,497 56	$2,157 70	$2,441 51	$1,995 00	$597 27	$11,359 07	$29,393 98	.....	.....	.....

NATIVITY AND OCCUPATION OF PRISONERS.

The following will show the nativity of prisoners and their trades or occupations, classified according to the counties where they were committed or sentenced:

ATLANTIC COUNTY.—United States, 19; Canada, 1; Switzerland, 1; West Indies, 1. Barber, 1; blacksmith, 1; bartenders, 2; carpenters, 4; canvasser, 1; clerks, 2; farmer, 1; junk dealer, 1; laborers, 3; laundrymen, 1; machinist, 1; policy man, 1; ropemaker, 1; shoemaker, 1; waiter, 1; weavers, 2; watchmen, 2; no trade, 2.

BERGEN COUNTY.—United States, 39; Germany, 16; Ireland, 16; Austria, 1; Italy, 5; Belgium, 1; Holland, 2. Baker, 1; boatman, 1; carpenter, 2; engineer, 1; farmer, 1; laborers, 72; salesman, 1; shoemaker, 1.

BURLINGTON COUNTY.—United States, 104; Ireland, 167; Germany, 36; England, 14; Scotland, 4; Italy, 2; Sweden, 2. Bakers, 2; barber, 1; boatmen, 21; carpenters, 14; jockey, 1; laborers, 176; masons, 6; moulders, 3; rollers, 5; sailors, 6; shoemakers, 2; tramps, 63.

CAMDEN COUNTY.—United States, 289; Ireland, 268; Germany, 50; England, 37; Scotland, 12; France, 3. Bakers, 2; barber, 1; bricklayers, 4; blacksmiths, 8; bookbinder, 1; carpenters, 33; farmers, 11; hatters, 2; laborers, 129; masons, 2; machinists, 3; moulders, 2; plumbers, 2; printers, 4; servants, 36; saloonkeeper, 1; shoemakers, 47; tinkers, 20; tramps, 280; weavers, 11.

CAPE MAY COUNTY.—United States, 14. Farmer, 1; laborers, 5; tailor 1; tramp, 1.

CUMBERLAND COUNTY.—United States, 60; Ireland, 7; Germany, 3; France, 3. Barber, 1; carpenter, 1; confectioner, 1; farmers, 5; glassblowers, 8; gymnast, 1; jeweler, 1; laborers, 30; masons, 2; machinists, 2; medium, 1; moulder, 1; nailers, 2; pianomaker, 1; potmaker, 1; sailor, 1; storekeeper, 1; tailors, 2; umbrella menders, 2; waterman, 3; weaver, 1; no occupation, 1.

ESSEX COUNTY, (Newark.)—United States, 942; Ireland, 361;

Germany, 175; England, 61; Italy, 28; Scotland, 38; France, 7; Canada, 7; Austria, 5; Denmark, 4; Switzerland, 3; Poland, 2; Hungary, 2; Belgium, 1; Holland, 1; Sweden, 1; China, 1; East India, 1; Nova Scotia, 1. Accountants, 3; actors, 2; agents, 4; bakers, 20; bagmakers, 2; barbers, 7; bartenders, 6; buffers, 8; beltmakers, 2; brushmakers, 5; blacksmiths, 23; brakeman, 1; butchers, 12; buttonmakers, 10; brewers, 6; bookkeepers, 7; boilermakers, 6; bottler, 1; boatmen, 4; boot-blacks, 7; cabinetmakers, 10; carpenters, 29; carriagebuilders, 2; clerks, 14; cooks, 5; confectioners, 1; coachbuilders, 2; combmaker, 1; curriers, 20; contractors, 2; cutters, 7; coopers, 4; clergyman, 1; cigarmakers, 7; collector, 1; dyers, 6; drover, 1; expressman, 1; engineers, 8; engravers, 5; firemen, 5; foot-pressmakers, 4; foundrymen, 2; farmers, 8; finishers, (brass,) 4; gardeners, 7; grocers, 2; hotelkeeper, 1; housekeeper, 1; hatters, 165; harnessmakers, 11; hucksters, 17; hostlers, 12; horseshoers, 3; iceman, 1; jewelers, 9; junkdealers, 9; japanners, 18; jockey, 1; laborers, 301; leather finishers, 8; lawyers, 4; leather tackers, 5; laundryman, 1; locksmiths, 5; 'longshoremen, 3; loomfixers, 5; liquor dealers, 2; machinists, 18; masons, 17; miners, 8; morrocco dressers, 11; moulders, 25; malster, 1; musician, 1; oystermen, 2; organ-builders, 2; painters, 28; peddlers, 8; photographer, 1; priest, 1; potters, 13; property-owner, 1; printers, 15; platers, 10; porter, 1; plasterers, 3; plumbers, 3; polishers, 27; quarrymen, 4; rollers, 2; ragpickers, 2; roofers, 5; refiners, 3; satchelmakers, 2; shoemakers, 37; servants, 32; stonecutters, 15; stairbuilders, 8; saloonkeepers, 5; saddlemakers, 3; sash and blindmakers, 2; sewing machine agents, 5; smelters, 2; sailors, 6; salesmen, 9; spinners, 3; steamfitters, 2; solderers, 2; stampers, 2; tailors, 21; tinsmiths, &c., 15; tanners, 20; teamsters, 23; trunkmakers, 6; truckmen, 2; toolmakers, 2; telegraph constructors, 2; upholsterers, 4; waiters, 10; watchmen, 3; weavers, 3; washers, 4; wheelwrights, 3; mechanics, (miscellaneous,) 45; no trade, 356.

GLOUCESTER COUNTY.—United States, 20; foreign, 8. Blacksmith, 1; laborers, 25; printer, 1; tramps, 3.

HUDSON COUNTY, (Jersey City.)—United States, 420; Ireland, 323; England, 53; Germany, 117; Scotland, 10; Canada, 6; Cuba, 4; Italy, 25; Sweden, 3; Russia, 3; Poland, 3; France, 3; Hungary, 3; Holland, 1; Belgium, 3; Switzerland, 1. Agents, 12; bakers, 6; butchers, 7; blacksmiths, 13; carpenters, 21; cigarmakers,

4; clerks, 7; cooks, 4; coopers, 11; dressmakers, 3; housekeepers, 15; hostlers, 5; laborers, 388; machinists, 20; masons, 26; moulders, 3; painters, 17; servants, 22; sailors, 7; salesmen, 5; shoemakers, 21; tailors, 27; teamsters, 6; weavers, 4; miscellaneous, 29; none, 300.

HUDSON COUNTY, (Snake Hill.)—United States, 256; Ireland, 243; Germany, 84; England, 22; Italy, 11; Scotland, 5; Canada, 4; Denmark, 6; Switzerland, 3; France, 2; Sweden, 1; Poland, 2. Bakers, 10; barbers, 5; boilermakers, 2; bricklayers, 3; boxmakers, 3; blacksmiths, 3; brakemen, 3; butchers, 6; boot-blacks, 4; carpenters, 20; cooks, 3; clerks, 6; coopers, 3; cigarmakers, 2; drivers, 4; druggists, 2; engineers, 9; trimmers, 5; factory boys and girls, 8; gardeners, 6; glassblowers, 2; housekeepers, 26; hatters, 4; hostlers, 2; harnessmakers, 2; japanners, 2; laborers, 276; masons, 6; machinists, 3; moulders, 2; painters, 21; potters, 2; ropemakers, 2; ragpickers, 2; shoemakers, 11; servants, 75; stonecutters, 3; tinsmiths, 4; miscellaneous, 23; none, 41.

HUNTERDON COUNTY.—United States, 15; foreign, 3. Barbers, 2; laborers, 9; miner, 1; liquor dealer, 1; railroad agent, 1; tailors, 2; none, 2.

MERCER COUNTY.—United States, 174; Ireland, 57; England, 18; Germany, 14; Scotland, 6; Canada, 2; France, 2; Switzerland, 1; South Wales, 1; East Indies, 1; West Indies, 1. Barbers, 3; blacksmiths, 3; boatmen, 3; brewers, 3; chairmakers, 2; cigarmakers, 3; clerks, 2; dyers, 2; hatters, 2; ironworkers, 9; laborers, 130; masons, 2; merchants, 4; millers, 2; painters, 5; peddlers, 2; potters, 24; printers, 5; servants, 45; saloonkeepers, 2; shoemakers, 3; tinsmiths, 2; weavers, 3; miscellaneous, 15; none, 2.

MIDDLESEX COUNTY.—United States, 343; foreign, 327. Bartenders, 3; blacksmiths, 3; butchers, 6; carpenters, 7; cigarmakers, 2; cooks, 2; farmers, 3; hatters, 3; horseshoers, 3; junk dealers, 2; laborers, 454; masons, 6; machinists, 6; moulders, 13; painters, 4; printers, 4; shoemakers, 9; servants, 84; tailors, 10; tinkers, 16; tramps, 18; miscellaneous, 4.

MONMOUTH COUNTY.—United States, 101; foreign, 44. Blacksmiths, 3; barber, 1; boatman, 1; butcher, 1; carpenter, 1; dentist, 1; engineer, 1; harnessmaker, 1; laborers, 92; machinist, 1; masons, 2; painters, 7; printer, 1; peddler, 1; physician, 1; salesman, 1; sailor, 1; tinker, 1; watchmaker, 1.

MORRIS COUNTY.—United States, 62; foreign, 61. Bakers, 2 blacksmiths, 2; boatmen, 3; brakeman, 1; carpenter, 1; combmaker, 1; chairmaker, 1; coachman, 1; cook, 1; farmers, 4; gardener, 1; laborers, 34; miners, 10; painters, 3; papermaker, 1; plumber, 1; saloonkeepers, 5; servant, 1; spinner, 1; tinsmith, 1; tramps, 1; vender, 1; waiter, 1; weaver, 1; none, 1.

OCEAN COUNTY.—United States, 7; Russia, 1. Cabinetmaker, 1; truckman, 1.

PASSAIC COUNTY.—United States, 375; Ireland, 184; England, 47; Scotland, 26; Germany, 47; Holland, 14; Russia, 6; France 3; Switzerland, 1; Italy, 2; Belgium, 1; Canada, 2. Bakers, 7 blacksmiths, 69; boilermakers, 5; bookkeepers, 2; builders, 3 butchers, 4; carpenters, 33; cigarmakers, 3; coopers, 2; dyers, 3; farmers, 6; hatters, 3; hostlers, 10; laundrymen, 2; laborers, 73; machinists, 14; moulders, 6; painters, 4; peddlers, 11; printers, 2; plumbers, 3; servants, 37; stonecutters, 5; shoemakers, 10; seamstresses, 7; tailors, 4; tanners, 2; tinkers, 2; weavers, 56; miscellaneous, 11; none, 203.

SALEM COUNTY.—United States, 31; Ireland, 3; Germany, 2. Laborers, 31; physician, 1; servants, 3; tailor, 1.

SOMERSET COUNTY.—United States, 48; Ireland, 13; Germany, 8. Boot-black, 1; brickmaker, 1; carpenter, 1; coachman, 1; farmers, 3; harnessmaker, 1; housekeeper, 1; hostler, 1; laborers, 17; mason, 1; pumpmaker, 1; polisher, 1; servants, 2; saloonkeeper, 1; shoemaker, 1; teamsters, 3; tinsmith, 1; woolen mills operatives, 15; none, 14.

SUSSEX COUNTY.—United States, 15; Ireland, 5; England, 2; Germany, 1. Laborers, 24; painter, 1.

UNION COUNTY.—United States, 178; Ireland, 76; England, 10; Germany, 16; Italy, 2; Scotland, 1; Sweden, 1; Canada, 2; Switzerland, 1; Russia, 1; Denmark, 1; Austria, 1. Boys, 12; girl, 1; clerks, 4; dressmakers, 4; farmer, 1; huckster, 1; laborers, 134; mechanics, 73; peddlers, 3; waiters, 5; wives, 23.

WARREN COUNTY.—United States, 37; Ireland, 5; Germany, 3; England, 2; Sweden, 1; Italy, 2; Denmark, 1. Artist, 1; blacksmith, 1; bricklayer, 1; butcher, 1; civil engineer, 1; dressmaker, 1; engineers, 2; fisherman, 1; fireman, 1; laborers, 33; machinists, 1; painter, 1; polisher, 1; plumber, 1; shoemaker, 1; waiters, 2; none, 1.

THE CRIMINAL CLASSES OF NEW JERSEY.

ABSTRACT OF VICE-PRESIDENT'S REPORT FOR NEW JERSEY, MADE TO "THE ASSOCIATION FOR THE ADVANCEMENT OF WOMEN," HELD AT PORTLAND, MAINE, OCTOBER, 1882.

Our last year's plan for securing comparative data from the different States, directed in the same line of inquiry, has decided us to confine our report this year, almost exclusively to the criminal classes of New Jersey. Our ladies, members and non-members of the Association for the Advancement of Women, intended to get returns from every prison in the State. On inquiry, we found that county prison records had not been carefully kept in the past, but that, for the future, monthly reports would be sent regularly to the Bureau of Statistics, at Trenton. This decided us, in a large measure, to suspend detailed inquiries for the current year. Enough counties, however, were heard from to enable us to report that the proportion of female to male prisoners is everywhere small, nowhere, it is believed, reaching as high as ten per cent. of the whole. The proportion of women committed for great offences is much less still, in proportion to the whole number committed.

With one exception, we are assured that the certainty of punishment and the terms of punishment for the two sexes are equal. This exception is in Essex County, embracing the city of Newark, where the term affixed to minor offences was reported: men, four months; women, two months.

This exception needs further investigation. There is evidence that in large towns particularly, women are sometimes punished for a class of offences against order and good morals, for which men, equally guilty, are not held answerable to the law.

But our statistics are chiefly obtained from the published reports of the New Jersey State Prison, and of the New Jersey State Reform School for Juvenile Delinquents.

A friend has obtained statistics of the number, the sexes, and the color of the prisoners at the State Prison during the last ten years:

Number of white males	5,044
" " females	215
Number of colored males	885
" " females	90
Whole number of males	5,929
" " females	305

The State Prison Report for 1881, gives the whole number in confinement on October 31st:

Total	803
White males	669
" females	22
Colored males	106
" females	6
Whole number of men	775
" " women	28

The maintenance of convicts *per capita* was 17 cents and 7 mills per day, including clothing, or $64.69 per annum. The convicts, earnings, *per capita*, were $82.62 per annum. Some five hundred of the men are employed by contractors, who pay from 50 to 60 cents per day for their labor. We note:

On laundry contract	100
On shirt contract	100
On collar contract	100

The occupations of both men and women, chiefly confined to indoor industries, must have a steadily subduing influence. But what shall be said of the following item of expense: Tobacco, $1,703.26! A board of women directors might not consider tobacco to be one of the necessaries of prison fare. It is, at least, a fair question as to how far the withholding of tobacco rations might deter men from getting themselves committed to prison life. Another interesting query is, how far enforced abstinence from tobacco, in long terms, might help to quiet the turbulence of the criminal classes.

In the State Reform School for Boys, tobacco is not reported needful, even for lads already addicted to its use. On the contrary, under the head "Moral and Domestic Conditions," we find it noted of the

eighty-six boys admitted during 1881, "forty-three have used tobacco." This probably refers to habitual use. We can hardly suppose that the forty-three other boys of that class have not occasionally aspired to this popular test of manhood.

The Girls' Reformatory has formerly been noticed. The report of Boys' Reform School is promising. The total number of articles washed in the family laundry was 101,837; ironed, 39,581; and the work done in the family sewing-room embraces 14,858 pieces made or repaired; 11,036.1-12 dozens of manufactured shirts of varied patterns, and 10,838.3-12 dozens laundried, many of them elegantly done, were the product of the workshops. It is reported that should the shirt-making fail, the skill the boys have acquired would aid, and can be employed in making coats, pants, &c. The boys also cultivate the farm and make bricks; and when the regulation work is done, are allowed to earn money on their own account; one hundred and seventy of the boys having earned $847.98 last year.

Of the eighty-six boys admitted in 1881, fifty-seven could not read. Their mental and moral improvement seems satisfactory. The whole number in the school is two hundred and fifty-eight. They are divided into five families, and it is a suggestive fact that the teachers are *all women.*

There are twenty-two official persons; eleven men, and eleven women.

The matron has a salary of $300 per year.
The dining-room girl gets but $216 per year.
The tailoress, laundress, cook, assistant matron and five teachers, receive each, $240 per year.

The eleven men receive:

Officer, watchmen and farmer, each	$360 00
Officer, bookkeeper and engineer, each	480 00
Officer, a machinist, assistant superintendent, each	600 00
Two officers with factory and laundry, each	780 00
Superintendent	2,500 00

The positions of these eleven men evidently involve very much more ability and responsibility than those occupied by the eleven women. But when we consider that the aggregate salaries of one set is $7,780 per annum, and the other only $2,676, the difference seems

rather disproportionate. Is the disproportion, if any, simply governed by supply and demand in the labor market, or is it, in part, the result of customs which originated in a state of society largely outgrown at the present day? Would the elective franchise, if exercised by women, tend to equalize salaries attached to political or semi-political appointments? One inference is obvious—a State institution is more likely than a private enterprise, to consider, and if desirable, to remedy any unfairness in remuneration. It will be wise, therefore, to call attention to this matter.

A. B. BLACKWELL,
Vice President for New Jersey.