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PENNSYLVANIA

•The  Co. •

TARR AND McMURRY GEOGRAPHIES

SUPPLEMENTARY VOLUME

PENNSYLVANIA

BY

WILLIAM W. RUPERT, C.E.

SUPERINTENDENT OF SCHOOLS, POTTSTOWN, PENNSYLVANIA

6032

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PREFACE

FOR the general plan of this Supplement, and for kindly and helpful criticisms, I am greatly indebted to the authors of the Series.

Acknowledgment is also due for the following photographs: Figs. 1, 2, and 44, presented by Professor Milton C. Cooper of Philadelphia; Figs. 5 and 42, presented by Professor Ralph S. Tarr of Cornell University; Figs. 6 and 35, presented by Dr. J. T. Rothrock, Commissioner of Forestry; Figs. 7, 8, 9, 10, 11, 12, and 13, presented by Professor Daniel S. Hartline of the Bloomsburg State Normal School; Figs. 17 and 18, presented by the Westinghouse Air Brake Company; Figs. 21, 23, and 24, presented by Superintendent D. A. Harman of Hazleton, Pennsylvania; Figs. 26, 27, and 28, presented by the American Bridge Company; Fig. 46, presented by my wife; Fig. 48, presented by Miss Effie Starrett, teacher in Pottstown schools; Fig. 50, presented by Dr. J. P. McCaskey of Lancaster; Fig. 53, presented by Dr. Daniel Carhart of Western University of Pennsylvania.

Hearty thanks are tendered to city and borough superintendents all over the state for valuable information respecting local matters.

WILLIAM W. RUPERT.

POTTSTOWN, PA.,
December 20, 1902.



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PENNSYLVANIA



PENNSYLVANIA SUPPLEMENT

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INTRODUCTORY QUESTIONS AND SUGGESTIONS.—(1) On a map of the United States, note carefully the position of Pennsylvania. (2) What states touch Pennsylvania? (3) What waters wash its boundaries? (4) Between what parallels does Pennsylvania lie? (5) Between what meridians? (6) When one stands in the most northern portion of Pennsylvania, is he halfway from the equator to the pole? (7) Using the scale of the map, verify the following figures: The greatest length of the state from east to west is about 302 miles; greatest width, about 176 miles; area, about 45,215 square miles. (8) What is the distance, air-line, from Philadelphia to Pittsburg? (The distance between the cities by rail is 354.3 miles. The best express train requires $7\frac{3}{4}$ hours to run from one city to the other.) (9) How does the distance between Pittsburg and Philadelphia compare with that between London and Paris? (10) With the distance between London and Edinburgh?

(11) Referring to the proper tables in your geography, compare the area of Pennsylvania with that of the kingdom of Belgium. (12) Putting Scotland and Switzerland together, how do they compare in size with Pennsylvania? (13) Which is the larger, Portugal or Pennsylvania? (14) Pennsylvania or England? (15) Using the tables in your geography, calculate what part of the population of the United States is found in Pennsylvania? (16) What part of the population of Pennsylvania is found in the city of Philadelphia? (17) How does the population of Pennsylvania compare with that of Canada? (18) On the average, how many people to the square mile in Pennsylvania? (19) How many to the square mile in your county? (20) In the United States?

ORIGIN OF THE NAME PENNSYLVANIA

Two hundred and twenty-one years ago the vast and populous area now known as Pennsylvania, with all its untold and unsuspected wealth, was granted by the king

of England, Charles II, to William Penn. But why should the king be so generous? As we shall see, it was not generosity that prompted the grant. William Penn's father — Admiral Penn — had been a brave and loyal subject of the king, and at the time of the admiral's death the king owed him for services and money loaned (for even kings were in those days obliged to borrow money) \$80,000.

The admiral being dead, this money belonged to his son and heir, William. Now William Penn was anxious to get away from England because he and many of his friends had been persecuted, fined, and imprisoned on account of their religion. William Penn was a Friend, or Quaker. He was also an able and unflinching advocate of civil, religious, and political rights. Practising and preaching such doctrines in those days meant no end of trouble.

Anxious to find a community where the persecuted of all lands and all religions might live under the freedom of their own laws, and seeing no hope for any such colony in the Old World, Penn turned his eyes toward the New. He had already encouraged some of his converts to emigrate to America, and their success at Burlington, N.J., filled him with hope for the future.

Although the king owed William Penn \$80,000, Penn did not want money; he needed land. The king did not have much money, but he had land and to spare. What could be easier? "I will," thought Charles II, "discharge this debt by giving William Penn some of my land across the sea," and he certainly gave him a generous slice — one large enough to accommodate all the Quakers in the world.

This new province must have a name. Penn himself suggested New Wales, but this did not suit the fancy of

the king. Penn next proposed Sylvania, meaning woodlands, which the king at once accepted after adding the prefix Penn, the Welsh word for head, in honor of the admiral, Penn's father. Penn was not pleased with this addition, for to the mind of the plain Quaker the prefix smacked of vanity. He even went so far as to offer the king's secretary twenty guineas (about \$100) if he would drop the first syllable, but fortunately this was not done.

Pennsylvania is also known throughout the world as the "Keystone State," because, like the "keystone" of an arch it stood in the centre of the thirteen original colonies, six of these colonies lying north of Pennsylvania, and six lying south of it. Which were north? Which were south? (The arch-like curve of the Atlantic coast line, with the crown of the arch opposite to Pennsylvania, makes the resemblance to a keystone quite striking. Point it out in the map.)

It has also been asserted by some, and there may be truth in the assertion, that Pennsylvania was called the Keystone State because the vote of her delegation in the Continental Congress secured the adoption of the Declaration of Independence.

PHYSIOGRAPHY AND NATURAL PRODUCTS

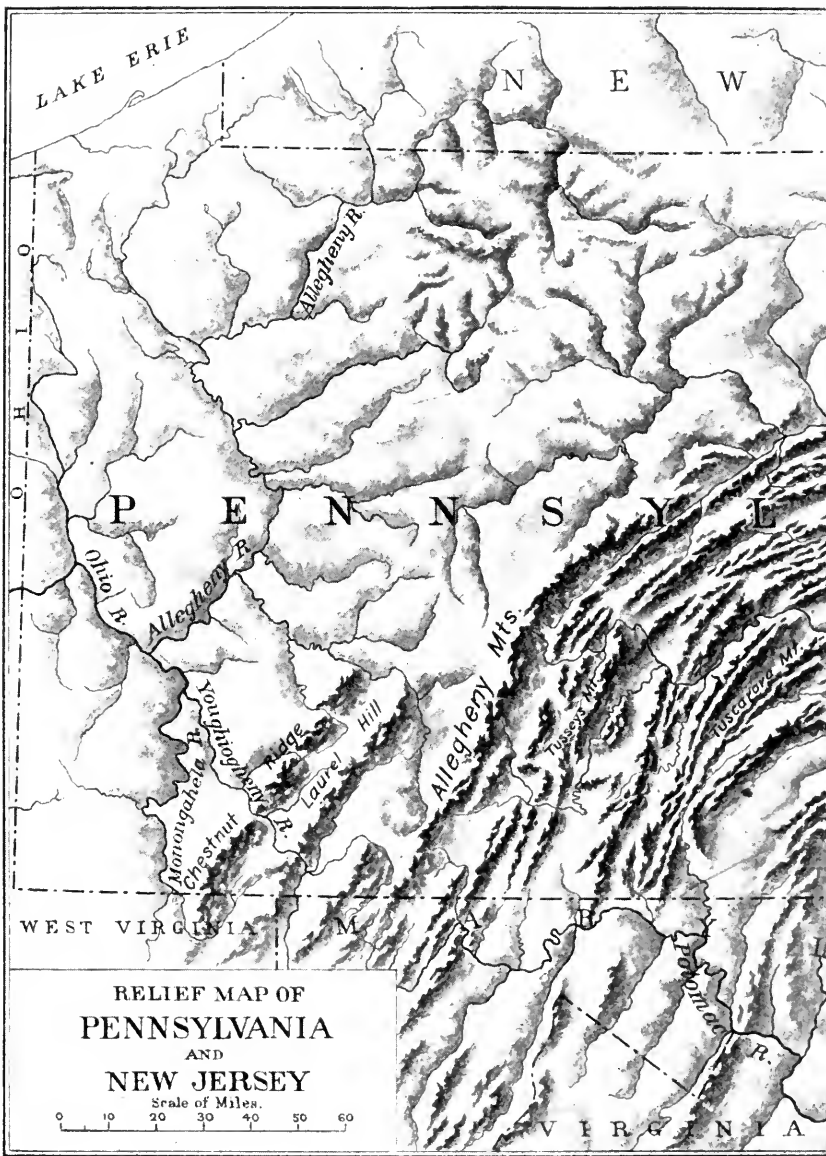
Extending from the far north with a majestic sweep, the Appalachian Mountains cross the eastern United States from New England to Alabama. The Keystone State lies directly across their course. In order to understand this wonderful mountain system; and at the same time some of the principal geographical features of Pennsylvania, we shall have to take a peep at the history of the Appalachians.

Long, long ages before the present mountains of our state were born, there existed what geologists call the

Older Appalachians. This old range of mountains, after crossing New England and northwestern New Jersey, swept right over what is now a part of the great city of Philadelphia, and thence passed on toward the south. True there are no mountain peaks in this portion of our state to-day; but this is no proof that they never have been there. The signs and traces of a lofty mountain range, now departed, are pointed out by Professor Angelo Heilprin, the geologist of the Academy of Natural Sciences, Philadelphia, in his delightful book, "Town Geology." After calling attention to the manner in which erosion reduces the height of mountains, he says, "In ages gone by mountain peaks rivalling, if not exceeding, the Mont Blanc in altitude, may have constituted the ancestors of the present humble elevations of Fairmount Park." Little by little, through long, long ages, Time's tooth gnawed down these grand old mountains until they were brought close to the sea-level. Only here and there where the rock masses were especially hard, as was the case with the White Mountains of New Hampshire and the Black Mountains of North Carolina, were there any mountains left standing.

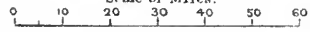
With these exceptions, then, and a few others, these mountains were all reduced to lowlands. But now a remarkable thing happened. These lowlands, with the few hard masses standing bravely and boldly above them, were all elevated by a gentle but powerful uplift of the land. This gentle uplift produced a broad swell, from the crest of which slopes extended to the southeast and the northwest. This broadly uplifted portion, though folded and faulted in places, did not at first present a decidedly mountainous appearance; but it does so appear





RELIEF MAP OF
PENNSYLVANIA
AND
NEW JERSEY

Scale of Miles.





now because of the excavation of many valleys by the erosive action of water. The mountains thus formed are the ones that greet our eyes to-day. They lie farther west than the old range, and though called by geologists the Newer Appalachians, they are not by any means young.

Now we come to another very important event in the history of the Appalachians—an event that practically fixed the position of Philadelphia. Long after the uplift of the lowlands, and after the great swell of land thus produced had been cut up into ridges and valleys by the removal of the soft rock by erosion, down went the land again. True, the land did not sink very far, but it sank enough to allow salt water to enter the Delaware as far as its junction with the Schuylkill. In other words, if Pennsylvania could not go to the sea, the sea could go to Pennsylvania. It was, then, this subsidence of the land that gave Pennsylvania her great port in the East.

Three large and well-defined physical divisions are found in Pennsylvania.

Older Appalachian Belt.—Lying east and south of the modest ridge known as South Mountain, we have a rolling, hilly upland with an average elevation of about three hundred feet, and seldom rising more than five hundred feet above the sea-level. This is the Older Appalachian Belt. The valleys and uplands of this section are remarkably well adapted to agriculture; and many of the most intelligent and prosperous farmers in the world are found here. The counties of Adams, York, Lancaster, Chester, Delaware, Montgomery, Bucks, Philadelphia, and about half of Berks are within this area. Nearly one-third of the entire population of Pennsylvania is found in this corner of the state.

Lancaster County, near the centre of this section, with a population of almost 160,000, and with an area of nearly 1000 square miles, is justly famed for her agricultural wealth. Her corn, wheat, milk, and butter cannot be surpassed, and her tobacco ranks with the best. Schuylkill, Chester, Pequa, and other valleys of this section are noted for their excellent crops, large barns, and comfortable,



FIG. 1.

Field of tobacco, Lancaster County, Pa.

well-furnished farm-houses. Evidently the Older Appalachian Belt is not to be despised by the agriculturist.

Newer Appalachian Belt.—North and west of the area just described comes the Newer Appalachian Belt—a younger mountain system with many ridges and intervening valleys. Some of these ridges run for fifty or sixty miles with scarcely a deflection from a bee-line, and show few if any notches. When one ridge changes its direction, the others, as a rule, change with it, thus enclos-

ing valleys with parallel sides. Viewed from some commanding height, these parallel ridges remind one of the successive waves of the sea. This section of the state might very properly be called the ridge-and-valley belt, or the mountainous belt. It sweeps entirely across the state from northeast to southwest, and stretches from the South Mountain on the east to the Alleghanies on the west.

These long, even-crested mountain ridges are known by many local names. You can find these names on the map. They divide the lowlands into many separate val-



FIG. 2.
Farm buildings, Lancaster County, Pa.

leys, which are often connected with some difficulty by roads over the mountains. Mother Nature sometimes comes to man's help, and kindly connects the valleys by means of water gaps—notches which rivers or creeks have cut across the ridges. The Delaware, the Schuylkill, the Lehigh, and the Susquehanna have cut beautiful and famous gaps in the mountains. Men are, of course, shrewd enough to take advantage of these gaps when entering a new country; or later, when building railroads. Examine your map carefully, and see what rail-

roads, if any, pass through the gaps just named. What lesson respecting the composition of a mountain ridge may be learned from an even, unnotched crest?

The superb scenery about the Delaware Water Gap—where the Delaware breaks through the Blue Ridge—induced capitalists to build large summer hotels in that vicinity. Here people from the cities seek the cool, pure air,



FIG. 3.

The Delaware Water Gap.

the sweet water, the delightful quiet, and the charming scenery of the mountains.

The valleys between the ridges are frequently underlaid by limestone. This is a striking characteristic of that magnificent valley lying between the South Mountain and the Blue Ridge. It is a garden in fertility, and of surpassing beauty. A ride along it in a railroad train



FIG. 4.

“Old Bangor Slate Quarry,” 300 feet deep, Bangor, Pa. Largest slate quarry in the United States, and next to the largest in the world.

makes one wish he were a farmer. It should be noted, however, that this noble valley is not confined to Pennsylvania. To the northeast it extends across northern New Jersey, and to the southeast it may be followed to Georgia. The valley, as a whole, is known as the Great valley, but various local names are applied to it. West of the Susquehanna, in Pennsylvania, it is called the Cumberland valley; but east of that stream it is known as the Lebanon valley. In New Jersey it is the Kittatinny valley; in Virginia it is the famous Shenandoah. Using the scale of the map, estimate the width of the valley at dif-

ferent points in Pennsylvania. Estimate the length of the Great valley. Name three towns in the Cumberland valley, and three in the Lebanon valley.

In this mountain belt is found a generous supply of limestone, slate, and iron ore; but most important of all here are the richest deposits of anthracite coal to be found in the world. Since both coal and limestone are needed



FIG. 5.

Mauch Chunk. View from summit of Mt. Pisgah.

for the extraction of iron from its ore, it is fortunate for Pennsylvania that all three are found here in abundance.

Mining is, therefore, a most important industry in the Newer Appalachian Belt. This industry has attracted many European miners and laborers to Pennsylvania, and hence in the mining districts foreigners are very numerous.

The anthracite coal is found in three separate fields, — the northern, the middle, and the southern. Of the first field, Wilkesbarre, Scranton, and Pittston are the most im-

portant mining centres. The remarkable wealth and prosperity of these cities may be traced directly to coal. Of the middle field, Shamokin, Shenandoah, Mahanoy City, and Hazleton are the important centres. Pottsville, Tamaqua, and Mauch Chunk owe their prosperity, if not their very existence, to the southern deposit of anthracite.

Just as the cities named in the above paragraph owe their birth and vigorous life to deposits of anthracite, so Williamsport is the natural result of the remarkably valuable forests of white pine, hemlock, and other timber that grew along the west



FIG. 6.
Forest of virgin white pine, Clearfield
County, Pa.

branch of the Susquehanna. The lumberman's axe and the hungry sawmill have, however, made sad havoc during the last fifty years in the great forests of William Penn's "Sylvania," and Williamsport, though as prosperous and wealthy as ever, and though still cutting about 150,000,000 feet of lumber yearly, is losing her distinctive character as a great lumber mart.

The Alleghany Plateau. — The third natural division of Pennsylvania, known to geologists and geographers as the Alleghany Plateau, embraces all that portion of the state (with the exception of a very small area along Lake Erie) which lies west and north of the Alleghanies.

This plateau along the crest of the Alleghanies is about 2000 feet above tide. The slope of the plateau toward the valleys on the east is quite abrupt, but the slope toward the west is very gradual, extending far away toward the prairies of the west. Where the plateau crosses into Ohio, it is still nearly 1000 feet high. The height of the plateau, the steep slopes facing the east, and the absence of important gaps acted as serious checks upon immigration into the valley of the Ohio.

Within the Keystone State there is no cut completely through the mountain system similar to that of the Mohawk valley in New York. This, for Pennsylvania, must be regarded as a misfortune. Had there been such a cut, Philadelphia might have been the metropolis of the United States. Commerce with the great West, through the Mohawk valley, was a most important factor in the growth and importance of New York. Philadelphia is, by the whole width of the state of New Jersey, nearer the West than New York; but the mountain ridges, and the still more formidable Alleghany Plateau, lay squarely between the two.

Along the streams, which traverse this region in every direction, the plateau has been cut down, forming tortuous valleys of considerable depth. To an unobserving traveller in these deep valleys, the plateau-like nature of the country through which he is passing is not apparent. The true nature of the region would at once be recognized from a balloon.

A considerable portion of this section is well adapted to agriculture, but it is the petroleum, natural gas, and bituminous coal that have made it rich and famous. Here, too, are found the finest forests in the state; also fire-clays, good building stones, and excellent sand for glass-making.

The cities and towns of this part of the state owe their present wealth and prosperity, and in some cases their very existence, to the magnificent beds of bituminous coal that lie but a few hundred feet beneath the surface, and to the wonderful petroleum that is readily reached by drilling. Had these riches, better than gold or diamonds, beneath the surface of the plateau been wanting, even Pittsburg and Allegheny, so admirably located at the head of the Ohio, and now one of the great industrial centres of the world, might have remained comparatively insignificant. As anthracite made Wilkesbarre, and as pine and hemlock gave birth to Williamsport, so petroleum produced such cities as Bradford, Oil City, Franklin, and Titusville.

Along Lake Erie is a small strip of fertile country which belongs to the Erie Plain. The soil and climate are especially adapted to the growing of grapes. Many varieties are cultivated, but the Concord is the favorite. At the height of the season as many as sixty cars of fine grapes are shipped daily from North East — the centre of the grape-shipping trade.

The Terminal Moraine. — You have read, when studying North America, about the great glacier that thousands of years ago came down from the North. This great ice-sheet came down into Pennsylvania. It reached within sixty miles of the site of Philadelphia, and within thirty-

five miles of the place where Pittsburg now stands, before that great enemy of ice—heat—brought it to a standstill. A glacier ceases to advance when there is heat enough to melt the ice as rapidly as it moves forward. The moving ice carries with it great quantities of clay and rock mate-

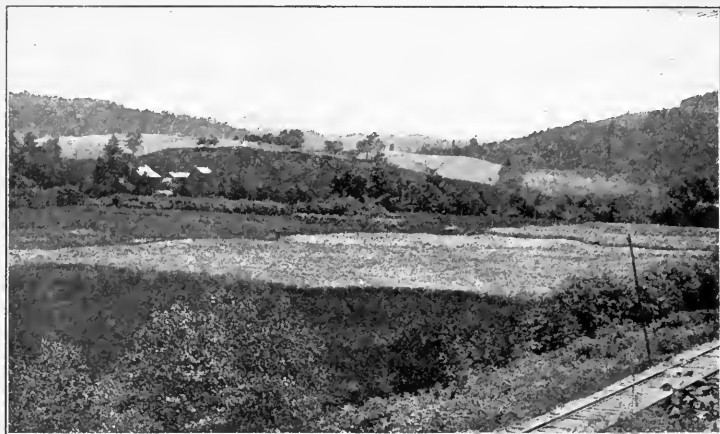


FIG. 7.

The great terminal moraine crossing Fishing Creek Valley, Cumberland County, Pa. At this point the moraine is probably 125 feet high and half a mile wide. Foreground is glaciated area.

rial which, dropping out along the front of the glacier as the ice melts, forms a huge pile of *débris* called a *terminal moraine*.

The great terminal moraine enters Pennsylvania one mile below Belvidere on the Delaware River. From this point, with many twists and turns, but keeping a general northwest direction, it crosses the counties of Northampton, Monroe, and Carbon, reaching the Lehigh River at Hickory Run about ten miles north of Mauch Chunk.

At this point it enters Luzerne County, after crossing the southern portion of which it strikes the east branch of the Susquehanna at Beach Haven, about fifteen miles above Bloomsburg.

Toward the northwest the moraine crosses the counties of Columbia, Sullivan, Lycoming, Tioga, and Potter. On leaving Potter County, the moraine finds itself in the state of New York, but after a brief course here it returns to Pennsylvania, crossing the Conewango River in Warren County about seven miles north of the county seat. From



FIG. 8.

Nearer view of terminal moraine. Country highway cut through its front. Notice the cobbles.

the Conewango the moraine extends southwest, passing through the counties of Crawford, Venango, Butler, Lawrence, and Beaver. It is rather remarkable that the moraine leaves Pennsylvania at precisely the latitude at which it enters it — $40^{\circ} 50'$.

In the eastern portion of the state, Stroudsburg, Wilkes-

barre, Pittston, Scranton, and Wellsboro are all on the glaciated area. In the western portion of the state, Erie, Meadville, Mercer, and New Castle are also on land that has been scoured by the great ice-sheet. Franklin, Oil City, and Titusville are close to the moraine, but are on the unglaciated area.

Pupils who live near the terminal moraine have an enviable opportunity to study the effects of the great ice-



FIG. 9.

Eagles Mere, Sullivan County, Pa. This beautiful sheet of water was produced by glacial action.

sheet. On the one side of the moraine is soil that has been through that wonderful mill—the ice-sheet; on the other side is soil that, unless it has been carried forward by streams, has never been ground in the glacial mill. The contrast is often very great, and always instructive.

As you have learned, the occurrence of lakes and marshes (which represent extinct lakes) is one of the

most striking features of glaciated areas. The area back of the terminal moraine in Pennsylvania is no exception to this rule. North of the moraine are hundreds of lakes; south of it, not one.

Deep Lake and Lakes Poponoming and Minneola, all in Monroe County, are kettle-hole lakes—lakes in kettle-shaped depressions of the terminal moraine. Lakes of this kind are numerous in Pennsylvania. Though the water covers a very small area, it is often quite deep—30 to 50 feet. Sometimes the terminal moraine itself dams up a stream, thus forming a lake. Long Pond, upon the top of the Pocono Mountain, was formed in this way.

Waterfalls are also signs of a glaciated area. North of the moraine in Pennsylvania there are over two hundred waterfalls—all beautiful, and many of considerable size.

Of course the great ice-sheet brought into Pennsylvania an immense number of boulders, large and small, and it manufactured cobblestones for us by the million. Every schoolboy who has visited any city on or near the glaciated area must have seen these cobblestones used for making the firm but noisy and rough roadways found there. Philadelphia, especially, has been noted for its cobblestone streets; but here and elsewhere better material is now used for the construction of roadways.

On Penobscot Knob, a mountain that overlooks Wilkesbarre, rests a big boulder measuring $9 \times 6 \times 4\frac{1}{2}$ feet. This boulder, like thousands of others, was brought here by the ice, and left where it is now seen.

Much of the brick-clay about Philadelphia and Pittsburg, and indeed along the valleys of all streams flowing from the glaciated portion of our state, was made by the



FIGS. 10, 11, 12, 13, 14.
A group of Pennsylvania waterfalls.

torrents of muddy water that flowed from the front of the melting ice-sheet.

Drainage and Kindred Matter. — When we remember that Pennsylvania has an area of about 45,215 square miles, and an annual rainfall of about 40 inches, the presence of such large rivers as the Delaware, the Susquehanna, and the Allegheny is readily understood.

On the eastern boundary, the Delaware with its famous and beautiful tributaries, the Lehigh and the Schuylkill, drains, within the state, an area of 6443 square miles. These tributaries, rising in the anthracite coal regions, furnish natural and easy routes for railroads by which the anthracite may be transported from the mines to the seaboard. The Delaware admits the largest ocean steamers to Philadelphia, and is navigable by small boats as far as Trenton. Both the city of Philadelphia and the national government have spent, and are spending, large sums of money to improve navigation in the Delaware. This stream drains in all about 11,000 square miles of territory.

The Susquehanna with its branches drains an area of 21,000 square miles — nearly one-half of the state. This noble river is famous alike for its beauty and its historical associations. The Susquehanna is a wide, shallow stream, filled with islands, and often broken by rapids. It is therefore not navigable, but immense quantities of lumber were formerly rafted down its current in seasons of high water. The coal from the northern anthracite region finds an easy road to market along its banks. The North Branch and the West Branch unite at Northumberland to form the Susquehanna proper. Fifteen miles above Harrisburg the Susquehanna receives a stream, the Juniata, which is widely celebrated for the beauty of its valley. The poet

has found in this stream a fitting theme for a song, "The Blue Juniata": —

"Wild roved an Indian girl,
Bright Alfarata,
Where sweep the waters
Of the blue Juniata."

The Ohio, between Pittsburg and the state line, together with the Allegheny and the Monongahela, which unite to form it, drains 14,747 square miles of our state. Of this area the Allegheny alone drains 9550 square miles. The Davis island dam, on the Ohio, built by the national government in 1878-1885, at a cost of a million dollars, gives to Pittsburg a magnificent harbor more than six miles long.

Much fine bituminous coal is exposed to view along the Allegheny and the Monongahela. These rivers are wide and shallow, but the national government has, at heavy expense, built great dams across them for the purpose of backing up the water, and thus making it deep enough to carry barges loaded with coal and other merchandise. By means of nine locks and dams, owned and maintained by the United States, the Monongahela is made navigable as far as the West Virginia line. In like manner the Allegheny has been made navigable for many miles. The slack water between the dams is called a pool. The fourth pool on the Monongahela, forty-one miles above Pittsburg, is now the scene of very active mining operations.

Oceasionally, coal accumulates in the harbor at Pittsburg, until a million or more tons are there awaiting a rise in the river. When the water reaches a suitable height, great fleets of coal boats, each containing from 10,000 to 15,000 tons, are made up for shipment to Cincinnati or

Louisville. At Louisville two or three Pittsburg fleets are sometimes united, thus making monster fleets, containing from 35,000 to 40,000 tons. These are towed to New Orleans by powerful towboats. The magnitude of a fleet conveying 40,000 tons of coal will be comprehended when we understand that it covers about ten acres of water.

Valleys are very attractive places in which to live. Here are fertile soil, water power, and superior facilities for transportation. But there is one danger inseparably connected with valleys—the danger from floods. Much property is destroyed every year in Pennsylvania by freshets, and not infrequently lives are lost. During the winter of 1901–1902, there were three destructive freshets in Pennsylvania. Lives were lost, and the losses in property were unusually heavy.

A simple but impressive calculation recently suggested in "Forest Leaves," by Mr. John Birkinbine, gives us a hint of the tremendous power set free in a rainfall of a few inches. An inch of rainfall on a square mile represents a weight of about 65,000 tons. Or, to look at the matter in another way, one inch of rain on a square mile would fill a pipe, with a diameter sufficient to allow a man to stand upright in it, sixteen miles long. Now when we call to mind the area drained, for example, by the Susquehanna, and remember that from two to three inches of rain may occasionally fall in a single day, we are prepared to expect disastrous floods.

How much of any given rainfall finds its way at once to the streams, depends upon the slope and the condition of the ground receiving it. Among other causes that augment the run-off, and thus increase the danger from freshets, is the destruction of our forests. The floor of a forest is absorbent. It is somewhat like a sponge; it holds the water for some time, giving it up gradually. Such action, it will be seen, not only diminishes

the danger from freshets, but it also stores up water in the soil against the days of drought which, sooner or later, are certain to come. Forests, of course, cannot prevent freshets, but they do mitigate their destructive effects.



FIG. 15.

Bridge over the Susquehanna at Harrisburg, Pa.
Wrecked by flood in winter of 1901-1902.

“Every freshet and every drought,” says Mr. Birkinbine, “emphasizes the importance of the state of Pennsylvania’s maintaining a system of forest protection on one-sixth of its area which the Commissioner of Forestry asserts is better adapted to forest growth than to other purposes, and is a strong argument in favor of increasing and maintaining its forest reserves.”

SUGGESTIONS. — (1) Perhaps you would like to verify by your own calculations the figures given above respecting the rainfall on a square mile. (2) Construct a drainage map of Pennsylvania, showing the three principal river systems, — the Delaware, the Susquehanna, and the Ohio. (3) Draw lines to represent the water partings between the different river basins. (4) Do any other river systems receive drainage from Pennsylvania? If so, what are they?

CLIMATE

The following tables, compiled from the official reports of the U. S. Weather Bureau, give the facts respecting temperature, rainfall, and snowfall in different parts of the state for the year 1901. Departures from the normal are indicated in separate columns.

TEMPERATURE IN DEGREES FAHRENHEIT

Stations	Annual Mean	Departure	Maximum	Minimum	Elevations of Instruments, Feet
Erie . . .	48.2°	- 0.6°	91°	- 2°	1400
Pittsburg . .	52.6°	- 0.3°	98°	2°	842
Harrisburg .	51.9°	- 0.4°	100°	9°	361
Philadelphia	53.8°	0.0''	103°	6°	117

PRECIPITATION IN INCHES

Stations	Total Annual Precipitation, including Melted Snow	Departure	Snowfall
Erie	31.67	- 8.11	58.7
Pittsburg . .	40.76	+ 4.01	44.6
Harrisburg .	29.81	- 8.11	18.3
Philadelphia .	45.54	+ 5.56	10.0

It will be seen from an examination of the tables that the average temperature of the northwest is considerably lower than the average temperature of the southeast. It will be seen, too, that while the annual normal precipi-

tation does not vary much in the different parts of the state, the snowfall in the north and west is much greater than it is in the south and east.

Upon the whole the climate of Pennsylvania is healthful and invigorating. Among the mountains are numerous summer resorts where thousands may be found in search of rest, pleasure, and health.

QUESTIONS AND SUGGESTIONS — (1) How do you explain the above facts respecting temperature, rainfall, and snowfall? (2) A good thermometer and a rain gauge are important aids in the study of geography. If you have these instruments, compare your records with a number of places quite differently located. (3) What winds bring rain to you? Why? (4) What are the prevailing winds in your vicinity? Why? (5) Do you know of any summer resorts in your part of the state? What are their chief attractions? (6) Procure and examine booklets from Cresson Springs, Cambria County, Eagles Mere, Sullivan County, or other famous resorts. They contain valuable information and instructive illustrations.

RAILROADS AND CANALS

As we ride along in one of the magnificent express trains of the present day, it is hard to realize that seventy-five years ago there was no such thing as a passenger steam railroad in the United States. Railroads are among the most potent factors of modern civilization, and Pennsylvania is well supplied with them. Within her borders there are to-day over 10,000 miles of railroads, and along these roads are found the great interests of the state.

In the early days of Pennsylvania, the turnpike and the broad-wheeled Conestoga wagon, drawn by six or eight horses, were regarded with quite as much admiration as that which is now bestowed upon our superb railroads — the best in the world. Between 1790 and 1806

a turnpike, passing through Lancaster, Carlisle, Shippensburg, and Bedford, was built from Philadelphia to Pittsburg. Over this rolled a great tide of emigration to the West. Food, clothing, furniture, medicine, farming implements, men, women, and children were hauled in wagons across the mountains to Pittsburg. During a year over 12,000 of these wagons, 33 every day, entered that city. The old pike, with scores of old-fashioned hotels lining its course, is still in existence; but the glory, both of the pike and the hotels, has long since departed.

In the meantime the steamboat was invented and found its way into the Ohio and the Mississippi. The people of the West could now float their flour, pork, and lumber down to New Orleans, and in the steamboat bring back the sugar, coffee, dry-goods, and other things which they needed. This was far cheaper than hauling over the Alleghanies in Conestoga wagons. If the people of the East were to hold this wonderfully remunerative trade, they must provide some cheaper means of transportation.

The first step in this direction was taken when it was proposed to build the Erie Canal. When this canal was finished in 1825, the cost of carrying a ton of freight from Albany to Buffalo was reduced from \$120 to \$14. You may be sure that this caused great excitement in Pennsylvania. It was now possible to send freight from Philadelphia to Albany by sailing vessels, and then by the Erie Canal, Lake Erie, Lake Chautauqua, and the Allegheny River to Pittsburg. Freight could be sent by this route for one-third of what it cost to wagon it over the mountains of Pennsylvania.

What could Pennsylvania do? She lost no time, but determined at once to join Philadelphia and Pittsburg by

a system of canals. This, in a mountainous state like Pennsylvania, was a most serious undertaking; but, fortunately, the railroad was now slowly developing, and the people of the state utilized it in their system of transportation, thus making it part railroad and part canal. The railroad of that day, however, was not a steam road; it was only a horse railroad.

From Philadelphia to Columbia, by way of Lancaster, the railroad was used. There goods for the West were transshipped to the canal and conveyed along the Susquehanna and the Juniata to Hollidaysburg. Here another change must be made—that time from canal to cars. These cars were now hauled to the foot of a series of inclines, on the summits of which were placed stationary engines for the purpose of drawing the cars up the mountains. By these means they reached the summit of the Alleghanies—1397 feet above Hollidaysburg and 1172 feet above Johnstown. From this point, in like manner, the cars were let down inclined planes on the other side of the mountains to Johnstown,—the eastern end of the trans-Alleghanian canal and the western terminus of the “Portage Railroad,” as this system of inclined planes was called. Here the goods were again transferred to the canal, and in due time reached that famous centre of distribution—Pittsburg. The ruins of the old Portage Railroad may still be seen from the car windows by travellers over the main line of the Pennsylvania Railroad, which long ago displaced the old system.

This system of transportation, combining the horse railroad and the canal, was a great improvement upon the Conestoga wagon; but, like the pike, it, too, was inadequate to the needs of the people. The railroad was a

single-tracked one with turnouts to enable cars to pass each other. Naturally, the drivers, a careless set at best, frequently met where there was no turnout. This meant a block to traffic, or a fight, or both, and in the end one party was obliged to go back to the first turnout. Finally, in 1834, the road was double-tracked, and the first locomotives were used for drawing the cars. Soon it was plain that horses and locomotives could not work on the same tracks, and in 1836 steam became the motive power. From that time to this there has been a constant series of im-



FIG. 16.

Pennsylvania Railroad Bridge over the Susquehanna, a few miles above Harrisburg. Material, stone; length, one mile. Cost, \$1,000,000. Mountain in foreground, Kittatinny. Second range, Sharp Mountain. Mountain in background, Peters.

provements in railroad construction, in locomotives, in cars, and in management. From light wooden rails we have come to those of heavy steel; from frail bridges to strong; from hand-brake to air-brake: from passenger cars looking like our present freight cars to perfect palaces; from insignificant coal cars holding a few tons to great steel ones carrying fifty tons: and from crude management to that which challenges the admiration of the world.

In no particular has improvement been more marked than in the character of the locomotives. In 1831 the Baltimore and Ohio Railroad Company offered a premium of \$4000 "for the most approved engine which shall be delivered for trial upon the road on or before the 1st of June, 1831." One of the requirements was that the engine should not exceed $3\frac{1}{2}$ tons' weight. The premium was taken by the "York," which was built at York, Pa. Locomotives weighing over a hundred tons are now built, and their power is in like proportion. In the early locomotive no cab sheltered the engineer, no brake was at his command, and wood was the fuel supplied.

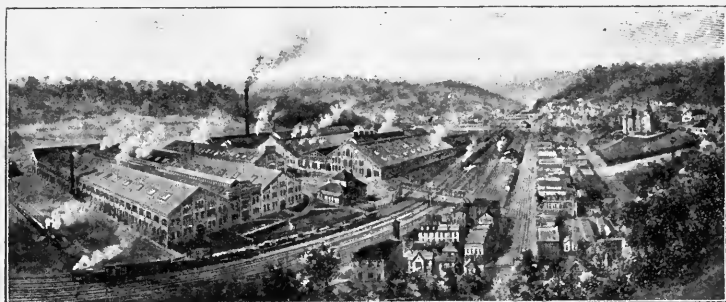


FIG. 17.

Works of the Westinghouse Air Brake Company at Wilmerding, on the Pennsylvania Railroad, fourteen miles east of Pittsburg, Pa.

Without his Westinghouse air-brake, the engineer of to-day would be helpless indeed. The Westinghouse Air Brake Company, Wilmerding, Pa., about fourteen miles east of Pittsburg, on the main line of the Pennsylvania Railroad, makes one set of brakes every minute of a working day. To December 31, 1900, the number of Westinghouse brakes ordered in the United States alone for locomotives was about 40,000, and for railway cars about 1,160,000. The Westinghouse brake is the standard railway brake of

the world, and is used in Africa, America (on about 550 railways), Argentina, Australia, Austria-Hungary, Belgium, Bulgaria, Germany, Great Britain, Holland, India, Italy, Persia, Roumania, Russia, Servia, Spain, Sweden, Norway, and Switzerland.

It was at Honesdale, Pa., in 1829, that the first run was made by a locomotive in America. This is a fact of which



FIG. 18.

An interior view of the Westinghouse Air Brake Company's Works, Wilmerding, Pa.

Pennsylvanians are a little proud. Horatio Allen, an engineer of the Delaware and Hudson Canal, brought it from England, where he had been studying the application of steam to transportation by land. When Allen had his locomotive on the track, he urged some one in the large assemblage gathered to see the wonderful machine, to take a seat on the engine with him; but no one was bold enough to do so. He therefore pulled open the throttle,

and, alone in his glory, swept out of sight at the rate of ten miles an hour — a high speed for those days.

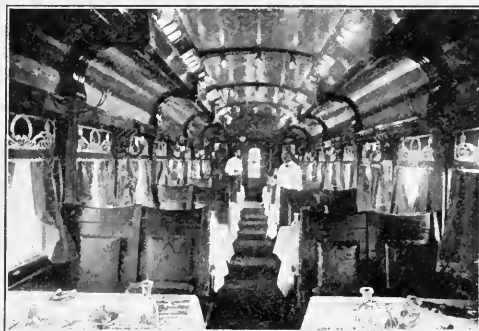


FIG. 19.
A modern dining car.

Freight is now carried safely and rapidly at the rate of about half a cent per ton per mile. Passengers in luxuriously furnished coaches, having at their command dining cars, sleeping cars, smoking cars, barber shops, and other conveniences, are carried across the state in a little over seven hours. What a change from the days of the Conestoga wagon!

INDUSTRIES OF PENNSYLVANIA

Agriculture.—This is the industry that takes precedence of all others. Without it there would soon be no necessity for any of the other industries, for man himself would either be reduced to savagery or would disappear from the planet. Men have lived, and could again live, without coal, petroleum, iron, steel, leather, sugar, silks, and fine carpets; but we cannot live without the grains, fruits, vegetables, meat, and milk that come from the farm.

The farmer of this day should be a well-educated man. Chemistry, geology, physics, entomology, botany, and mathematics are of direct practical value to the farmer;

while subjects like literature, geography, and history are as important to him as they are to the majority of men. The writer recently called at a farm about 4.30 in the evening. The farmer was busy with the installation and testing of a gasoline engine which he had just purchased for running the ice machine connected with his refrigerator. In the same building his daughters (one of them is a graduate of a good high school, and expects to go to college next September) were running the centrifugal machine with which this farmer separates milk from cream. Comment is quite unnecessary.

During the last ten years there has been an increase of six per cent in the number of farms

in the state. The following table gives the statistics of the principal crops as presented in the census of 1900: —

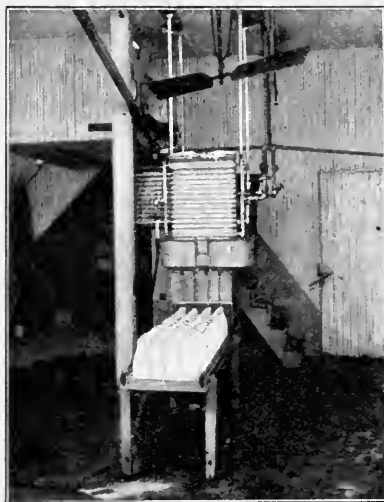


FIG. 20.

Separating cream from milk with centrifugal machine. The machine is the small black object under left arm of fan. Cream passes over cold pipes on left, and milk over those on right.

Crops	Value	Crops	Value
Hay and forage	\$37,514,779	Orchard fruits	\$7,976,464
Corn	21,896,795	Forest products	6,481,181
Wheat	13,712,976	Miscellaneous vegetables	6,088,214
Oats	11,093,893		
Potatoes (white)	9,397,054		

The most important crops included in "miscellaneous vegetables," in the order of their acreage, are sweet corn, cabbages, tomatoes, turnips, cantaloupes, cucumbers, watermelons, asparagus, and celery. How many of these are raised in your vicinity? In Pennsylvania the apple is the chief orchard fruit. Are there many raised in your county? What varieties? Can you tell wheat from oats as they grow in the field? How? How many bushels of wheat per acre are considered a good crop? Oats? Corn? Potatoes? Are there any valuable forest products in your vicinity? To what uses are they put?

The value of the milk, butter, and cheese, as shown by the census for 1900, was nearly \$36,000,000. Boys who are trying to make money raising chickens will be glad to know that the eggs and poultry, by the same census, were worth over \$16,000,000 — only \$2,000,000 less than the wonderful petroleum.

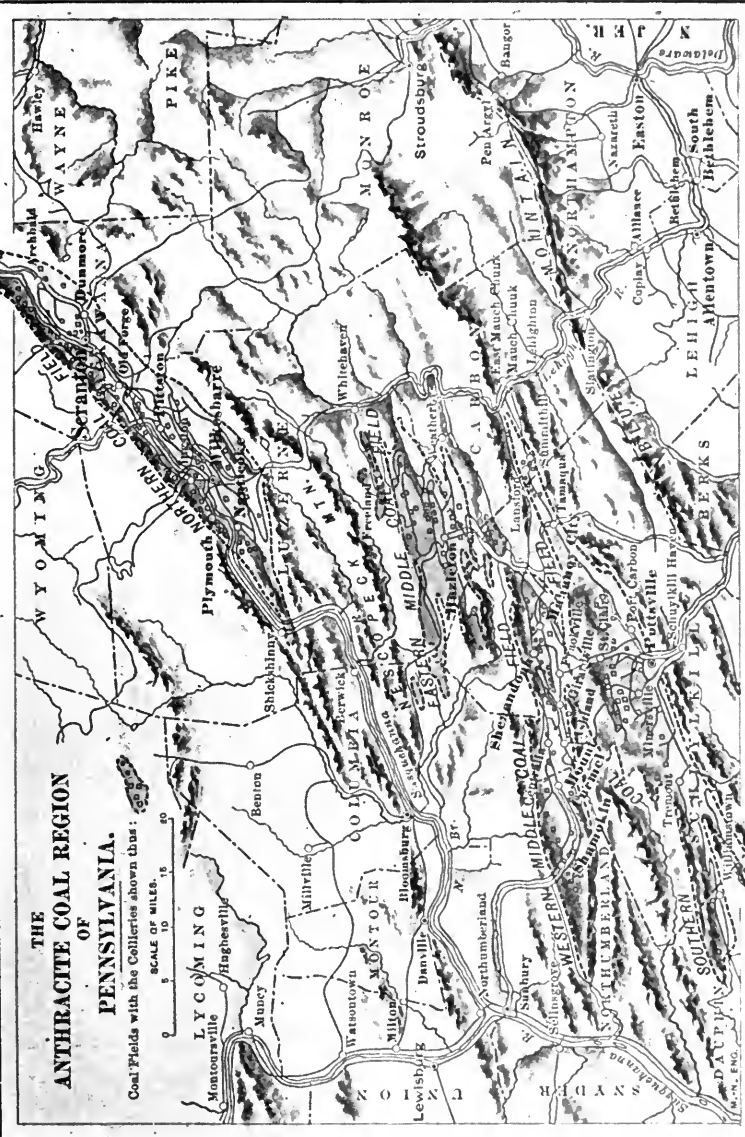
The Coal Industry.— Should the world be suddenly deprived of its supply of coal, what a blow it would be to our civilization! There would be no gas to illuminate our streets or our houses; the thousands upon thousands of steam-engines that are to-day producing so many of the necessities of civilized life would stand idle; our magnificent railroads would fall into decay; and our palatial ocean steamers would rot at their wharves.

About the year 1240 a considerable amount of coal was burned in London, but it made so much black smoke that the people thought it poisoned the air. They therefore appealed to Parliament, asking that body to prohibit its use. In response, Parliament passed a law making the burning of coal a crime punishable by death.

Although coal has been used, in small quantities, as fuel

THE ANTHRACITE COAL REGION OF PENNSYLVANIA.

Coal Fields with the Collieries shown thus :



for many hundreds of years, it was not until the eighteenth century that the scientific mining of coal was begun. Prior to this the mines were shallow, rarely going below water-level, and the coal was raised to the surface by very simple means.

It was in the bituminous coal field in the vicinity of Richmond, Va., that the first systematic mining was done in this country. During the War for Independence the coal mined there was, among other uses, employed in the manufacture of cannon-balls and other war material.

Anthracite coal was first discovered in the Wyoming valley, Pennsylvania. This discovery was made in 1768 by two blacksmiths, named Gore, who used the coal in their forge. At that time, however, no one thought of burning anthracite in an ordinary stove or open grate. It was believed that its combustion depended upon the blast of air driven through it by the blacksmith's bellows.

In 1776 anthracite coal was transported to Carlisle for the Continental Army. It was taken to Harrisburg in boats, and from there hauled in wagons. This was the first shipment of anthracite ever made in this country.

In 1803 two flat-bottomed boats, or arks, as they were then called, loaded with Lehigh anthracite, were floated from Mauch Chunk to Philadelphia. They carried about two hundred tons. Five arks were started on this dangerous journey, but three were wrecked long before they reached their destination. The coal that went to the bottom of the river, however, did not meet a worse fate than that which reached Philadelphia, for no one could make it burn, and it was pronounced worthless.

In 1812, Colonel George Shoemaker, of Pottsville, hauled nine wagon-loads of coal to Philadelphia. He sold two

loads, but gave the other seven away. He was looked upon as a rascal who was attempting to sell black stones for coal, and he was obliged to hurry out of the city to avoid arrest.

However, the two loads sold by Colonel Shoemaker were bought by Messrs. White and Hazard, who were operating wire-works, at the Falls of Schuylkill. Mr. White and his firemen, after spending a full half-day poking, raking, and fanning the fire, closed the furnace doors at noon in disgust and went to dinner. Returning in the afternoon, they were amazed to find the furnace doors red-hot and the furnace in danger of melting. These manufacturers thus learned that poking and raking do more harm than good when you are starting a fire with anthracite. They learned also that "stove coal" will make a very hot fire, and that, too, without artificial blast. This was an object lesson that meant much for the future of coal.

About ten years before this, Judge Jesse Fell of Wilkesbarre had succeeded in using anthracite in an open grate, but the importance of his discovery was not generally understood.

The mining of anthracite upon a commercial scale began in 1820, when 365 tons were shipped from the Lehigh region to Philadelphia. This was at the rate of one ton per day. In 1900 Pennsylvania mined 51,000,000 tons of anthracite, — about 140,000 tons per day, — and in addition she mined 71,000,000 tons of bituminous coal, or 122,000,000 tons in all.

The entire coal output of the whole United States for the year 1900 was 240,965,917 tons. It will be seen, therefore, that the single state of Pennsylvania furnished

more than one-half the whole amount. During the last twenty-one years Pennsylvania has averaged 55 per cent of the total output in the United States.

✓ A little illustration will help us to understand what an enormous mass of coal is represented by the figures just given. From Philadelphia to Pittsburg the distance is, following the tracks of the Pennsylvania railroad, 354 miles. If the anthracite mined in Pennsylvania during the year 1900 were dumped evenly along one side of the tracks, all the way from Philadelphia to Pittsburg, it would make a wall 41 feet high and 41 feet wide. From the windows of your car, your only chance to see over the great walls and catch a glimpse of the green fields beyond would be when crossing a bridge, or when running along some high embankment.

What an amazing growth since 1820! What a change since the days of 1240!

✓ When men first began to use coal, it did not require much knowledge or skill to obtain it. The coal was on or near the surface, and a pick and shovel were all that were required. As the demand for coal increased, and the beds were followed into the earth, coal-mining grew more and more difficult. As soon as the mines attained any considerable depth, serious obstacles were encountered. Water came into the mines; this must be pumped out. The air was foul; the mines must be ventilated. The coal is deep down in the earth; powerful and expensive hoisting engines were needed to lift it to the surface. The passageways and chambers of the mine were in danger of caving in; they had to be supported by timbers. It was not always easy to tell where coal was and where it was not; the geologist was called in to settle that im-

portant question. Thus, to-day, coal-mining has become an industry which demands of those who superintend it scientific and mechanical talent of a high order; of those who work in the mines, skilled hands and brave hearts.

The beds of bituminous coal in Pennsylvania are noted for their regularity and their nearly horizontal position. The anthracite, however, is found at all angles to the hori-



FIG. 21.

Coal stripping near Hazleton, Pa.

zon, having been tilted from the horizontal since the coal was formed. For this reason, among others, the engineering skill required to mine anthracite is much greater than that needed to mine bituminous coal.

While most coal-mining operations of to-day are carried on far beneath the surface, it should be remembered that in a few favored localities anthracite is mined in the full glare of the sun. These favorable conditions are found

in the vicinity of Hazleton and a few other places. In these favored spots, beds of anthracite with only a thin covering of earth upon them are found. Under such circumstances the thin covering of earth is stripped off, and the coal is then mined in the full light of day. Such operations are called "mining by stripping." "Stripping," however, is so rare that it is regarded as a curiosity.

Ordinarily, the beds of coal are reached either by slope or by shaft. We shall first explain how coal is mined by means of a slope.

We have said that beds of anthracite generally rest in an inclined position. These inclined beds often reach the surface. Having found the line along which the anthracite comes to the surface, the mining engineer excavates a passage right down through the coal. Such a passage is called a *slope*. The pitch of the slope is just the same as that of the coal-bed, and may be steep or gentle. Slopes are generally made from 16 to 22 feet wide and 7 feet high — a pretty big hole in the ground. The slope is commonly divided into three compartments, — two of large size for raising coal, and a small one for the pumping apparatus.

Now, at the outset, it must be understood that it is not safe to mine out all the coal in a bed. If this were done the roof of the mine would fall in, and that would be the end of the mine. The open spaces made by taking out coal are called *breasts*, or *chambers*, and the long walls of undisturbed coal that are left between the breasts to support the roof are called *pillars*. \ Pillar does not seem to be a very good name for what is really a wall, but it is not easy to change old names. \ The breasts are usually about 30 feet wide, and the pillars 20. The height of the breast depends upon the thickness of the coal-bed.

The accompanying diagrams will make this kind of mining easily understood.

From the bottom of the slope you see a passage extending to the right and left. Such a passage is called a *gangway*. It is about 8 feet high and 10 feet wide. On each side of the slope and gangway you will notice heavy walls of coal. These walls are left to prevent the coal from caving in and destroying these important passages. Indeed,



FIG. 22.

I. Breasts and pillars.

the pillars themselves have, as a rule, to be supported by very strong timbering, the nature of which may be seen in Fig. 22, II.

The light spaces are the breasts from which the miners have taken the coal; the dark spaces are pillars. As the miner loosens the coal in the breasts, it runs down by its own weight to the gangway, where it is received in cars and drawn by mules to the foot of the slope. From this point it is drawn up the slope by a hoisting engine located at the surface.

The arrows show the directions taken by the air currents forced through the mine by a powerful ventilating fan. The air travels to the end of the gangway, then enters the most remote breast, passes up one side of it through an airway constructed for that purpose, crosses the front of the breast where the miners are at work, goes down the other side, passes through a small opening in the pillar, crosses the front of the next breast, and so on until finally, having done its work, it escapes through the airway.

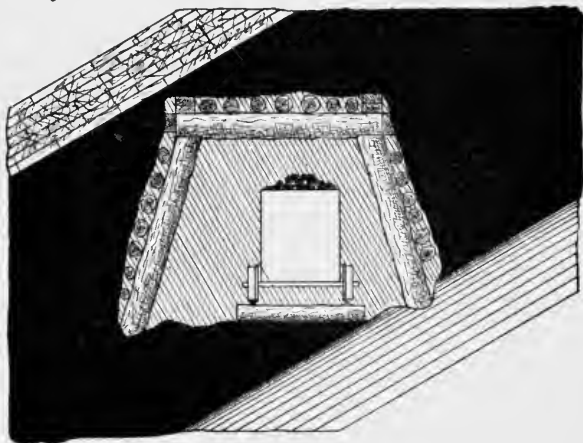


FIG. 22.

II. Gangway.

The first gangway is usually driven about 300 feet from the surface. The coal above this is called a *lift*. When one lift has been mined, the slope is driven down about 300 feet farther, another gangway is constructed, and the next lift is mined.

There are two good reasons for commencing at the gangway and working upward upon the bed. (1) If the miner should begin at the top and work down the bed, separate

pumping and hoisting apparatus would be needed for each breast. (2) By commencing at the top the miner would be compelled to handle the coal more or less. Beginning at the bottom, the coal runs down the breast and into the car standing in the gangway.

The chief difference between a shaft and a slope is that the former descends vertically into the earth, while the latter does not. Shafts vary in size; but 12 feet x 30 feet may be taken as average dimensions for the mouth, and they frequently descend to great depths. One at Pottsville, Schuylkill County, is 1600 feet (nearly one-third of a mile) deep. To sink such a shaft costs years of time and much money. You may be certain it is not located in a haphazard manner. This is a problem for the scientific engineer.

When the shaft reaches the coal, the gangway is driven to the right and the left, and the work of mining is practically the same as it is when the coal is reached by a slope. Gangways frequently extend for several miles from the foot of the shaft or slope.

Because of the dust, mining coal is dirty work. When a miner has finished a day's work, he is very black. Then, too, a miner's life is a laborious one, and is full of danger. Powder must be used to blast out the coal, and there is always danger in powder. Roof-falls are also fruitful sources of accidents. Then there is the fire damp, an explosive gas that is very dangerous. [H. M. Chance, in his "Coal Mining," Pennsylvania Second Geological Survey, estimates that one life is lost for each 100,000 tons mined.]

Anthracite coal as it comes from the mines is not ready for our stoves and furnaces. It is full of "slate" and other impurities that must be removed. Then, too, it

must be broken and assorted into grades of nearly uniform size. All this work is done in a large, high building called a *breaker*, which is placed near the mouth of the mine. Breakers are expensive, a good one, including machinery, costing about \$100,000. This expense is not incurred in mining bituminous coal, for it is so soft that a breaker is unnecessary.



FIG. 23.

Coal breaker at Drifton, near Hazleton, Pa. Notice the little mountain of culm in the background.

When a car of anthracite comes from the mine, it is at once run to the breaker and dumped into a chute formed of parallel bars of iron, placed about four inches apart. The small coal, dirt, and pieces of rock are screened out, but the large pieces of coal pass on to a machine, the essential parts of which are sets of strong rollers with projecting teeth. This machine breaks up the coal, and like the building in which it is located, it, too, is called a breaker.

After passing through the machine, the coal is thoroughly screened so that each size — broken, egg, large stove, small stove, etc. — is kept by itself. While passing along the chutes to the pockets from which the coal is drawn off into the cars

for shipment, boys, and old men who are too feeble to perform hard labor, pick out the slate.

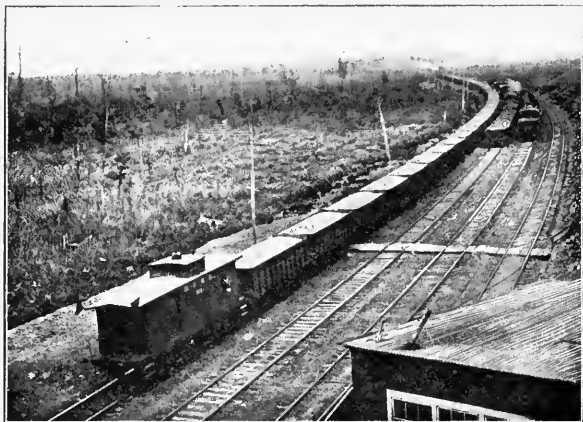


FIG. 24.

Fifteen hundred tons of coal on way from mines of Coxe Brothers to Perth Amboy. The scenery here is characteristic of the coal regions.

The slate picker commonly sits astride the chute on a board seat, keeps his eyes on the moving stream of slate and coal, and dexterously seizing the former, throws it out. The "breaker boy" is an interesting character about the mines. His work, though not laborious, is dirty and monotonous. The dust in a coal breaker is often so dense that lamps must be used at midday.

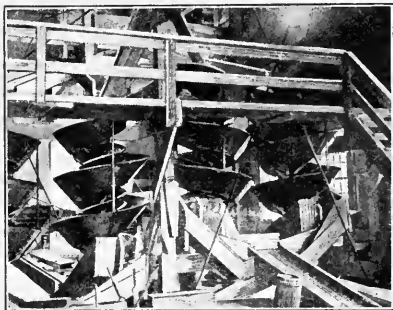


FIG. 25.

Spirals or mechanical slate pickers. (By courtesy of the *North American*.)

Some machines have been invented to pick the slate, but they have not

yet displaced the boys to any great extent. Quite recently a mechanical slate picker, called a spiral, has been constructed for the purpose of replacing the hands and eyes of the breaker boy. The spiral works upon the principle of centrifugal force. Coal and slate start down the spiral together, but since the coal is lighter than the slate, the former is thrown farther from the centre than the latter, and thus are they separated.

Iron and Steel Industry.

— In the manufacture of iron and steel, Pennsylvania leads the world. Within her borders in 1900 were 291 establishments producing iron and steel, and giving employment to an army of 110,864 wage-earners. The products of the blast furnaces, rolling mills, and steel works for this one year were valued at

\$434,445,200, — 23.7 per cent of the total products of the state, and more than three and a half times the value of all the gold and silver yielded by the mines of the United States in 1900. Of all the iron and steel produced in the

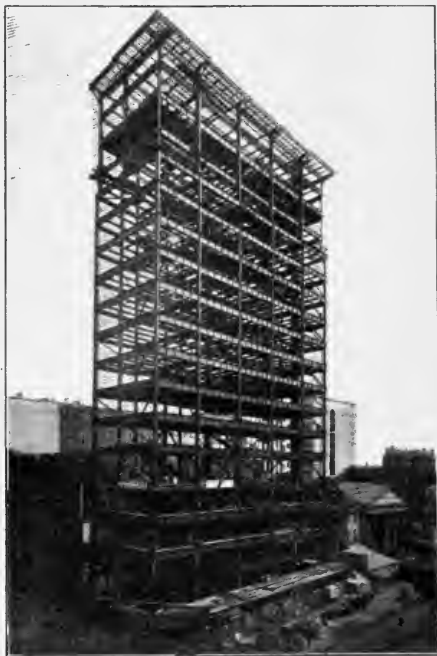


FIG. 26.

Real Estate Trust Company building, Broad and Chestnut streets, Philadelphia.



FIG. 27.

Pennsylvania railroad bridge over the Delaware River, Philadelphia. A bridge remarkable for weight and strength.

United States during the year 1900 Pennsylvania produced more than one half, — 54 per cent.

Not only are steel and iron extracted from the ore within the state, but her manufacturers and engineers use these

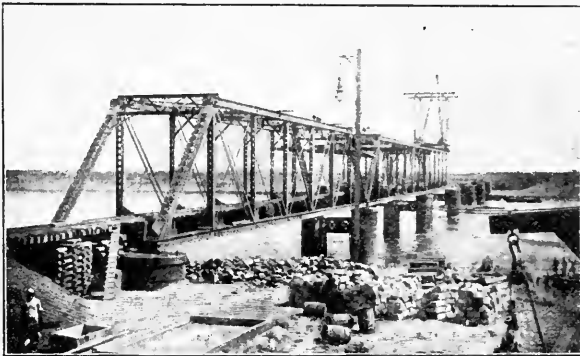


FIG. 28.

The Atbara River Bridge.

in the construction of ships, bridges, locomotives, electrical apparatus, cars, sky-scraping buildings, and a thousand other things.

One or two illustrations will show how the world prizes steel and engineering skill from Pennsylvania. The steel bridge over the Atbara River in the Soudan, Africa, is a fine exemplification of the triumphs of American industry and engineering. The celerity with which this bridge was manufactured and shipped from the Pencoyd Works of the American Bridge Company at Philadelphia is a fact well known in two continents, the whole time spent on

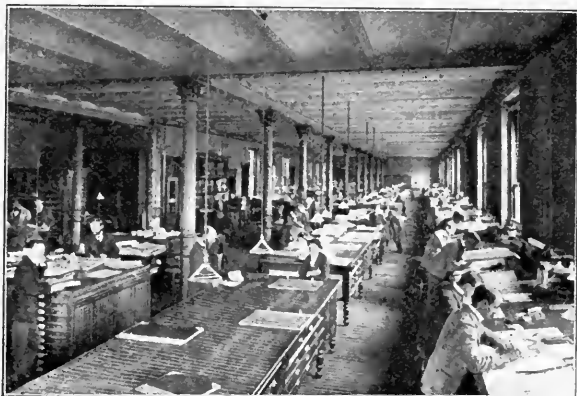


FIG. 29.

Drawing-room, Baldwin's Locomotive Works.

the contract amounting to about one-sixth of that requested by some of the competing English firms. Our success in this matter "took away the breath" of our English cousins. The Hawkesbury River Bridge in Australia is another illustration of how Pennsylvania steel in the form of bridges is finding its way around the world.

Locomotives, too, from Baldwin's great works in Philadelphia, where nine thousand employees turn out four locomotives a day, are found in all parts of the world.

When any nation needs the finest steel ships, she comes to Cramp's yards, Philadelphia. These are the merest hints of the magnitude and importance of Pennsylvania's iron and steel industry.

The first successful attempt to manufacture iron in Pennsylvania, of which we have any record, was made by Thomas Rutter in 1716, at Pool Forge on Manatawny Creek, about three miles above Pottstown. Although Pennsylvania was not the first colony to manufacture iron, the industry was well established here long before the Revolution. As early as 1756 Pennsylvania was declared to be "the most advanced of all the American colonies in regard to its iron works."

While Pennsylvania takes first place in the manufacture of steel and iron, she takes fifth rank in the production of iron ore. Michigan and Minnesota are to-day the great producers of the raw material; but since they do not have the coal for reducing the ore, they send most of it to Pennsylvania for that purpose. With the opening of the Sault Ste. Marie Canal, in 1855, began the trade in Lake Superior iron ore, which has to-day assumed such vast proportions. One Pennsylvania steel company has recently built its own railroad, connecting its works at Pittsburg with Lake Erie.

Eastern Pennsylvania was at first the principal seat of the iron industry in the state. Here were the immense deposits of fine magnetic iron ore in the Cornwall hills near Lebanon. Up to 1840 charcoal was the fuel used in the iron furnaces, and this could be procured anywhere in abundance. But about this time anthracite coal was largely substituted for charcoal, and for years was much more important in the manufacture of iron than bitumi-

nous coal. Since 1875, however, this relation has been reversed. Coke is now the chief fuel in the production of pig iron. The change from charcoal and anthracite to coke, the presence of natural gas in the western part of the state, and the cheap transportation for the fine Lake Superior ores, are causes which have shifted the centre of the iron industry to Pittsburg and its vicinity.

Not only has the fuel changed with the passage of the years, but there have been vast improvements in other directions. One of the most recent is the new method of casting the "pigs." Formerly, when the furnace was tapped, the molten iron was run out into a great network of sand moulds. Having cooled here, the iron was broken up into pieces of suitable size, and after much lifting, wheeling, and carrying, the "pigs" were deposited

in cars ready for shipment. Now, by the latest and best method, the iron runs from the furnace into cars of peculiar construction. These cars are called *ladles*, and are each capable of holding about eighteen tons of melted

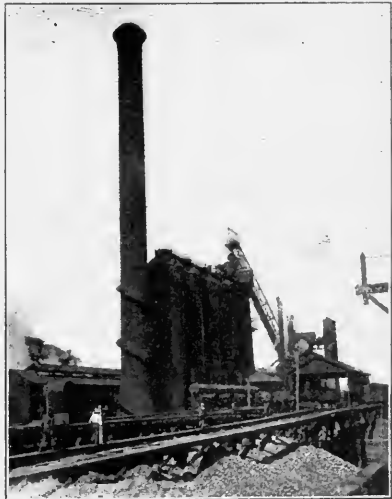


FIG. 30.

A modern blast furnace, "The Warwick," Pottstown, Pa. Capacity 500 tons every 24 hours. Ore, fuel, and flux are carried up the inclined plane on the right. Draft chimney on left, 220 feet high. The four enormous cylinders next to the chimney are the "hot blast stoves."

iron. The ladles are at once run to the casting machine, which consists, essentially, of a series of cast-iron moulds

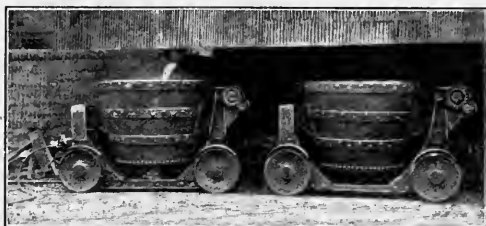


FIG. 31.

Iron running from furnace into "ladle."

attached to an endless chain. As the moulds move slowly beneath the mouth of the tilted ladle, the iron runs into them. The "pigs" soon solidify, and when the chain,

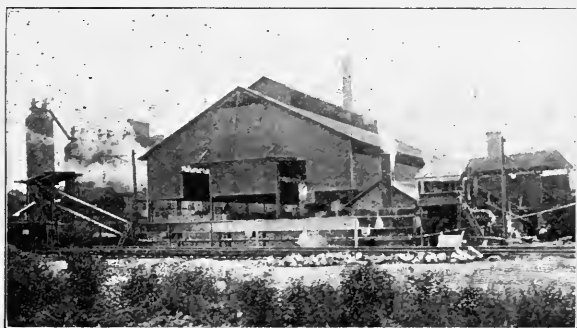


FIG. 32.

View of the "casting machine." In the background at the right the liquid iron is seen running into the moulds. In the foreground is the cold water tank. On the left is a car waiting for the "pigs."

reaching the farther end of the casting machine, inverts the moulds, the "pigs," still very hot, but no longer liquid,

drop upon another endless chain which carries them first slowly through a tank of cold water, and then up an incline from which they slide down into the car waiting to receive them.

It will be seen that the "pigs" have not been touched by a man. All the work has been done by steam and gravity. The "pigs" weigh about 125 pounds each, and are free from the sand which adhered to the old-fashioned pig iron. Those who live in the vicinity of a modern iron furnace may, by day and by night, hear the clatter of the "pigs" as they drop into the car.



FIG. 33.

Interior view of "ladle." It is lined with fire-brick.

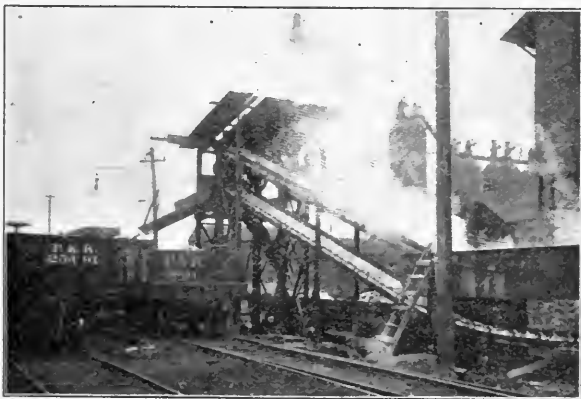


FIG. 34.

Nearer view of inclined plane, which carries "pigs" to car. One "pig" is seen dropping into car.

Textile Industry. — The manufacture of textiles stands next to steel and iron in importance. In 1900 there were in Pennsylvania 1102 establishments engaged in the manufacture of textiles. More than 100,000 wage-earners were employed in these plants, and the value of the products was, in round numbers, \$159,000,000.

Silk. — Of the several branches included in the textile industry, the manufacture of silk stands first in the value of products. In 1880 Pennsylvania stood fifth in the United States in the value of silk produced; in 1900 she ranked second, producing 29 per cent of all the silk produced in this country. Any observing traveller in Pennsylvania must have been impressed with the large number of silk mills that have been erected recently. Philadelphia, Scranton, Allentown, and Easton are leaders in the manufacture of silk. In 1900, however, there were seventy-two towns and cities in Pennsylvania which were engaged in this industry.

Cotton. — The manufacture of cotton goods is carried on most extensively in Philadelphia and Chester. Wilkesbarre, however, has the honor of introducing the manufacture of "Nottingham lace" into the state. This she did in 1886. Between 1891 and 1896, plants for the manufacture of this lace were built in Philadelphia, Scranton, and Columbia. In 1899 the Wilkesbarre plant manufactured nearly 900,000 pairs of Nottingham curtains. In 1899 there were only nine lace plants in the United States, and of this number Pennsylvania had seven.

Woollen Goods. — Pennsylvania ranks second in the manufacture of woollen goods. This industry was early established by English settlers on the banks of the Schuylkill, and in the year 1900 the industry was carried on almost

entirely in the city of Philadelphia. The woollen mills of this city excel in a number of products, but they are especially famed for their women's dress goods. Indeed, no city in America pretends to compete with Philadelphia in this particular.

Nearly one-half (48 per cent) of all the carpet manufactured in the United States is made in Philadelphia. Before the Revolution carpets were rarely seen in this country; to-day they are found in almost every home. When we understand that cutting and sewing the rags, and preparing the warp for fifty yards of rag carpet, cost a woman four or five months of hard work, we are not surprised to learn that many of our grandparents were well satisfied to eat and sleep in rooms with bare floors. A Philadelphia power loom, costing about \$450, will to-day weave fifty yards of Brussels carpet in a single day of ten hours. In a single room you may see scores of such looms at work at once.

Messrs. John and James Dobson, of Philadelphia, employ 5300 persons in the manufacture of carpet. To run the machinery of this plant requires 100 tons of coal each day. These manufacturers even make their own looms, some of which, weaving rugs three yards wide, are worth \$1000 each. The wool used is imported from northern Europe and other cold countries, because wool grown in a cold climate is best adapted to the manufacture of carpet. Measuring machines, working with great celerity and accuracy, measure the miles upon miles of carpet that are here produced.

Leather Industry. — In the tanning, currying, and finishing of leather Pennsylvania takes first rank in the United States. The magnitude of this industry appears when we

learn that it stands fourth in the manufacturing industries of the state (steel and iron, textiles, and foundry and machine-shop products occupying the first three places), and that its annual products are worth over \$55,000,000.

Philadelphia is a great centre for this industry. Tioga, Elk, Potter, and Clearfield counties are the other most im-



FIG. 35.

Among the hemlocks, Sullivan County, Pa.

portant centres. The Cowanesque Tannery, Tioga County, uses annually in the manufacture of sole leather 7000 tons of hemlock bark. A ton of bark will tan about 400 pounds of sole leather. The whole world is called upon to supply the hides that are needed by the manufacturers of the state.

Refining Sugar.— In Pennsylvania this industry is confined to Philadelphia, because the raw sugar comes by water from

the West Indies, the East Indies, and other sources. In 1900 there were in Philadelphia seven establishments engaged in refining sugar and molasses. The value of the products was over \$36,000,000. The great tall refineries along the Delaware must attract the attention of any visitor.



FIG. 36.

Hemlock bark, Cowanesque Tannery, Tioga County, Pa.

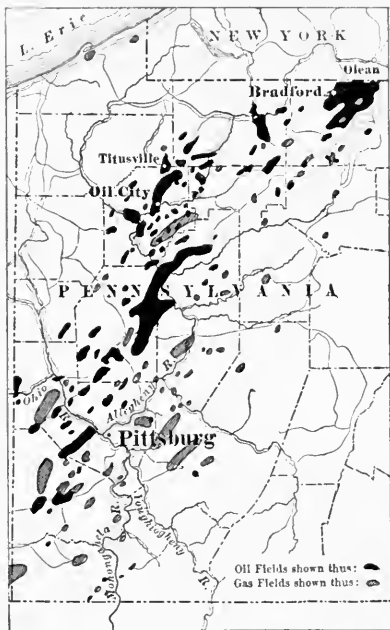
If you are fortunate enough to have a pass admitting you to one of these refineries, you will get an indelible impression of the importance and the magnitude of these truly wonderful places. You will see enormous storage sheds filled with the muscovado, or raw sugar. Here you will see little electric engines busy as bees, some taking muscovado in, and others bringing it out to be refined. You will see two men, each with a sharp knife in his hand, standing over a grating in the floor. Quickly, two men, each with a big bag of muscovado on a truck, rush to the opening in the floor and throw the bags from the truck to the grating. Like a flash the men with knives rip the bags open from end to end, and their contents, falling between the bars into an enormous vat of hot water, are soon reduced to the liquid form. A group of men with trucks keep the men with knives busy, and thus the work of liquefying the muscovado goes on with a rush.

Powerful pumps now force this sweet liquid to the highest story of the lofty building. Here it runs into hundreds of stout linen bags hanging in a vertical position. The liquid passes through the bags, but flies, bees, sticks, and many other foreign substances are left behind. Now the yellow liquid, looking like river water after a rain, is filtered through bone-black, or charred bone. This bone-black is placed in great cylindrical vessels about twenty feet in height and several feet in diameter. One of these cylinders will hold fifty tons of bone-black, and a single refinery may use a hundred or more of them. When the liquid sugar runs out at the base of one of these gigantic cylinders, it is as clear as the purest spring water, and is ready for the vacuum pan. Here it is boiled in a partial vacuum, because such boiling is not only cheaper than boiling under atmospheric pressure, but it produces a much finer grade of sugar.

From the vacuum pan, the sugar, in the form of thick paste, passes down to the next floor where the wonderful centrifugal machines receive it. These machines, making about 1400 revolutions a minute, quickly fling out the syrup which is mixed with the sugar, and the latter is then allowed to drop to the floor below, whence, by means of belts, it is carried to the warehouse, in which it is finally packed for market. The syrup thrown out by the centrifugal machines is, you may be sure, not lost. It is converted into molasses. A sugar refinery, like a blast furnace, runs night and day. The largest establishments refine several thousand barrels every day.

Petroleum.¹ — Within the memory of men not fifty years old, petroleum has passed from a medicinal curiosity to a

¹ From *petra*, a rock, and *oleum*, oil, or rock oil.



OIL AND GAS FIELDS OF WESTERN PENNSYLVANIA.

product of supreme importance. When the "forty-niners" rushed pell-mell to California for gold, they unconsciously left behind them, under the mighty rock masses of the Appalachians, something more valuable — petroleum.

In 1859 Edwin L. Drake, generally called Colonel Drake, struck oil on "Watson's Flats," just below Titusville in Crawford County. As a curiosity, which with much trouble might be gathered in small quantities, petroleum had been known for hundreds of years. Indeed, it was found on the shores of the Dead Sea 1700 B.C., and it was not unknown to the early Egyptians. Colonel Drake, however, was the first man, at least in modern times, to drill a well for oil.

You may be certain there were many persons in 1859 who regarded Colonel Drake very much as the courts of Europe looked upon Columbus when he tried to convince them that the world is round. Columbus was regarded as a crazy adventurer; so, too, was Colonel Drake. But E. L. Drake had a will not unlike that which dwelt in Columbus, in Napoleon, in Grant. Amidst struggles and discouragements that would have overwhelmed ordinary men, Colonel Drake kept the steel chisel of his drill at work.

At last, on Saturday afternoon, August 28, 1859, came the cry of "Oil! oil!" Then those who had ridiculed the colonel, those who had said he was throwing good money



FIG. 37.
Edwin L. Drake.

into a mere hole in the ground, made a mad rush to put some of their money into holes just like his. This was the beginning of an industry which has done so much for the comfort and convenience of modern civilization, and which is adding untold millions to the wealth of the world.

Before Colonel Drake taught the world how to obtain oil in large quantities, it was laboriously collected in a small way. Here and there the oil was seen floating on

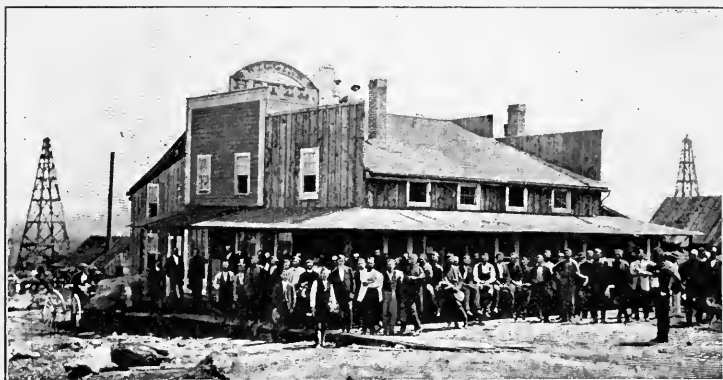


FIG. 38.

Wiggin's Hotel. Shows crowd of pumpers, drillers, and teamsters waiting for dinner. No complaints of "hard times" here.

water, from the surface of which it was absorbed by blankets. These, when wrung out, would furnish clear oil. By this primitive method, employed by the Indians and the early white settlers, one might, perhaps, in a month, collect a barrel of oil. The Seneca Indians collected the oil in this way, and hence petroleum in its earlier history was known as "Seneca Oil." Applying the oil externally, the Indians used it for headache, toothache, and rheumatism.

As early as 1845 petroleum was used as a lubricant, as a medicine for both man and beast, and last, but not least, as a source of light. The world was sadly in need of something better than the tallow candle and snuffers, and this need was filled by kerosene and the modern lamp.

In the early days of the industry petroleum was transported in strong barrels made of oak hooped with iron. When this method became too slow, flat ears carrying two huge wooden tubs were used. After the wooden tubs came the great cylindrical cars, holding about 5000 gallons each, with which many school children are familiar.



FIG. 39.

Pumping station, Titusville, Pa.

But the time soon came when even these cars were not equal to the work to be done. Then it was that the American engineers taught the world how to transport petroleum. It must, they said, be pumped through pipes — an idea that challenged the admiration of the world.

In 1862 a bill authorizing the construction of a line from Oil Creek to Kittanning was introduced at Harrisburg, but the active opposition of those engaged in teaming oil

prevented its passage. The first successful pipe line was put down at Titusville. It was only four miles long, and carried only eighty barrels of oil per day, but it demonstrated the possibility of transporting oil in this manner. In spite of opposition from the owners and drivers of oil wagons, other lines followed. The opponents of the pipe line, however, were bitter and determined. They cut the lines, set fire to the tanks, and even threatened the lives of the pipe-line men. How ignorance stands out against progress is an old, old story, and one that will probably never end.

The growth of pipe lines was slow. At first oil was pumped only to refineries in the oil regions. But after a time enthusiasm arose, and men began to talk boldly about pumping oil to the seaboard. Wonderful as this seemed a few years ago, it is now regarded as a matter of course. To-day the trunk pipe lines carrying Pennsylvania petroleum are thousands of miles in length. The pipe used in these great lines must be very strong. It is tested, therefore, to withstand a pressure of 1000 pounds to the square inch.

At each pumping station there are two or more storage tanks of from 30,000 to 50,000 barrels capacity. While oil is being received in one tank, it is being pumped forward from the other. Pumping stations are located thirty miles or more apart. To provide against accidents, and to give opportunity for repairs, duplicate engines are supplied to each station. Night and day, summer and winter, over mountain and across river, these engines force forward a stream of oil to the distant refineries.

To locate these refineries properly requires good judgment. A mistake in this matter would be fatal. If the

oil is intended for export, the refinery must be situated so that large sea-going vessels may receive their cargoes at wharves immediately adjacent to the works. There must also be railroad facilities, even when the oil comes through a pipe line, for securing coal and other supplies. The great refining centres in Pennsylvania are Point Breeze and Thurlow. Companies refining petroleum, and those manufacturing sulphuric acid and fertilizers, find

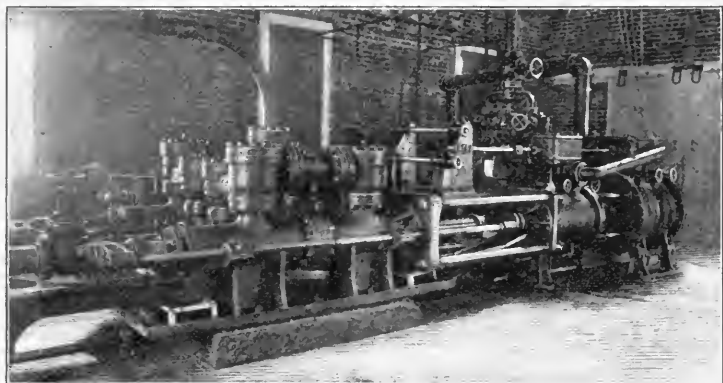


FIG. 40.

Pumping engine in the station at Titusville, Pa.

it to their mutual advantage to be located in the same vicinity. The latter purchase from the former, and use in the manufacture of phosphate the great quantities of refuse acid discharged from the refineries daily.

During the year 1900 Pennsylvania produced 13,258,302 barrels of crude petroleum. These figures represent an amount so great that it cannot be grasped by the mind without the aid of illustration. This quantity of petroleum would fill 10,312 ordinary schoolrooms; and these

rooms, placed end to end, would extend fifty-eight miles. If this petroleum were placed in a cylindrical pipe three feet in diameter, the pipe would have to be 2017 miles



FIG. 41.

Petroleum Centre, Venango County, Pa. A typical scene in the oil regions.
How many wells can you count?

long ; and if the pipe were only three inches in diameter, it would be long enough to extend from the earth to the moon.

Natural Gas.—Natural gas is generally found associated with petroleum, and is a remarkably convenient and valuable fuel for the manufacture of glass, iron, and steel. It is easily distributed in pipes to places many miles away. It requires no shovelling, and there are neither cinders nor ashes. In Pennsylvania in 1899 fifty rolling mills and

steel works, seventy-five glass works, and over a thousand other establishments were using this unrivalled fuel.

The natural gas produced in the state during the year 1900 was worth about \$9,000,000. The petroleum for the same period was worth \$18,088,016. The two were together worth almost as much as Colorado's gold for that year.

The Coke Industry.—Pennsylvania ranks first in this industry. In the year 1900 she produced 62.6 per cent of all the coke manufactured in the United States. It was worth over \$22,000,000. Most of this coke is produced in the vicinity of Connelsville, Fayette County, and is known as Connelsville coke—the finest in the world.

Coke is made by burning bituminous coal in ovens or retorts, and thus removing the volatile constituents. Its chief use to-day is as a fuel in the blast furnace.

The Glass Industry.—Pennsylvania also leads in the production of glass. The glass which she manufactured in 1900 was worth almost exactly the same as her coke, and more than three times as much as the glass produced by any other state. Pennsylvania, indeed, has commenced to export glass to Europe, South America, Canada, Australia, and New Zealand. The industry is most extensively carried on in the western part of the state, not only because the best fuel, natural gas, is there, but because some of the best glass sand in the world is also there. Then, too, as if nature were determined that nothing should be wanting, there is an abundance of excellent fire-clay suitable for glass furnaces found in western Pennsylvania and eastern Ohio.

CITIES AND TOWNS

In Pennsylvania there are 833 incorporated cities and boroughs. Of this number, 160 have each a population of more than 3000. For list of these, see table in Appendix. Referring to the proper table in the Appendix, see how many cities in Pennsylvania have more than 25,000 inhabitants. How many have over 100,000? How many have over 1,000,000?

PHILADELPHIA, famed for her schools, colleges, libraries, hospitals, asylums, and scientific societies, is one of



FIG. 42.

Market Street, Philadelphia, Pa.

the greatest cities of the world. It is 23 miles long and, on the average, $5\frac{1}{2}$ miles wide. The population in 1900 was 1,293,697 — just about one-fifth of the entire population of the state. It is sometimes called the “City

of Homes," because so many of her people live in their own houses. Her citizens are not crowded into "flats," but they live in rooms that open to the outer air and the health-giving sunshine. In this we find a partial explanation of the fact that Philadelphia's death-rate is one of the lowest to be found in large cities.

The New City Hall. —

That imposing structure, the City Hall, built of fine Massachusetts marble, stands on the very spot selected by Penn himself in 1681 for the future "town hall." More than a quarter of a century of time, and nearly twenty-five millions of dollars were consumed in its erec-



FIG. 43.

The new City Hall.

tion. It covers an area of four and one-half acres, and the total area of the floor space is fourteen and a half acres. It is one of the largest and finest public buildings in America.

The tower, the highest in the world, lifts the hat of William Penn, whose statue crowns it, 547 feet $11\frac{1}{4}$ inches above the ground. As you walk or ride around this magnificent pile, you cannot fail to observe two fine equestrian statues: the one is that of General George B. McClellan, the other that of General John F. Reynolds.

Here, too, you will see a statue of that genuine philanthropist, Stephen Girard.

Fairmount Park. — Philadelphians are naturally, and justly, proud of their celebrated park. For years it has been growing both in size and beauty. It now contains 3353 acres, and, with one exception, the Prater in Vienna, Austria, is the largest city park in the world. The fame of Fairmount Park rests upon its natural beauty, but many noble and instructive works of art are also found here. As you drive through the park you come unexpectedly upon beautiful and imposing statues of Washington, Lincoln, Grant, Meade, Humboldt, Columbus, and other great men. On Lemon hill you will see the fine old mansion where Robert Morris once lived and entertained such men as Franklin, Washington, and Lafayette. Still standing along the Wissahickon may be seen the house where David Rittenhouse, Pennsylvania's famous astronomer, was born. Horticultural Hall and Memorial Hall, built for the great Centennial Exposition of 1876, are still standing in the park. The former is now used for the propagation of rare and valuable plants, while the latter is occupied by the highly interesting and instructive exhibits of the Pennsylvania Museum and the School of Industrial Art. The Zoölogical Garden is also found in the park. It is the largest and best in America, and is of great value to any student of geography.

Commercial Museum. — Here is a large and remarkably instructive collection of raw and manufactured products gathered from all parts of the world. The reputation of the Museum is high, not only at home, but in foreign countries as well. To spend a day there is worth a trip across the state. The Museum is at present located at 223 South Fourth Street.

Academy of Natural Sciences. — The Academy stands at the corner of 19th and Race streets. There is no better place for the study of certain phases of geography. Here you will find very large and well-arranged collections of minerals and birds. There are also some remarkable geological specimens here which, once seen, can never be forgotten. Admission is free.

The Harbor. — No visitor to Philadelphia should fail to visit the Delaware River front. Here you see ships,



FIG. 44.

Launching of the "Iowa" at Cramp's shipyard, Philadelphia.

sailors, and cargoes from all parts of the world. Here you catch hints of the city's commercial life that are not revealed elsewhere. Here, too, you realize why the Delaware is called "the Clyde of America." You are thus helped to understand the supreme importance of the Delaware to Pennsylvania.

PITTSBURG, the metropolis of western Pennsylvania and the county seat of Allegheny County, is one of the great industrial cities of the world. As has been shown in other connections, coal, petroleum, natural gas,

and cheap transportation are the chief foundation stones upon which Pittsburg's wealth and power rest. These natural advantages have not only contributed to Pittsburg's prosperity, but they have crowded the banks of the Ohio, the Allegheny, and the Monongahela with towns and manufacturing plants which extend many miles beyond the corporate limits of the city. Were the limits of Pittsburg extended so as to include the city of Allegheny and a number of suburban towns, her population would be greatly increased. A plan for such extension of the limits has been considered, but has not yet been approved. If the plan should finally be adopted, Pittsburg would become "Greater Pittsburg," as New York has already become "Greater New York."

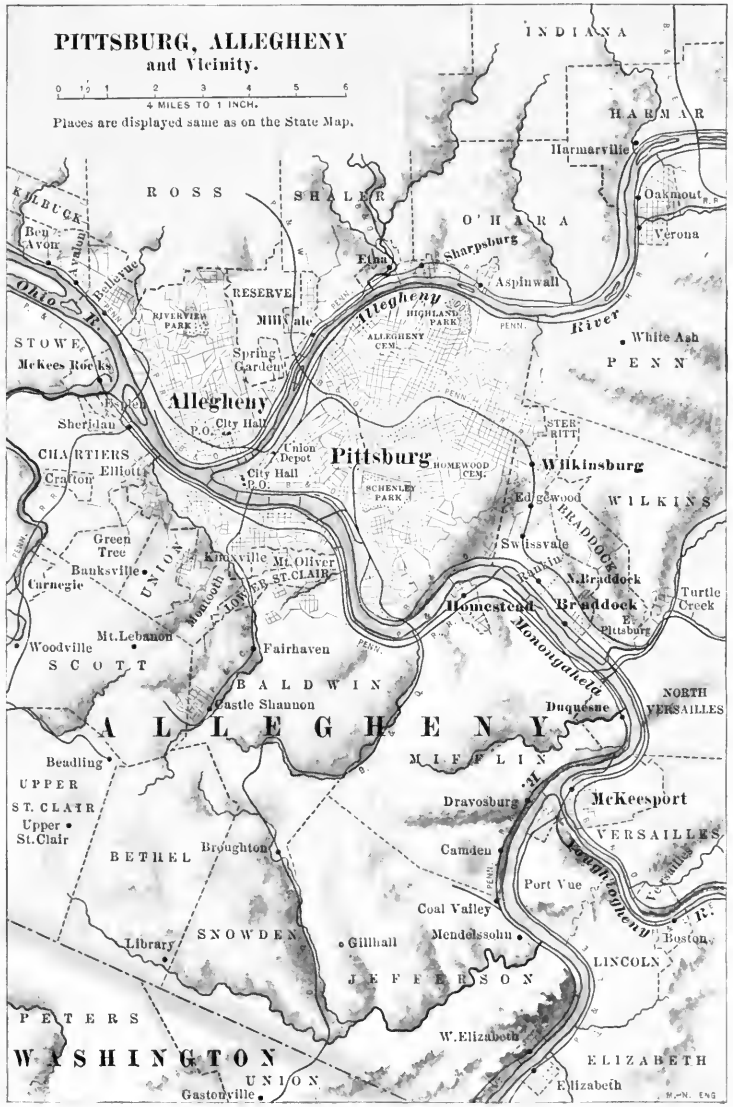
Pittsburg and the densely settled territory immediately adjacent are frequently spoken of as the Pittsburg District. In the production of the following manufactures the Pittsburg District leads the world: steel and iron, plate glass, window glass, tumblers, tin plate, steel cars, air-brakes, electrical machinery, steel and wrought iron pipe, fire-brick and clay, corks, and pickles. The largest electric generators that have ever been constructed, those at Niagara Falls, were made here. Pittsburg produces 75 per cent of all the plate glass made in the United States. Of ornamental glass for the table she produces 63,000 tons per annum. The corks manufactured are not for bottles alone, but for the grips of bicycle handle bars, inner soles of shoes, and floats for fishing seines. In Pittsburg's pickling and preserving works 2500 persons find constant employment.

ALLEGHENY. — On the Allegheny River, opposite Pittsburg, and connected with the latter by numerous bridges,

PITTSBURG, ALLEGHENY and Vicinity.

0 1 2 3 4 5 6
4 MILES TO 1 INCH.

Places are displayed same as on the State Map.



WASHINGTON
UNION
Gastonsville

W.M. ENG

lies the third city of the state — Allegheny. Large iron and steel mills, structural iron works, and the manufacture of steel cars, glass, and leather furnish employment to thousands. In addition to the Western University of Pennsylvania, which has received attention when speaking of education, there are in Allegheny three theological seminaries, — the United Presbyterian, the Presbyterian, and the Reformed Presbyterian. The largest reservoir in the United States for natural gas is in Allegheny. The Carnegie Free Library, with its 25,000 volumes, is one of the ornaments of the city, and is supplemented by a large public school library.

SCRANTON, in the midst of the northern anthracite coal field, and the county seat of Lackawanna County, has had a remarkably rapid growth. Though one of the youngest cities in the state, she is now fourth in population. Naturally the city is chiefly engaged in mining and shipping coal, but she also produces silk, cars, steel rails, and iron in many forms.

READING, the county seat of Berks County, is beautifully located where the Schuylkill breaks through the South Mountain range. On the mountains around the city are attractive summer resorts, from which may be had charming views of the Lebanon and the Schuylkill valleys. Almost within sight of the southern anthracite field, Reading is admirably situated for manufacturing purposes. Iron, steel, cars, hardware, stoves, hosiery, knit goods, woollen hats, and silk and cotton fabrics are produced here in large quantities.

ERIE, a port of entry, and the county seat of Erie County, has the finest natural harbor on the lakes. The city has a large trade in coal, petroleum, iron and copper ores, lum-

ber, and the products of its various manufactories of engines, boilers, malleable iron, brass, wooden ware, and household implements. It was first settled by the French in 1753 by the building of Fort Presque Isle. In 1756 there were one hundred French families living around the fort, but on the abandonment of the country by the French in 1763, Erie lapsed back into the wilderness, and was resettled by American families from the East in 1795.

WILKESBARRE, the county seat of Luzerne County, is beautifully situated in the famous Wyoming valley, and is but a few miles from the scene of the terrible Wyoming massacre. The men who founded the city in 1772 named it in honor of John Wilkes and Colonel Isaac Barre—two sturdy champions of American liberty in the British Parliament. Since Wilkesbarre lies in the heart of the northern anthracite region, coal is her great source of wealth. As might be expected, Wilkesbarre manufactures mining engines, cars, machinery for the mines, and wire rope. Silk and cutlery are also manufactured. Wilkesbarre's "Nottingham curtains" received attention in connection with the cotton industries of the state.

HARRISBURG, the capital of the state, is situated on the east bank of the Susquehanna River, which is, at this point, about a mile wide. A short distance north of the city the Susquehanna breaks through the Blue Mountains, presenting a rare scene of bluffs, coves, and vanishing vistas. It is an important railroad centre. Its leading industrial establishments are rolling mills, furnaces, steel works, and manufactories of shoes, watches, mattresses, and a variety of knit and woven fabrics. The legislature holds its sessions here every two years, and here are the Supreme Court and the several executive departments of

the state government. The public buildings are the Capitol, the State Arsenal, the State Library, and the Pennsylvania Insane Asylum.

LANCASTER, the county seat of Lancaster County, is in the midst of one of the finest agricultural districts in the world. Franklin and Marshall College is located here, and the Millersville Normal School, but four miles away, is connected with the city by trolley. From 1799 to 1812 Lancaster was the capital of the state. Two distinguished public men, James Buchanan and Thaddeus Stevens, lived and died in Lancaster. Much fine tobacco is raised on the fertile soil of Lancaster County, and the city has, therefore, a large trade in this article. Here are also numerous foundries, cotton mills, tanneries, and other manufactories.

ALTOONA, in Blair County, is situated at the eastern base of the Alleghanies. At this point passengers over the Pennsylvania Railroad prepare themselves to enjoy the beauties of the wonderful "Horseshoe Bend," which lies just west of the city. When you travel this way, arrange, if possible, to pass through Altoona by daylight. The immense manufacturing and repair shops of the Pennsylvania Railroad, the chief source of Altoona's prosperity, are located here.

JOHNSTOWN, in Cambria County, is on the Conemaugh River — a stream made famous by the "Johnstown Flood," which in 1889 destroyed nearly the whole city and drowned thousands of her citizens. Johnstown, however, was quickly rebuilt, and was soon more vigorous and prosperous than before the flood. The Pennsylvania Railroad, which passes through the city, and fine deposits of bituminous coal in the vicinity are important factors in Johnstown's pros-

perity. The Cambria Iron Company, seeing the advantages of the situation, located their mammoth iron and steel works here.

ALLENTOWN, the county seat of Lehigh County, and the largest city in the Lehigh valley, is situated on the Lehigh River, immediately south of the slate and cement region. It has diversified manufacturing establishments, such as furniture and shoe factories, wire and thread mills, and a number of silk mills. It is connected by numerous trolley lines with the surrounding country, and is the terminus of the Lehigh Valley Traction, which has a through line to Philadelphia. The Central Railroad of New Jersey, the Philadelphia and Reading, and the Lehigh Valley railroads also afford excellent means of transportation. Muhlenburg College and the Allentown College for Women are located here.

McKEESPORT, at the junction of the Monongahela and the Youghiogheny, is but fourteen miles from Pittsburg, and enjoys a good share of the natural advantages of that city. The industrial interests of McKeesport centre in iron, steel, and the mining of coal. When Pittsburg's limits are extended, McKeesport, together with Duquesne, Braddock, and Homestead, will doubtless become a part of "Greater Pittsburg."

CHESTER, the oldest town in Pennsylvania, is located on the Delaware River about midway between Philadelphia and Wilmington. Its rapid industrial development is due to its long river front, its railroad facilities, and its proximity to the coal regions. Ship-building, steel casting, and the manufacture of textiles, dye-stuffs, brick, and plaster are its chief industries. In the suburbs are large plants for the printing of textiles and the refining of

petroleum. It is the seat of the Pennsylvania Military College. Crozier Theological Seminary is located in Upland, which, not being within the corporate limits of Chester, still holds the name by which the whole settlement was known before Penn renamed it.

YORK, the county seat of York County, and the centre of a rich agricultural region, is noted for its varied and extensive industries. The chief manufactured products are ice machines, wire cloth, safes, nails, chains, water wheels, paper, organs, carriages, silks, candy, cigars, and the output of agricultural works, foundries, machine shops, and rolling mills. In 1777-1778, while the British occupied Philadelphia, the Continental Congress met in York.

WILLIAMSPORT, the county seat of Lycoming County, is beautifully situated on the West Branch of the Susquehanna. For years Williamsport was known as the "Sawdust City" because of the great amount of lumber cut in her sawmills. There is not quite so much sawdust as formerly, but her industries have become widely diversified, and she is now appropriately called the "Queen City of the West Branch." Her manufactures include wood-working machinery, doors, sash and moulding, furniture, paving bricks, gasoline engines, rubber and leather boots and shoes, clothing, and sewing machines. The United States Census Bureau—report for 1900—names Williamsport as the most healthful city in the state, and the fourth in this respect in the United States.

NEW CASTLE, the county seat of Lawrence County, is situated fifty miles northwest of Pittsburg. Within the last ten years the city has more than doubled her population. With excellent coal, glass sand, and fire-clay in her vicinity, the city has become a very important manufac-

turing centre. Her manufactures include iron, wire nails, glass, fire-brick, and flour.

EASTON, the county seat of Northampton County, is situated at the confluence of the Delaware and the Lehigh. It is the seat of Lafayette College, and has silk mills, drill works, railway supply works, two organ factories, and other industrial establishments. Soapstone, serpentine, and a rare variety of stone called verdolite are quarried just without the corporate limits of the city. Vast cement beds are located near the city from which thousands of barrels are produced daily. The famous treaty with the Five Nations is recorded as having taken place at the forks of the Delaware.

HISTORY

Almost three hundred years ago Henry Hudson, the famous navigator, entered what is known as Delaware Bay. Annoyed by shoals, and concluding that he was in treacherous waters, Hudson sailed out to sea again after having been in the bay but a few hours. Soon after this he entered the harbor of New York, where no shoals obstructed his passage. Although Hudson was an Englishman, he was at this time in the service of Holland, and the Dutch claim to the country drained by both the Hudson and the Delaware rested upon this voyage.

The Delaware was named in honor of Lord Delaware, governor of Virginia, who visited the mouth of the bay one year after Hudson. The English doubtless gave his name to bay and river, thinking that their claim to this part of the continent would thereby be strengthened. The Dutch sometimes called it Nassau, but they usually

spoke of it as the Zuydt, or South River, as they called the Hudson the North.

In the year 1616 Captain Hendrickson, a Dutchman, did what both Hudson and Lord Delaware failed to do,—passed the shoals at the mouth of Delaware Bay and, in a small yacht, the “Onrust,” or “Restless,” ascended the river as far as the Schuylkill.

Three years after the landing of the Pilgrims on Plymouth Rock we find the Dutch established on the Delaware. Their settlement was at Gloucester Point, on the Jersey side of the river, nearly opposite the present site of Philadelphia; but from this as a base the Dutch passed over into Pennsylvania, making themselves at home in the beautiful valley of the Schuylkill, where they enjoyed a very lucrative trade in beaver-skins.

But the Dutch were doomed to meet with opposition. The Swedes, too, were pleased with the Delaware, and understood very well the value of beaver-skins. They were also excellent farmers with keen eyes for fertile soil. Of course the Swedes did not have even the shadow of a claim to any land in North America, but in those days that did not make much difference. Those who were able, took and kept what pleased them.

The Swedes first settled near the present site of Wilmington, but from this point they worked their way into Pennsylvania, where they founded the town of Upland, now called Chester. They were eminently religious, and built churches wherever they had important settlements. This explains the presence of Old Swedes' Church which is still standing near the corner of Christian and Front streets, Philadelphia. Such names as Swedesburg, Swedeland, Swedes' Ford, and Swede Furnace, all found in the

vicinity of Philadelphia, point unmistakably to an occupation by this nation. In like manner, Schuylkill, meaning "hidden creek," indicates the presence of the Dutch.

But the day soon came when Dutch and Swedes alike must yield to a stronger power. The English, seeing that the Dutch occupied the country from the valley of the Mohawk to Delaware Bay, naturally became alarmed, and determined to bring Dutch rule in America to an end. This they did by pointing to the discovery of the continent by the Cabots away back in 1497, and by following up this little lesson in history by sending, in 1664, a fleet and army which demanded and secured possession.

When Penn arrived in Pennsylvania in 1682, as has been previously explained, he was heartily welcomed by his Dutch and Swedish subjects whom he treated with great kindness and consideration. Nor did Penn have any trouble with the Indians. He met them in a broad-minded and brotherly manner, and they responded with a remarkable and beautiful friendship that remained unbroken for nearly eighty years. Unfortunately, however there were long and serious disputes respecting the boundaries of Pennsylvania. To determine what part of the earth's surface was embraced in Penn's grant, gave untold trouble.

Connecticut claimed nearly the whole of the upper half of the state, and strove with arms, too, to make good the claim. An examination of a map of the United States will show at once that if the northern and southern boundaries of Connecticut were carried due west, they would cut off a big slice from Pennsylvania. The people of Connecticut were determined to have this slice.

On the south, Lord Baltimore claimed a broad belt ex-

tending some distance north of Philadelphia, and westward nearly to Pittsburg. The Baltimores were stubborn, determined men, and if they did not get this large and valuable belt of land, it was not because they did not work hard enough and long enough (ninety-two years) to secure it.

All this seemed bad enough, but there was still another dispute. Virginia claimed nearly all that was left of the western end of the state up to a north-and-south line drawn a little east of Pittsburg.

Had all the claimants received what they so long and earnestly sought, Pennsylvania would have been one of the small states of this Union. Connecticut would have had a large part of our anthracite and petroleum; to Maryland would have fallen the city of Philadelphia, and much of our best bituminous coal; Pittsburg, and all it stands for, would have gone to Virginia.

“When,” says Mr. Fisher, in his “Making of Pennsylvania,” “we consider all these boundary disputes, the long years through which they extended, the violence and bitterness with which they were maintained against us, the largeness of their demands, cutting us down from greatness to littleness, and depriving us of our two important cities and points of advantage, it is hard to restrain a feeling, not merely of satisfaction at our success in resisting these attacks, but of gratitude for the skill and persistence of the Penns who accomplished this result.”

The arc of a circle which forms the boundary between Pennsylvania and Delaware is struck from New Castle as a centre with a radius of twelve miles. Its position was at first determined by David Rittenhouse, the famous Pennsylvania astronomer and mathematician. Mason and Dixon, the well-known

English astronomers, who fixed the boundary between Maryland and Pennsylvania, resurveyed the circle around New Castle; but, finding Rittenhouse's work absolutely accurate, they, of course, did not change the position of the arc.

Four years were consumed by Mason and Dixon in running the famous line which has immortalized their names. This line, separating Pennsylvania from Maryland, is parallel to the equator and $39^{\circ} 43'$ from it. In the face of opposition by the Indians, who did not understand why the astronomers were looking so often at the stars through "big guns" (telescopes), Mason and Dixon cleared a path twenty-four feet wide among the trees, and in the middle of this they marked the exact line. The end of each mile was marked with a stone. Every fifth milestone bears on the side facing Maryland the arms of Penn; on the other face are seen the arms of Baltimore. The other stones are marked with a simple P on the one side and an M on the other.

The northern boundary of the state, the forty-second parallel, was marked out by Rittenhouse in 1785-1787. The triangle in the northwest corner, called the Erie Triangle, giving us the harbor of Erie and a very important frontage on the lake, was bought from the United States in 1792 for \$151,640.

Pennsylvania's Mixed Population. — No other state in the Union has a population more varied than that of Pennsylvania. Here may be found English, Germans, Scotch-Irish, Welsh, French, Italians, Poles, Hungarians, and other races. Such variety in nationality naturally brings with it great diversity in religion. But, as in the days of Penn himself, these differences occasion little friction.

The Quakers. — The Friends, or Quakers, settled principally in and around Philadelphia. They have always been noted for their fair dealings and cordial relations with the Indians, for their love of religious liberty, for their simplicity of dress and manners, and for their per-

sistent and determined opposition to war and to slavery. Haverford College and Swarthmore College, both under the control of Friends, bear ample testimony to the scholarship and ability of these amiable and unostentatious people. From their ranks have come some of the most famous men that Pennsylvania has produced.

The Scotch-Irish. — In striking contrast with the Quakers were the Scotch-Irish, who, seeking religious liberty and good farms, came to Pennsylvania in the early years of the eighteenth century. The name Scotch-Irish is somewhat misleading. It was applied to people (many of them of English origin) who, after living many years in Scotland, went over to Ireland to take possession of the lands from which Queen Elizabeth and James I had driven the Irish.

These people preferred to be by themselves in Pennsylvania and were, therefore, generally found on the frontier. As this moved westward, they moved with it. In this manner they were scattered all over the state, and there is scarcely a county to-day without representatives of their race.

In religion the Scotch-Irish were Presbyterians, and were stanch friends of education. Washington and Jefferson College, in the western part of the state, traces its origin back to these hardy frontiersmen. It was a Scotch-Irishman, too, who established the famous "Log College" on the banks of the Neshaminy, in Bucks County. From this humble beginning came the influences that produced Dickinson College and Princeton University.

The Germans. — As we have seen, there were Germans in Pennsylvania before the Quakers arrived, but the liberal government established by Penn induced many more to follow. During the first half of the eighteenth century

nearly a hundred thousand Germans, principally industrious and skilful agriculturists, found their way to the land of Penn. Naturally these men sought fertile soil, and in the Schuylkill, Lehigh, Lebanon, Cumberland, Juniata, and Susquehanna valleys they found it in abundance. To this day the Germans own and cultivate many of the best farms in the state. They have always been patriotic and law-abiding citizens. Their services during the Revolution and the Civil War challenge the admiration of all. Among them have been many men conspicuous for their scholarship.

Pennsylvania in the French and Indian War. — When, at the beginning of the French and Indian War, General Braddock found it impossible to procure in Maryland and Virginia the horses and wagons that were absolutely necessary to transport his baggage and cannon, Benjamin Franklin of Pennsylvania persuaded the farmers of Lancaster, York, and Cumberland counties to rent to the English general 150 wagons, with 4 horses to each, and 1500 packhorses. In the crushing defeat which Braddock suffered on the banks of the Monongahela, eight miles from Pittsburg, most of these horses and wagons were lost. To reimburse the farmers for their losses required time, patience, and a good round sum of money — about \$100,000.

But this was a small matter when compared with the Indian atrocities that naturally followed the victory over Braddock. The days of Penn were forgotten. The Indians put on their war paint, and, scalping and murdering as they went, ravaged the country from Pittsburg to Harrisburg, Lancaster, and Bethlehem.

Pennsylvania in the Revolution. — The part taken by Pennsylvania in the Revolution was indeed remarkable.

The First Continental Congress, Declaration of Independence, Constitutional Convention, stand for great things in the world's history ; while Brandywine, Germantown, and Valley Forge are names dear to the hearts of the American people.

Carpenter's Hall, Philadelphia, where the first Continental Congress met, is still standing between Third



FIG. 45.

Independence Hall, Philadelphia.

and Fourth streets and a little south of Chestnut. Independence Hall, made famous by the Declaration of Independence and the Constitutional Convention, is on Chestnut Street, between Fifth and Sixth. Here may be seen the portraits of the signers of the Declaration and many interesting relics. When you go to Philadelphia you should not fail to visit these historic shrines.

At Chadd's Ford on the Brandywine, in Chester County, September 11, 1777, was fought the battle that decided

the fate of Philadelphia. Washington and Lafayette here fought side by side. The British, however, won the day, and on September 26 their army entered Philadelphia in triumph. Eight days later Washington attacked the enemy again at Germantown, but was repulsed.

The redcoats now prepared to enjoy themselves in the city, while Washington and his army sought such shelter as they could find among the hills of Valley Forge twenty-three miles away. Perhaps the British lost nearly as much in Philadelphia through self-indulgence and dissipation as the Americans did at Valley Forge through cold, disease, and hunger. This is evidently what the shrewd Franklin had in mind when he said, "Howe did not take Philadelphia — Philadelphia took Howe."



FIG. 46.

Washington's headquarters at Valley Forge, Pa.

Philadelphia — Philadelphia took Howe."

Washington's headquarters at Valley Forge may be seen from the car windows by passengers over the Philadelphia and Reading Railroad; and a portion of the battle-field of Brandywine may, in like manner, be seen by passengers over the Baltimore Central.

The Chew House, the scene of desperate fighting in the battle of Germantown, is still standing.

Pennsylvania in the Civil War. — Geographically, Pennsylvania is very close to the South, but at the time of the Civil War she was most remote from her in sympathy.

In 1861, therefore, when Washington was in danger of falling into the hands of the Southerners, the first northern troops to arrive for its defence were 530 Pennsylvania volunteers from Reading, Lewistown, Pottsville, and Allentown. From that time until the surrender at Appomattox, the Keystone State gave men and money without stint. Her total contributions to the national armies amounted to about 390,000 men — a vast army.

Naturally, Pennsylvania suffered much from raids during the war. The open fertile valleys of the state extend across Mason and Dixon's line and thus offered easy access to the treasures of the North. Her flour, fine horses, and fat cattle were sadly needed by the Confederates, and more than once did the Southern raiders come after these and other good things. Chambersburg was burned to the ground, Carlisle was shelled, and the people of the Cumberland valley generally were made extremely uncomfortable.

Finally at Gettysburg, in Adams County, came the decisive battle of the war. During the first three days of July, 1863, did this most terrible battle of modern times rage. One hundred and fifty thousand men were engaged here in deadly conflict. When the smoke of battle cleared away one-third of this great host had disappeared. "Dead, wounded, and missing" were the words that explained their absence. As the writer recently walked over a portion of the field occupied by our men during the first day, the old soldier who accompanied him, with a wave of his hand in the direction of certain fields, said, "At the end of the first day's fight, sir, those fields were blue with men" — dead and wounded soldiers.

Three famous Pennsylvania generals were at Gettys-

burg. General George G. Meade of Philadelphia commanded the Union army. Then there was General Winfield Scott Hancock of Norristown, Montgomery County, who, after valiant service, was wounded in the thickest of the fight. The brave General John F. Rey-

nolds of Lancaster was killed during the first day's fight, but he lived long enough to keep the Confederates in check until the other divisions of the army arrived and posted themselves in the strong position that, during the next two fearful days, proved impregnable.

It was at the dedication of the Soldiers' National Cemetery at Gettysburg that President Lincoln delivered that brief but immortal

address, beginning with the words, — "Four score and seven years ago our fathers brought forth upon this continent a new nation."

Famous Men. — At Kennett Square, Chester County, in 1825, was born Pennsylvania's most famous literary man, — Bayard Taylor. Taylor himself desired that his fame should rest upon his poetry; but though this was excellent, his books of travel are so delightful that he is probably best known by them.



FIG. 47.

Reynolds's monument, National Cemetery,
Gettysburg, Pa.

Bayard's fondness for poetry displayed itself very early. At almost any time during his school days, poems and scraps of poetry could be found in his desk, pockets, and hat. He was also fascinated by geography and history. When but a mere boy he made up his mind that he would see Europe. True, he had no money, but this he would get. His friends laughed at him, but this did not discourage him.

Finally, when Bayard reached his nineteenth birthday, he determined to go to Europe. But where were the necessary funds? He had published and sold one of his poems. In this way he cleared \$20. The *United States Gazette* and the *Saturday Evening Post* were then published in Philadelphia. The editors of each of these gave Bayard \$50 for his promise to write letters for their columns. The editors were not certain they would use these letters, but they were pleased with the young man's manners, and decided to help him. About the same time Bayard sold some poems in manuscript for \$20. Thus the ambitious youth had scraped together \$140—a meagre sum, indeed, with which to start to Europe.

But Bayard went, and "Views Afoot" (you may be sure he could not ride) tells in enchanting manner the wonderful story of that first visit to Europe. His books of travel (he wrote many) have a charm that captivates the reader. Russell H. Conwell, in his "Life of Bayard Taylor," says, "His books upon travel will be read for a century to come."

For many years Bayard Taylor planned to have a home of his own near Kennett Square. In time he secured land and within sight of his native village built himself a beautiful mansion which he called Cedarcroft. Here

with overflowing hospitality he entertained many distinguished people.

In 1878 President Hayes appointed him minister to Germany. His appointment was received with great pleasure on both sides of the Atlantic, but he lived less than a year to serve his country in this capacity.

In Longwood Cemetery, about a mile and a half from Cedarcroft, under a handsome Greek altar, by the side of



FIG. 48.

Tomb of Bayard Taylor.

his first wife, the beautiful, loving, and lovable Mary Agnew, lies the poet and traveller, "taking, after his painful toils, the fitting rest." Around the frieze of the altar are these most appropriate words, — "He being dead yet speaketh."

The list of famous Pennsylvanians is very long. We suggest a few of many names that will amply repay study: Benjamin Franklin, James Buchanan, Robert Fulton, Stephen Girard, Elisha Kent Kane, Isaac I. Hayes, Thomas Buchanan Read, David Rittenhouse, Andrew G. Curtain, Thaddeus Stevens, Benjamin West, George Westinghouse.

EDUCATION

If any boys and girls in Pennsylvania grow up in ignorance, it is certainly not the fault of the state. The total amount of the state appropriation for public education is now \$5,500,000 annually. Of this amount \$200,000 are for the use of the thirteen state normal schools, and

\$50,000 are intended for township high schools. The balance, \$5,250,000, is for the common schools. This is a large sum of money, but it is only a small part of what is spent on public education. The school districts throughout the state raise by local taxation about \$18,000,000 more.

The whole number of children in the public schools of the state for the year ending June 3, 1901, was 1,161,524—more than one-sixth of the entire population. There were 30,044 teachers engaged in teaching these children. Teachers and children together, if placed six abreast, with two feet between the ranks, would make a column seventy-five miles in length.



FIG. 49.

Boys' Central High School, Philadelphia, Pa.

The present magnificent system of public schools in Pennsylvania, however, is not yet seventy years old. It dates from 1834. Previous to this there were denominational and private schools, but these could not reach the masses. Thousands went through life without knowing anything about the blessings of a school education.

In the state constitution of 1790, it should also be remembered, was the following provision: "The Legislature shall, as soon as conveniently may be, provide by

law for the establishment of schools throughout the state, in such numbers that the poor may be taught gratis."

In practice this meant that in order to be "taught gratis" the pupils, or rather their parents, must plead poverty. The rich and the well-to-do were required to pay for the tuition of their children. This plan had many and serious defects. The poor were not pleased with such schools because, in order to share their benefits, they must confess poverty; the rich and the well-to-do were no better satisfied with them, because the schools were naturally nicknamed "charity" and "pauper" schools.

After considerable opposition the Free School Act was passed in 1834. The law was to go into effect in September of that year. When, however, the people were notified to carry out the law, there was a blaze of indignation, and the law was generally either evaded or defied. In many places free-school men were shamefully treated and not infrequently ruined in business.

Some of the arguments against the education of all the children were that such education would create idleness, vice, and crime, and that the money required would bankrupt the state. Those who held these peculiar opinions determined to have the law repealed. The battle was, accordingly, carried to the halls of legislation at Harrisburg, where the final test of strength between the opponents and the friends of free education came on the 11th of April, 1835.

When on that day the chaplain rose for prayer, for what do you think he prayed? He besought Almighty God "to lay bare his strong right arm and save the state from the poverty and bankruptcy which were sure to follow if the people were to have their property wrested from them for the education of all the children." Soon after this wonderful prayer, the able and courageous Thaddeus Stevens took the floor, and in one of the most powerful speeches of his life defended the new school law. "Sir," said Mr. Stevens, in the course of his speech, "I trust that when we come to act on this question, we shall take

lofty ground, — look beyond the narrow space which now circumscribes our vision, — and so cast our votes that the blessing of education shall be conferred on every son of Pennsylvania, shall be carried home to the poorest child of the poorest inhabitant of the meanest hut of your mountains, so that even he may be prepared to act his part in this land of freemen, and lay on earth a broad and solid foundation for that enduring knowledge which goes on increasing through increasing eternity.”

To the magic of Mr. Stevens’s oratory was largely due the victory that was won for free schools. There is not a child in the schools of Pennsylvania that does not owe Thaddeus Stevens a debt of gratitude.

Nor should the name of George Wolf, governor of the state at this critical period, be forgotten. All his influence, power, and sympathy were with the friends of free education.



FIG. 50.

Thaddeus Stevens.

The Public Schools. — The value of the work done in the public schools of Pennsylvania is beyond all calculation. Here are laid the foundations of good citizenship and of happy and prosperous lives. The rich and the poor, the native born and the foreigner, meet here on a common level. Here they learn to know and to respect each other. In the public schools, obedience, politeness, industry, self-reliance, and ability count for much; birth and station for nothing.

The Normal Schools. — In order to prepare young men and young women for the difficult and delicate work of teaching, normal schools have been established by the state. The counties of the state are grouped into thirteen normal school districts, and in each of these is a flourishing normal school. These schools are of supreme importance to those



FIG. 51.

College Hall, University of Pennsylvania,
Philadelphia.

who wish to prepare to teach. They are located as follows: West Chester, Millersville, Kutztown, East Stroudsburg, Mansfield, Bloomsburg, Shippensburg, Lock Haven, Indiana, California, Slippery Rock, Edinboro, and Clarion.

Colleges and Universities. — In the Pennsylvania Report of the Superintendent of Public Instruction for 1901 may be found the names of twenty-nine colleges and universities that are found within the state. The list is given in the Appendix.

Chief among them is the University of Pennsylvania, at Philadelphia, with over 2500 students and about 270 professors, lectur-



FIG. 52.

Library, University of Pennsylvania, Philadelphia.

ers, and instructors. In addition to the regular classical course, the University maintains departments in philosophy, geography, law, medicine, engineering, hygiene, dentistry, and veterinary medicine. There is also a well-equipped astronomical observatory.

At the other end of the state is the Western University of Pennsylvania, with nearly 1000 students and 125 pro-



FIG. 53.

Group of buildings, Western University of Pennsylvania, Allegheny, Pa.

fessors and instructors. The work done in the astronomical observatory of this institution, by Professor Langley and Professor Keeler, has attracted the attention and challenged the admiration of the greatest astronomers in the world. Indeed, the Western University has been called "the cradle of the new astronomy."

Midway between these two universities, in Centre County, is the Pennsylvania State College. Thirteen four years' courses are now organized here,—four general

courses and nine technical ones. Under the latter division is a course in agriculture. To residents of Pennsylvania tuition is free. Students from other states pay \$100 a year for tuition. The enrolled attendance is now over five hundred.

SUGGESTIVE QUESTIONS.—(1) Is there any college or university in your vicinity? (2) Who is president? (3) What courses are maintained? (4) What degrees are conferred? (5) What are the entrance requirements? (6) What is the charge for tuition? (7) What of the library? (8) The museum? (9) Is the college open to both sexes? (10) Do you know any persons who are graduates of the college? (A catalogue, which may be had free upon application, will give you information on the subjects here suggested.)

Other Educational Institutions.—The deaf and dumb, the blind, the feeble-minded, and the orphans are all generously provided for in excellent schools maintained wholly or in part by the state. At Huntingdon, Huntingdon County, is the Pennsylvania Industrial Reformatory, and at Morganza, Washington County, is the Pennsylvania Reform School. The officers of these two institutions now have charge of over a thousand young criminals whom they are seeking to reform.

Hospitals for the Insane.—While asylums for the insane cannot be called educational institutions, they may be taken as a fair index of the degree of civilization in the state. The idea that insanity is the result of physical disease, and that successful treatment of it must be gentle and kind, is comparatively new. In the days of Shakespeare, and long after his time, lunatics were thrown into dungeons, loaded with chains, and beaten without mercy. The following item from an English constable's account-book illustrates the custom of whipping wandering lunatics: "Paid in charges for taking up a distracted woman, watching her, and whipping her next day, 8s. 6d." Indeed, insane persons were not infrequently burned at the stake as witches.

The Quakers of Pennsylvania were among the very first to recognize insanity as a bodily disease, and to provide for its

proper treatment. To-day over six thousand patients are receiving scientific treatment in the six insane asylums of the state. Of all the triumphs won by science for humanity, none surpass in good effects the modern treatment of the insane.

QUESTIONS AND SUGGESTIONS. — (1) Can the deaf and dumb be taught geography, history, and arithmetic? (2) Can the blind study such subjects? (3) Do you know of any school for the blind? (4) For the deaf? (5) Perhaps you can get one of the annual reports from The Pennsylvania Institution for the Instruction of the Blind, at Overbrook, Philadelphia, or from "The Pennsylvania Institution for the Deaf and Dumb," at Mt. Airy, Philadelphia. (6) Sketches of the hospitals for the insane, located at Harrisburg, Danville, Norristown, Warren, Dixmont, and Wernersville, may be found in Smull's "Legislative Hand Book."

GOVERNMENT

Legislative Department. — The law-making power of the state of Pennsylvania is the General Assembly, which convenes at the capitol once in two years. The regular sessions begin on the first Tuesday of January of every odd year. Though the length of these sessions is not fixed by law, they usually last about five months.

The General Assembly consists of a Senate and a House of Representatives. At present there are 50 senators, and 204 representatives. Senators are chosen for four years, and representatives for two; the former must be at least twenty-five years of age, and the latter twenty-one. Senators and representatives receive the same compensation, — \$1500 for the regular biennial session, and mileage at the rate of twenty-five cents per mile. For a special session they receive \$500 and mileage. In addition to this they are given \$50 for stationery and \$100 in postage.

The Executive Department. — The governor is chosen by the people for a term of four years. He is clothed, by

the constitution of the state, with great power. He must be at least thirty years old, and cannot be elected for two terms in succession. His salary is \$10,000 a year.

There is also a lieutenant-governor. If the governor dies, or is for any reason unable to discharge his duties, the lieutenant-governor takes his place. He is also *ex officio* the presiding officer of the Senate. He is elected at the same time and for the same term as the governor. His salary is \$5000 a year.



FIG. 54.

New State Capitol, Harrisburg, Pa.

Other important officers of the state are the secretary of the commonwealth, attorney-general, auditor-general, secretary of internal affairs, state treasurer, adjutant-general, superintendent of public instruction, and secretary of agriculture. For the names of these officers, and the salaries which they receive, see Smull's "Legislative Hand Book." What are the duties of the officers named in this paragraph?

The Judicial Department. — "The Judicial Power of this Commonwealth," says the Constitution of Pennsyl-

vania, "shall be vested in a Supreme Court, in courts of Common Pleas, courts of Oyer and Terminer and General Jail Delivery, courts of Quarter Sessions of the Peace, Orphans' Courts, Magistrates' Courts, and in such other courts as the General Assembly may from time to time establish."

The Supreme Court consists of seven judges who are elected by the voters of the state at large. They hold office for twenty-one

years, but are not again eligible. The salary is \$8000 a year, but the chief justice receives \$500 extra. The Supreme Court sits at Philadelphia, Harrisburg, and Pittsburg.

Because the Supreme Court was overloaded with business, the General Assembly, in 1896, established another court, — the Superior Court.

This, too, consists of seven judges elected by the voters of the state, but the term is only ten years. The Superior Court holds annual sessions at Philadelphia, Scranton, Williamsport, Harrisburg, and Pittsburg.

SUGGESTIVE QUESTIONS.—(1) What courts are found in your county? (2) In your city? (3) In your borough? (4) Who are

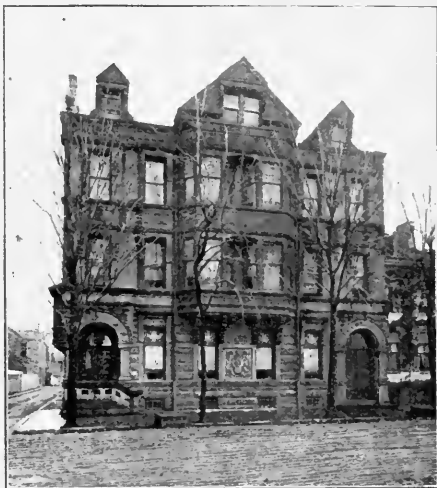


FIG. 55.

The Executive Mansion, Harrisburg, Pa.

your chief county officers? (5) What is the length of the term for which each is elected? (6) Consider the same questions with respect to the township and the borough. (7) Is there a legislative body in your vicinity? If so, what is the scope and character of its work? (8) Are you acquainted with any executive officers? (9) Who are they? (10) What do they do? (11) Are there any judicial officers in your vicinity?

A FEW REFERENCE BOOKS

Smull's "Legislative Hand Book."

"Town Geology," by Professor Angelo Heilprin. Published by the author.

"The Making of Pennsylvania." By Sydney George Fisher. Henry T. Coates and Company, Philadelphia.

"A History of Pennsylvania." By L. S. Shimmell. R. L. Myers and Company, Harrisburg, Pa.

"The Story of Philadelphia." By Lillian Ione Rhoades. American Book Company.

"Industrial Evolution of the United States." By Carroll D. Wright. Flood and Vincent, Meadville, Pa.

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Annual Reports of the Secretary of Internal Affairs. State Printer of Pennsylvania.

APPENDIX

TABLE OF COLLEGES AND UNIVERSITIES IN PENNSYLVANIA

NAME OF INSTITUTION	LOCATION	
	City or Town	County
Allegheny College	Meadville . . .	Crawford
Bryn Mawr	Bryn Mawr . . .	Montgomery
Bucknell University	Lewisburg . . .	Union
Central High School, Philadelphia	Philadelphia . .	Philadelphia
Dickinson College	Carlisle	Cumberland
Franklin and Marshall College . .	Lancaster	Lancaster
Geneva College	Beaver Falls . .	Beaver
Grove City College	Grove City . . .	Mercer
Haverford College	Haverford	Delaware
Lafayette College	Easton	Northampton
Lebanon Valley College	Annville	Lebanon
Lehigh University	South Bethlehem	Northampton
Moravian College	Bethlehem . . .	Northampton
Muhlenberg College	Allentown	Lehigh
Pennsylvania College	Gettysburg . . .	Adams
Pennsylvania Military College . .	Chester	Delaware
Pennsylvania State College	State College . .	Centre
St. Vincent College	Beatty	Westmoreland
Susquehanna University	Selingsgrove . .	Snyder
Swarthmore College	Swarthmore . . .	Delaware
Thiel College	Greenville	Mercer
University of Pennsylvania	Philadelphia . .	Philadelphia
Ursinus College	Collegetown . .	Montgomery
Villanova College	Villanova	Delaware
Washington and Jefferson College	Washington . . .	Washington
Waynesburg College	Waynesburg . . .	Greene
Western University of Pennsyl- vania	Allegheny and Pittsburg	Allegheny
Westminster College	New Wilmington	Lawrence
Wilson Female College	Chambersburg . .	Franklin

¹ From Pennsylvania Report of the Superintendent of Public Instruction, 1901.

POPULATION OF PENNSYLVANIA — 1790 TO 1900

CENSUS YEARS	POPULATION	PER CENT OF INCREASE	CENSUS YEARS	POPULATION	PER CENT OF INCREASE
1790 . .	434,373		1850 . .	2,311,786	34.1
1800 . .	602,365	38.7	1860 . .	2,906,215	25.7
1810 . .	810,091	34.5	1870 . .	3,521,951	21.2
1820 . .	1,047,507	29.3	1880 . .	4,282,891	21.6
1830 . .	1,348,233	28.7	1890 . .	5,258,014	22.8
1840 . .	1,724,033	27.9	1900 . .	6,302,115	19.9

TABLE SHOWING GROWTH OF CITIES IN PENNSYLVANIA WITH MORE THAN 25,000 INHABITANTS — 1790 TO 1900

	1900	1870	1840	1810	1790
Philadelphia . .	1,293,697	674,022	93,665	53,722	28,522
Pittsburg . . .	321,616	86,076	21,115	4,768	—
Allegheny . . .	129,896	53,180	10,089	—	—
Scranton . . .	102,026	35,092	—	—	—
Reading . . .	78,961	33,930	8,410	3,462	—
Erie	52,733	19,646	3,412	394	—
Wilkesbarre . .	51,721	10,174	1,718	1,225	—
Harrisburg . .	50,167	23,104	5,980	2,287	—
Lancaster . . .	41,459	20,233	8,417	5,405	—
Altoona	38,973	10,610	—	—	—
Allentown . . .	35,416	13,884	2,493	—	—
Johnstown . . .	35,936	6,028	949	—	—
McKeesport . .	34,227	2,523	—	—	—
Chester	33,988	9,485	1,790	—	—
York	33,708	11,003	4,779	2,847	—
Williamsport .	28,757	16,030	1,353	344	—
New Castle . . .	28,339	6,164	611	—	—
Easton	25,238	10,987	4,865	1,657	—

CITIES AND BOROUGHS OF PENNSYLVANIA WITH MORE
THAN 3000 INHABITANTS, CENSUS OF 1900

CITY OR BOROUGH	POPULATION	CITY OR BOROUGH	POPULATION
Allegheny	129,896	Coatesville	5,721
Allentown	35,416	Columbia	12,316
Altoona	38,973	Connellsville	7,160
Archbald	5,396	Conshohocken	5,762
Ashland	6,438	Corry	5,369
Ashley	4,046	Coudersport	3,217
Athens	3,749	Danville	8,042
Avoca	3,487	Darby	3,429
Bangor	4,106	Dickson	4,948
Beaver Falls	10,054	Doylestown	3,034
Bellefonte	4,216	Dubois	9,375
Bellevue	3,416	Dunmore	12,583
Berwick (Columbia County)	3,916	Duquesne	9,036
Bethlehem	7,293	East Mauch Chunk	3,458
Blairsville	3,386	Easton	25,238
Blakely	3,915	Edwardsville	5,165
Bloomsburg	6,170	Elliott	3,345
Braddock	15,654	Erie	52,733
Bradford	15,029	Etna	5,384
Bridgeport	3,097	Forest City	4,279
Bristol	7,104	Franklin	7,317
Butler	10,853	Freeland	5,254
Carbondale	13,536	Gettysburg	3,495
Carlisle	9,626	Gilberton	4,373
Carnegie	7,330	Girardville	3,666
Catasauqua	3,963	Greensburg	6,508
Chambersburg	8,864	Greenville	4,814
Charleroi	5,930	Hanover	5,302
Chester	33,988	Harrisburg	50,167
Clearfield	5,081	Hazleton	14,230
		Homestead	12,554

CITIES AND BOROUGHS OF PENNSYLVANIA—*Continued*

CITY OR BOROUGH	POPULATION	CITY OR BOROUGH	POPULATION
Huntingdon	6,053	Monongahela	5,173
Indiana	4,142	Mt. Carmel	13,179
Jeannette	5,865	Mt. Pleasant	4,745
Jersey Shore	3,070	Nanticoke	12,116
Johnsonburg	3,894	New Brighton	6,820
Johnstown	35,936	Newcastle	28,339
Kane	5,296	New Kensington	4,665
Kingston	3,816	Norristown	22,265
Kittanning	3,902	North Braddock	6,535
Knoxville (Allegheny County)	3,511	Oil City	13,264
Lancaster	41,459	Old Forge	5,630
Lansford	4,888	Olyphant	6,180
Latrobe	4,614	Philadelphia	1,293,697
Lebanon	17,628	Philipsburg	3,266
Lehighton	4,629	Phœnixville	9,196
Lewisburg	3,457	Pittsburg	321,616
Lewistown	4,451	Pittston	12,556
Lock Haven	7,210	Plymouth	13,649
Luzerne	3,817	Pottstown	13,696
McKeesport	34,277	Pottsville	15,710
McKees Rocks	6,352	Punxsutawney	4,375
Mahanoy City	13,504	Quakertown	3,014
Mauch Chunk	4,029	Rankin	3,775
Meadville	10,291	Reading	78,961
Mechanicsburg (Cum- berland County)	3,841	Renovo	4,082
Media	3,075	Reynoldsville	3,435
Meyersdale	3,024	Ridgway	3,515
Middletown	5,608	Rochester	4,688
Millvale	6,736	St. Clair	4,630
Milton	6,175	St. Marys	4,295
Minersville	4,815	Sayre	5,243
		Schuylkill Haven	3,654
		Scottdale	4,261

CITIES AND BOROUGHS OF PENNSYLVANIA—*Concluded*

CITY OR BOROUGH	POPULATION	CITY OR BOROUGH	POPULATION
Scranton	102,026	Towanda	4,663
Sewickley	3,568	Turtle Creek	3,262
Shamokin	18,202	Tyrone	5,847
Sharon	8,916	Union City	3,104
Sharpsburg	6,842	Uniontown (Fayette County)	7,344
Shenandoah	20,321	Warren	8,043
Shippensburg	3,228	Washington (Wash- ington County)	7,670
Slatington	3,773	Waynesboro	5,396
South Bethlehem (Northampton Co.)	13,241	West Bethlehem	3,465
South Williamsport	3,328	West Chester	9,524
Steelton	12,086	West Pittston	5,846
Stroudsburg	3,450	Wilkesbarre	51,721
Sunbury	9,810	Wilkesburg	11,886
Susquehanna	3,813	Williamsport	28,757
Tamaqua	7,267	Wilmerding	4,179
Tarentum	5,472	Winton	3,425
Taylor	4,215	York	33,708
Titusville	8,244		

THE COUNTIES OF PENNSYLVANIA

COUNTY	AREA, SQUARE MILES	POPULATION, 1900	COUNTY SEAT
Adams	531	34,496 Gettysburg
Allegheny	757	775,058 Pittsburg
Armstrong	612	52,551 Kittanning
Beaver	452	56,432 Beaver
Bedford	1,003	39,468 Bedford
Berks	900	159,615 Reading

THE COUNTIES OF PENNSYLVANIA — *Continued*

COUNTY	AREA, SQUARE MILES	POPULATION, 1900	COUNTY SEAT
Blair	510	85,099	Hollidaysburg
Bradford	1,162	59,403	Towanda
Bucks	595	71,190	Doylestown
Butler	814	56,962	Butler
Cambria	666	104,837	Ebensburg
Cameron	381	7,048	Emporium
Carbon	402	44,510	Mauch Chunk
Centre	1,227	42,894	Bellefonte
Chester	763	95,695	West Chester
Clarion	572	34,283	Clarion
Clearfield	1,130	80,614	Clearfield
Clinton	857	29,197	Lock Haven
Columbia	479	39,896	Bloomsburg
Crawford	1,005	63,643	Meadville
Cumberland	544	50,344	Carlisle
Dauphin	523	114,443	Harrisburg
Delaware	195	94,762	Media
Elk	774	32,903	Ridgway
Erie	772	98,473	Erie
Fayette	830	110,412	Uniontown
Forest	431	11,039	Tionesta
Franklin	756	54,902	Chambersburg
Fulton	442	9,924	McConnellsburg
Greene	620	28,281	Waynesburg
Huntingdon	899	34,650	Huntingdon
Indiana	828	42,556	Indiana
Jefferson	646	59,113	Brookville
Juniata	407	16,054	Mifflintown
Lackawanna	424	193,831	Scranton
Lancaster	973	159,241	Lancaster
Lawrence	376	57,042	New Castle
Lebanon	356	53,827	Lebanon



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