The only organized group of the region was the band of Moravians that founded Bethlehem in 1741. They came with a fixed purpose to serve as missionaries to the Indians. Their history more properly belongs to Northampton County, although very early they extended their activities beyond its borders. The Indian village of Nain, built by them, was in Lehigh County, and a Moravian group settled early at Emmaus and gave it its biblical name.

Improvements of different kinds came rapidly, but the first community need was for better transportation facilities. In 1735 the first road was laid out. By present locations it extended from about one-fourth mile northwest of Breinigsville, through Macungie, Shimerville, Old and New Zionsville, Hosensack, and thence to North Wales in Montgomery County, where it connected with an existing road to Philadelphia. Other roads quickly followed.

The government of the region was a matter of early concern. When the first settlers arrived the section was part of the original Bucks County, one of the three original counties established by William Penn in 1682. The distance to the county seat and the travel difficulties necessitated smaller units as the settlements increased. On March 11, 1752, Northampton County was established and on March 6, 1812, a portion was separated to constitute Lehigh County. Division into townships also progressed during a period of years. The first township to be organized was Upper Milford in 1737. It later was divided into Upper and Lower Milford. Saucon Township was established in 1743, but at the time included both Lower Saucon Township, Northampton County, and Upper Saucon Township, Lehigh County. The early erection of these two townships indicates the rapidity with which the region was settled. The establishment of other townships by division and alteration continued over a long period.

For many years after its settlement, German was the almost universal language in Lehigh County. The German used was in the beginning the dialect of the Palatinate, but in time many corruptions crept in until Pennsylvania German (erroneously frequently called “Pennsylvania Dutch”) gradually became essentially a distinct dialect and was carried far beyond the borders of Pennsylvania. Although still in common use, especially among the older residents, generally the children of today are unable to speak it. The rapid decrease in use of the dialect during the past few decades has been brought about by its ban in the public schools, good roads and automobiles, rural free mail delivery, the telephone, and the radio.

The further history of Lehigh County is not pertinent to this report. Mills were erected along the streams, taverns opened along the roads, and gradually shops, factories, and villages came into existence. Starting as a purely agricultural region it has gradually passed into a highly industrial one. The population also has become far more mixed as immigrants later came from more varied sources. The development of the various industries of the region will be discussed in later chapters.

Bibliography

Even though some repetition is involved, in that titles given below are also included in the general bibliography, a short selected list of
the most important historical publications dealing with Lehigh County is given here. The earliest works deal mainly with the Indians. The Moravian Archives, Bethlehem, contain a wealth of material concerning the early settlement of the Lehigh Valley.

Loskiel, George Heinrich. Geschichte der Mission der evangelischen Brüder unter den Indianen in Nordamerika.
784 pp., Barby, Leipzig, 1789.
See Loskiel 1794.

Translated from the German by Christian Ignatius LaTrobe.
In three parts, pp. 159, 234, 233. Index (19 pp.), London, 1794. (Copy in Lehigh University Library contains map 16" x 18½" of “Part of the United States of America, published 15th Nov. 1798 by J. Stockdale, Piccadilly.” The map shows “those places in which the Christian Indians resided.”)
An extremely interesting narrative which portrays life and character of the Indians who inhabited this region.


Heckewelder, John. A Narrative of the Mission of the United Brethren among the Delaware and Mohegan Indians, from its commencement, in the year 1740, to the close of the year 1808, comprising all the remarkable incidents which took place at their missionary stations during that period, interspersed with anecdotes, historical facts, speeches of Indians, and other interesting matter.
429 pp., Philadelphia, 1820.

Rupp, I. Daniel. History of Northampton, Lehigh, Monroe, Carbon and Schuylkill Counties: containing a Brief History of the First Settlers, Topography of Townships, notices of leading events, incidents, and interesting facts in the early history of these counties; with An Appendix, containing matters of deep interest. Embellished by several engravings.
554 pp., Harrisburg, 1845.

Henry, M. S. History of the Lehigh Valley, containing a copious selection of the most interesting facts, traditions, biographical sketches, etc., relating to its History and Antiquities, with a complete history of all its internal improvements, progress of the coal and iron trade, manufactures, etc. ... Illustrated by numerous engravings.
436 pp., Easton, 1860.

747 pp., Philadelphia, 1871.

72 + 37 pp., 50 maps, Reading Publishing Co., Reading, Pa., 1876.
LEHIGH COUNTY


MERCER, HENRY C. The Antiquity of Man in the Delaware Valley. Reprinted from publications of the University of Pennsylvania, Vol. VI. 85 pp., 30 figs., Boston, 1897.


DEVELOPMENT OF KNOWLEDGE OF THE GEOGRAPHY AND GEOLOGY OF LEHIGH COUNTY WITH BIBLIOGRAPHY AND CARTOGRAPHY

By Benjamin L. Miller

The region embraced within the present limits of Lehigh County was first visited by white men about 1701. So far as known these earliest visitors left no written record of their observations, a situation that prevails likewise with the still earlier inhabitants, the Delaware Indians.

The earliest contributions to our knowledge of the area were made by explorers and travelers, some of whom have left records of careful and exact observations. An example of exaggeration or fantastic description is the work of Gottlieb Mittelberger, who made a journey to Pennsylvania in the years 1750-1754, and returning to Germany related many a "tall story" of his experiences and the objects he had seen.

The map-makers, geographers, geologists, and historians also began their work soon after the first settlements were made and have continued to add to our knowledge down to the present at an almost steadily increasing rate. For the past 100 years there is scarcely a year without some worthwhile contribution.

Naturally the titles contained in the bibliography and cartography are of unequal value. In many the information is indefinite, fragmentary and, in certain cases, incorrect. Certain articles are, in large part, merely repetitions of previous ones. All that have come to the attention of the writer have been listed, regardless of their merits or demerits, with the idea in mind that time and effort may be saved thereby for future investigators.

In this 200-year record the writings of a few men stand out so prominently as to deserve specific mention. For the first century these are James Scull, Nicholas Scull, W. Scull, Lewis Evans, William Maclure, frequently called the "Father of North American Geology," and Parker Cleaveland.

The second century opened the era of systematic investigations by trained scientists. In 1836 the First Geological Survey of Pennsylvania was established with the brilliant geologist, Henry D. Rogers, as Director. In his Second Annual Report published in 1838 he laid the foundation for all later geological and geographical work in the region. In his succeeding Third, Fourth and Fifth annual reports and in the comprehensive Final Report (1858) he supplied a mass of data that still possesses much value and must be consulted by all present-day workers. More detailed studies have been made since that time and many explanations have been modified, yet little change has been made in the basal concepts of Rogers and his co-workers as expressed in their writings between 1836 and 1858.
Between the close of the First Geological Survey and the beginning of the Second Geological Survey of Pennsylvania in 1874, the contributions were less numerous and in general of minor importance. Articles descriptive of the Friedensville zinc mines appeared during this time and some historical publications containing important geographical material.

The Second Geological Survey, 1874 to 1895, was under the direction of J. Peter Lesley, who seems to have visited Lehigh County on numerous occasions. Several other members of the Survey were also interested in specific problems, but the major investigations were made by Frederick Prime, Jr., who was especially assigned to the Lehigh Valley. Prime devoted most of his attention to the iron mines, which at that time were being worked most actively. However, he did considerable stratigraphic and structural work in addition to his economic studies. R. N. Sanders studied the slate quarries and F. A. Genth collected information concerning the minerals for the Survey. Also Dr. Edgar F. Smith, then Professor of Chemistry in Muhlenberg College, likewise contributed to our knowledge of Lehigh County minerals.

From the close of the Second Survey until the establishment of the existing Fourth Survey little systematic geological work was carried on in the region. Occasional articles, mainly pertaining to the economic mineral resources, were published. Most of these were prepared by the staff members of the geological departments of Lafayette College and Lehigh University. Three of the investigators of this period are worthy of special mention. They are the late Dr. Edward H. Williams, Jr., the late Dr. Frederick B. Peck, the head of the Department of Geology in Lafayette College for many years, and Dr. Edgar T. Wherry, now a member of the botanical department of the University of Pennsylvania. The contributions of these men are of great importance.

**Bibliography and Cartography**

**1715**

MOLL, HERMAN. A New and Exact Map of the Dominions of the King of Great Britain on ye Continent of North America.

London, 1715 (Dedication gives date of 1711). 26"x40". Scale 1 inch = 60 miles. Moravian Archives.

It appears that no information in regard to the regions embraced in Lehigh County was available. The "Perquemuck" (Schuylkill) River flows almost parallel to the "Dellaware" River to its junction at Philadelphia.

**1738**

SCULL, JAMES. Manor of Macungy. Tract of Land Situate in Macungy & Whitehall Townships in County of North Hampton containing two thousand one hundred & forty seven acres and 101 perches with allowance of 6 per cent by James Scull.

13¾"x17¾". Pennsylvania Archives, 3d ser., vol. 4.

A very irregular tract. Owners of adjoining properties are named.

**1740**

EASTBURN, BENJAMIN, Surveyor General. A Draught of Sundry Tracts of Lands, surveyed to Divers purchasers in ye Forks of Delaware River, and on, and near the West Branch of said River, in ye County of Bucks.
Drawn in the year 1740, by Benja. Eastburn, Surv'v. Gen'l. 21"x33". Scale: 1 inch = ½ mile. Hist. Soc. of Pa., Moravian Archives.

Manuscript map. Shows ownership of various tracts, many belonging to William Allen. The Lehigh River is called the West Branch of the Delaware. "Menaskie" creek, "Leheigh" (Little Lehigh) creek. Map covers area embracing location of present towns of Easton, Bethlehem, Allentown, Coplay, etc.

1749

EVANS, LEWIS. A map of Pensilvania, New-Jersey, New-York and the Three Delaware Counties by Lewis Evans, MDCCXLIX.


See Gipson, L. H. 1939.

"Groushall" (generally written Grousehall) (Hunting lodge of Lynford Lardner) is only place named in Lehigh County. Bethlehem is written "Bethlem." South Mountain is called "Leheigh Hills" and the range on the north side of the county is called "The Blue mountains or the Kittatinny M." Cedar, Truckers (now Jordan), and Trout creeks are shown.

Different descriptions are printed on margins of map, including a fairly accurate one of the weather.

This map with some revision was republished in 1752.

1750


This is Evans' map drawn for Peter Kalm. The Lehigh County region is a smaller scale representation of the 1749 map.

1752

ANONYMOUS. Northampton County. Map 17½"x19½". Scale: 1 inch = 5¾ miles.

Original in Amer. Phil. Soc., Phila. Photostat in Hist. Soc. of Pa. Is dated 1752 but contains much later data such as names of counties (Lehigh, Carbon, Monroe, Pike, etc.) erected long after that date. It is possible that this map was later changed.

A generalized manuscript map which includes the entire territory lying north of Bucks County to the New York State line and westward to the Schuylkill River.

1753

ANONYMOUS (Probably C. G. Reuter). Bethlehem Tract with all the Adjacent Lands, 1753 (?).

18½"x30". Scale 1 inch = about 3.75 perches. Hist. Soc. of Pa. Pen and ink, partly colored. Scale incorrect; area larger.)

Sawmills on Sand Island along Monocacy Creek. Opposite it along Lehigh River "S. (single) Sr's. washhouse." "S. (single) Breth. washhouse" along Lehigh River to the west about where silk mill now stands.

EVANS, LEWIS. A Brief Account of Pennsylvania, 1753.

Two manuscripts exist in the libraries of the Historical Society of Pennsylvania and The Library Company of Philadelphia, neither of which is the original. Published recently by L. H. Gipson. See Gipson, L. H. 1939 in this bibliography.

Contains an interesting description of the Great Valley in which the greater portion of Lehigh County is situated.

"Between the Kittatinny Mountains, & a smaller Chain of Hills, which we call by several names, as Lexey (Evans' name for Lehigh) Hills, Oley Hills, Flying Hills, & South Mountain etc. there is a fine Valley from 8 to 12 Miles wide, which extends under different Names, from New Jersey to Georgia, above 800 miles, the Stone of it is mostly Limestone, and the Soil, very good. A very singular appearance runs thro' all the little Hills, above mentioned, they seem'd formerly not to have belonged to the Soil, but to have been laid a top of the Ground: The same Stratum extends under them, from one Side to the other, & where they are broken for the passage of Rivers the Lime Stone & other Strata, are everywhere obvious under them, & The same Phoenomena, attend most other little Hills."
1755

EVANS, LEWIS. A General Map of the Middle British Colonies in America by Lewis Evans. 1755.


- Differs only slightly from Evans’ 1749 and 1752 maps. Trout, Truckers (Jordan), Lehey (Little Lehigh), and Saucon (probably Ontelaunee) creeks are shown.

EVANS, LEWIS. Analysis of a Map of the Middle British Colonies in America.

32 pp., Philadelphia, 1755.

Describes in a general way the topography and drainage of the region. "The South Mountain is not in Ridges like the Endless Mountains, but in small, broken, steep stony Hills; nor does it run with so much Regularity. In some Places it gradually degenerates to Nothing, not to appear again for some Miles in Breadth. Between the South Mountain and the higher Chain of the Endless Mountains, (often for Distinction called the North Mountain and in some Places the Kittatinni, and Pequillin), there is a Valley of pretty even, good Land, some 8, 10 or 20 Miles wide, which is the most considerable Quantity of valuable Land that the English are possesst of; and runs through New-Jersey, Pennsylvania, Maryland and Virginia. It has yet obtained no general Name, but may properly enough be called Piedmont, from its Situation. Besides Conveniences always attending good Land, this Valley is everywhere enriched with Limestone." (p. 7.)

"The West Branch of Delaware" (the Lehigh River) "is but inconsiderable, compared with the North-Eastern Branch, into which it falls at Easton." (p. 21.)

1756

MITTENBERGER, GOTTLIEB. Reise nach Pennsylvanien im Jahr 1750 und Rûckreise Deutschland im Jahr 1754.

Stuttgart, 1756.

See Eben, Carl Theo., 1898 for translation.

1758

ANONYMOUS. Map extending from Forks of the Delaware (Easton) to Mæcongy (Macungie) north of “Lehi” Hills. “Copy 1758.”

11”x15”. Scale: 1 inch = 400 perches. Hist. Soc. of Pa.

Not much information.

REUTER, P. C. G. Historical Map of the Moravian Lands at Bethlehem.

Based upon a map drawn by P. C. G. Reuter, March, 1758.

14”x17”. Scale: 1 inch = 100 rods. Pen and ink drawing. Hist. Soc. of Pa.

Shows location of Nain, about 250 rods west of Monocacy Creek and north of small tributary. South Mountain is named “The Lecha Mountain.”

1759

ANONYMOUS. Draft of the Lands in Salisbury which Jacob Ehrenhardt and Sebastian Knause donated to the Moravian Settlement (Gemein Ort.) in that Township. Surveyed April 10, 1759.


Shows ownership of several tracts along the Little Lehigh Creek.

SCULL, NICHOLAS. Map of the improved Part of the Province of Pennsylvania by Nicholas Scull. 1759.

30”x60”. Scale: 1 inch = 3.8 miles. Pennsylvania Archives, 3d ser., app. vol.

Several townships are named. The Lehigh River (called West Branch of the Delaware), Trout, Jordan and Lehegh (Little Lehigh) creeks are shown. Settlements or single homes are located such as Truckers mill (near mouth of Trout Creek, Grouschall (west of present Allentown), Trexler (Trexlerstown), Kime (north-west of Trexler), Billman Mill (near present Deibertsville), Hinkle (near site of Shimerville), Crall (near site of Zionsville), and Plumsted on Cedar Creek.
**1760**

**Anonymous.** A Draught of Several Roads going through Bethlehem Land. 1760.

$15\frac{3}{4}''\times 16''$. Scale: $1$ inch $= 200$ perches. Pen and ink drawing. Hist. Soc. of Pa.

Shows location of "Nain, ye Indian Town" on west side of "Manokasy" Creek and north of stream coming in from west, south of present location of paint mill. This stream shown heading in spring. Sawmill on Sand Island. "Allen's Town" is shown. Roads to Philadelphia, Easton, Nazareth, Fort Allen, Allentown and Reading are called King's Roads.

**Garrison, Nicholas and Kolokofsky (Golgowfsky), George Wenceslaus.** A Draft of Four Fording Places over the Lehigh near Bethlehem. Surveyed Oct. 2, 1760, by Nicholas Garrison, Jr., and Geo. Wenceslaus Kolokofsky (Golgowfsky).

$12''\times 33''$. Four ink sketches. Scale: $1$ inch $= \text{about } 8.8$ rods. Hist. Soc. of Pa.

The highest ford is about one mile above Bethlehem near the Geissinger Farm, the lowest two miles below Bethlehem.

**1762**

**Anonymous.** Northampton Town. Surveyed by Order of William Allen, Esq., 1762.

$16\frac{3}{4}''\times 17''$. Scale not given. Hist. Soc. of Pa.

This map indicates that Allen himself chose the name Northampton Town for what is now Allentown.

**1770**

**Scull, W.** A map of Pennsylvania exhibiting not only The Improved Parts of that Province but also Its Extensive Frontiers laid down From Actual Surveys and Chiefly from the late map of W. Scull, published in 1770.

$24''\times 48''$. Scale: $1$ inch $= 6\frac{2}{3}$ miles. Pennsylvania Archives, 3d ser., app. vol.

Several streams appear on map, such as West Branch of Delaware (Lehigh), Leheigh (Little Lehigh), Jordan or Truckers, and Trout creeks. The estates of Grouschall and Plumsted are shown. Northampton is name given to present city of Allentown.


$21''\times 31''$. Scale: $1$ inch $= 9$ miles. Pennsylvania Archives, 3d ser., app. vol.

Only a few streams, mountains, and towns in Lehigh County named. Allentown appears as "Northampton." South Mountain called "Leheihg Hills."

**1777**

**Sauthier, C. J.** A map of the Provinces of New York and New Jersey with a part of Pennsylvania and the Province of Quebec from the Topographical Observations of C. J. Sauthier. Augsburg, 1777.

$29''\times 40''$. Scale: $1$ inch $= 12\frac{1}{2}$ miles. Pennsylvania Archives, 3d ser., app. vol.

Very few names and topographic features in Lehigh County. South Mountain is called "Leheihg Hills," possibly a typographic error and intended for Leheigh. Nothing shown in Lehigh County except West Branch of the Delaware (Lehigh) River and Leheihg Hills (South Mountain).

**1788**

**Schöpf, John.** Reise durch einige der mittlern und südlichen vereinigten nordamerikanischen Staaten. Unternommen in den Jahren 1783 und 1784.

Two parts, Erlangen 1788. Translated with title, Travels in the Confederation (1783-1784), and edited by Alfred J. Morrison, 2 vols., 426 pp., 344 pp., Philadelphia, 1911.

See Schöpf, 1911.

Howell shows course of Lehigh River, Jordan, Trout, Little Lehigh, Hosassock (Hosassock), and Maiden creeks. Several mills and residences are located, some of which are named.

1794

Cazenove, Theophile. Journal, Manuscript in French.
75 pp., 1794. Translated from the French by Rayner Wickersham Kelsey, 103 pp. and map. Haverford, 1922.

See Kelsey, 1922.

Translated from the German by Christian Ignatius LaTrobe. Three parts, 159, 234, 233 pp. Index and map. London, 1794.
Contains some items of geographic interest. An excellent account of the Indians that formerly occupied this region.

1795 circa

29½"x33". Scale: 1 inch = 9 miles. Pennsylvania Archives, 3d ser., vol. 1.

Very few places named in what is now Lehigh County. What is now Allentown appears as “Northampton.” A ferry just below mouth of Hokendauqua Creek is named “Fousts Ferry.” Lehigh River appears as “Lehi River.”

1800

Anonymous. Plan of the Road, laid out by order of Court from the Easton Road, thro’ Bethlehem to the Berks County Line in Upper Milford Township (no date, perhaps about 1800).
7½"x34". Scale: 1 inch = 100 perches. Pen and ink drawing. Hist. Soc. of Pa.

Ownership of various tracts shown. Shows 3 mills along the Little Lehigh and one on tributary coming in from the south.

1805

Ogden, John C. An Excursion into Bethlehem & Nazareth in Pennsylvania, in the year 1799.

Describes the large spring at Allentown. Some of the clay industries (stove tile and clay pipes) of Bethlehem described were located in what is now Lehigh County.

1807

510 pp., Philadelphia, 1807.

Gives several brief descriptions of the topography and geology of the Lehigh Valley. Says “the limestone generally lies in a state of confusion, and as it were jumbled together by violence.” (p. 46.)

1809


Has brief references to the distribution of the "Primitive" (pre-Cambrian) crystalline rocks and the "transition" (Lower Paleozoic) sedimentary rocks of eastern Pennsylvania, with mention of localities near Bethlehem and Easton. The accompanying generalized geological map is the first to show the regions of Lehigh and Northampton Counties.

1811
HOWELL, READING. A Map of the State of Pennsylvania. 22"x33", 1811.
Townships of Northampton County (which at that time included what is now Lehigh and portions of Carbon and Monroe Counties) are named. A few towns are also named.

1816
Brief descriptions of some minerals from Lehigh and Northampton counties. More described in later edition.

1817
Has brief references to distribution of the "primitive" (pre-Cambrian) crystalline rocks and the "transition" (Lower Paleozoic) sedimentary rocks of eastern Pennsylvania, with mention of localities near Bethlehem and Easton.

1818
MACLURE, WILLIAM. Observations on the geology of the United States of America.
Has brief references to distribution of the "primitive" (pre-Cambrian) crystalline rocks and the "transition" (Lower Paleozoic) sedimentary rocks of eastern Pennsylvania, with mention of localities near Bethlehem and Easton.

Advances the idea that there were "barriers which probably restrained the waters, in some parts of North America, after the Ancient Ocean had retired." Believes that Blue Mountain was such a barrier or dam "by which the waters were restrained for a considerable time." In describing the Delaware Water Gap he says "the vastness of the dismemberment impresses every traveller with a sense of its present grandeur, and of the prodigious force necessary to rend the mountain from its summit to the base." Lehigh Gap was formed in a similar way. Before the bursting of the mountain at Lehigh Gap and Delaware Water Gap, the water of the sea was partially discharged through the Wind Gap.

1822
CLEAVELAND, PARKER. An Elementary Treatise on Mineralogy and Geology, 818 pp., second edition, Boston, 1822.
"In Pennsylvania, at Allentown, a Buhrstone or cellular quartz is found and employed for millstones (Cooper)" (pp. 265-266). Also says basaltite occurs "in Pennsylvania near Reading and Bethlehem" (p. 300). Includes a small scale geologic map of the eastern part of the United States.

HECKEWELDER, JOHN. Names which the Lenni Lenape (Lennape) or Delaware Indians gave to Rivers, Streams and Localities within the States of Pennsylvania, New Jersey, Maryland and Virginia with their Significations.
See Heckewelder, 1872.
1825

Melish, John. Map of Pennsylvania constructed from the County Surveys authorized by the State and other original documents, 1825. Revised edition in 1832.
52"x75". Scale: 1 inch = 5 miles.
Names townships, towns, streams. Contains insets giving "statistical & Geological Remarks." Gives "South Mountains or Lehigh Hills." Sleeking River located northeast of "Pogeeville." Gap east of Bake Oven Knob is called Kunkles Gap. "Northampton or Allentown."

Robinson, Samuel. A Catalogue of American Minerals with their localities, etc.
316 pp., Boston, 1825.
Lists several minerals from Lehigh County, including buhrstone or cellular quartz found near Allentown and employed for mill purposes, and basanite near Bethlehem. Most of the information was taken from Cleaveland's "Mineralogy."

1830

Tanner, H. S. Map of Northampton and Lehigh Counties, Pennsylvania, 1830.
181/2"x21". Scale: 1 inch = 2 1/2 miles. Hist. Soc. of Pa.
Includes what is now Carbon and Monroe Counties as well as the present Northampton and Lehigh Counties. A generalized map. Has some unusual spellings and several place names not in use now.

1831

Silliman, Benjamin. Notes on a journey from New Haven, Conn., to Mauch Chunk and other Anthracite regions of Pennsylvania.
Gives a description of the Lehigh River and particularly of the Lehigh Gap. Does not believe that the gap was mainly cut by the Lehigh River.

1832

Part First 63 pp., Part Second 508 pp., map, Philadelphia, 1832.
Contains a brief description of the Lehigh Valley, principally abstracted from William Maclure's report (1818). A short description of each of the named geographic features of Lehigh County.

1833

Finch, I. Travels in the United States of America and Canada, etc.
435 pp., London, 1833.
Describes the Lehigh Water Gap and the flat top of Blue Mountain. He refers the conglomerates of the mountain to the "old red sandstone" (p. 110).

1835

Eaton, Rebecca. A Geography of Pennsylvania for the Use of Schools, and Private Families.
Contains brief descriptions of some of the geographic features of Lehigh County.

1838

93 pp., columnar section and table (Two editions with slight differences). Harrisburg, 1838.
Describes sandstones (Hardyston) of South Mountain (pp. 20-23), limestones and iron ores of the Kittatinny Valley (pp. 23-30), slates (pp. 30-36), sandstones and conglomerates of Blue Mountain (pp. 36-39). Descriptions of specific iron mines, slate and limestone quarries, paint and clay deposits. Explains Delaware Water Gap and other water gaps as due to "transverse dislocations" (p. 79).
1839

119 pp., Harrisburg, 1839.
Brief descriptions of the Paleozoic sandstones and limestones of South Mountain and the small valleys lying southeast of Kittatinny Valley, such as Saucon Valley.

1840

215 pp., Harrisburg, 1840.
Gives five analyses of iron ore from mines northwest of Allentown, near Emmaus and west of Trexlertown (pp. 178-180).

1841

179 pp., Harrisburg, 1841.
Contains descriptions of the gneisses, Paleozoic sandstones and limestones of the southern portion of Lehigh County (pp. 16-30). Describes some magnetite and limonite iron mines (pp. 39-43), and a few occurrences of the Triassic conglomerates (pp. 43-45). Contains ten analyses of magnetite and brown iron ores (pp. 107-112) and three analyses of limestones (p. 191).

1843

MAXIMILIAN, PRINCE OF WIED. Travels in the Interior of North America (1832-1834). Translated from German by H. Evans Lloyd.
320 pp., London, 1843.
Occasional brief notes on the topography of the region and the rocks observed in his travels.

TREGO, CHARLES B. A Geography of Pennsylvania containing an account of the history, geographical features, soil, climate, geology, botany, zoology, population, education, government, finances, productions, trade, railroads, canals, etc. of the State; with a separate description of each county and questions for the convenience of teachers.
384 pp., Phila., 1843.

1845

RUPP, I. DANIEL. History of Northampton, Lehigh, Monroe, Carbon and Schuylkill Counties.
554 pp., illustrations. Harrisburg, 1845.
Contains many descriptions of the topographic and geologic features of Lehigh County, among which the following topics are of special interest: The Lehigh River (pp. 111-113) and the great floods of November 1840 and January 1841 (pp. 53-59, 84, 143). The Lehigh Water Gap (Die Lecha Wasser-Kaft) (pp. 113-115); and suggests a strange explanation for its origin. Describes springs and caves (pp. 130-131, 134, 143). Describes Breinigsville iron ore mine, which contains so much iron sulphide as to be shipped to Philadelphia for manufacture of copperas (p. 130). Big or Mammoth Rock (Bower's Rock) (pp. 130-134).

1850

HENRY, M. S. Map of Northampton County, Pennsylvania.
This map is of interest because it shows "Zinc Works" along the Lehigh River in "South Bethlehem" and indicates that Frieldsville zinc ore at that date was being hauled into Bethlehem.
1851

LEA, ISAAC. On the bones of a reptilian quadruped from Lehigh County, Pa.
Describes bones and teeth of a reptilian quadruped found in a calcareous conglomerate on Hassac's Creek (Hosensack) Creek, Upper (Lower?) Milford Township, Lehigh County, by Dr. Shelly.

1853

12 pp., New York, 1853.

ANONYMOUS. Pennsylvania and Lehigh Zinc Company.
An account of the zinc industry at Bethlehem and the new patent process of Mr. Wetherill for making zinc oxide from the crude ore. Notes the progress of the mining operations, still in the very early stages.

BLAKE, W. P. On the occurrence of Crystallized Carbonate of Lanthanum.
Describes a specimen of lanthanite found at the Friedensville zinc mines. Gives crystal measurements and chemical analyses.

LEA, ISAAC. Description of a fossil saurian of the New Red Sandstone formation of Pennsylvania; with some account of that formation.
Refers to the bones of a "reptilian quadruped" found in a calcareous conglomerate on Hassac's (Hosensack) Creek, Upper (Lower?) Milford Township, Lehigh County, and described in the Proceedings of the Acad. in 1851, pp. 171-172, and 205.

1854

ANONYMOUS. Pennsylvania and Lehigh Zinc Company.
Mentions Wetherill's process for making zinc white from Friedensville zinc ore. Praises the purity of the resultant product.

SMITH, J. LAWRENCE. Re-Examination of American Minerals, Part IV.
Reports lanthanite near South Bethlehem and gives analysis (pp. 378-379, 427).

WHITNEY, J. D. The Metallic Wealth of the United States.
510 pp., Philadelphia, 1854.
Gives a brief description of the Friedensville zinc mines to the close of 1853. The character of the ore and ore bodies are briefly described (pp. 351-352).

1855

In margin of map are views of the Pennsylvania and Lehigh Zinc Works, Upper (Calypso) Island, and first house in Bethlehem. Map shows Dr. Oppelt's Hydropathic Institute (five buildings, where St. Luke's Hospital is now situated). The large spring of Upper (Calypso) Island is located along eastern shore.

1857

ANONYMOUS. Discovery of Zinc near Allentown.
Mining Mag., vol. 9, p. 182, New York, 1857.
Says that zinc ore similar to that in the Saucon Valley was discovered in the digging of a well in Allentown near the Lehigh River. This was probably an error as no further mention of it is known to have been published.
JENTH, F. A. Contributions to Mineralogy—Lanthanite.

Dr. Genth acknowledges the gift of lanthanite from Friedensville. Analysis agrees with those of Wm. P. Blake and J. L. Smith.

ROBERTS, SOLOMON W., Chief Engineer. Map Showing the Route of the North Pennsylvania Rail Road from Philadelphia to Bethlehem with its Branches to Doylestown and Freemansburg and its connections with the Lehigh Valley Rail Road. January 1857. Road opened to the Lehigh River Jan. 1, 1857.
24"x48". Scale: 1 inch = 2½ miles. Hist. Soc. of Pa.

A generalized map.


Describes the geology and the economics of the deposit.

38"x52". Scale 1 inch = 8 miles.

Geological formations are hand colored. Is based on Rogers’ map. Bears statement that it was “submitted for correction to J. Peter Lesley ... who constructed the maps and sections of the Geological Survey of Pennsylvania.”

The entire Rittersville hill north of the Lehigh River is mapped as “Primal Sandstone; compact white sandstone, Formation I.”

1858

BLAKE, WILLIAM P. Lanthanite and allanite in Essex County, New Jersey.

Mention of lanthanite and allanite at Bethlehem (pp. 245, 246).

ROGERS, HENRY DARWIN. The Geology of Pennsylvania.
Vol. 1, 586 pp., Vol. II, 1045 pp., geological map of the State, sections, etc. Philadelphia, 1858.

Many descriptions of geological features of Lehigh County. The following are the most important: Vol. I—geological section from Allentown to Coopersburg (pp. 100-101); Primal (Hardyston) quartzite (p. 196); basal limestone (p. 282); Rittiman Valley limestones and shales (pp. 237-250); iron ores (pp. 236-238); Friedensville zinc mines (p. 238); structure of Blue Mountain (pp. 287-288). Geological section in back of volume. Volume II—Fossils (p. 692); minerals (pp. 710, 712); iron ores (pp. 723-727).

1859

BLODGET, LOBIN, Secretary. Twenty-sixth Annual Report of the Philadelphia Board of Trade.
226 pp., Philadelphia, 1859.

“In the Lehigh district most of the furnaces have continued in blast through the whole period of disaster to the trade generally, the demand for their iron, which is of superior quality, and has almost entirely displaced the Scotch pig for the use of founders, being such as to keep them steadily employed.” (p. 113.) Annual anthracite furnace production of iron for three years in the Lehigh Valley, twenty out of twenty-four furnaces in operation: 1856—121,021 tons; 1857—113,299 tons; 1858—100,000 tons.

772 pp., New York, 1859.

Contains numerous descriptions of the iron mines, furnaces and forges of Lehigh County.

1860

ELIOT, CHARLES W. and STORER, FRANK W. On the impurities of Commercial Zinc, with special Reference to the Residue insoluble in Dilute Acids to Sulphur and Arsine.

"The purest of all the zins which we have analyzed is that manufactured at the Pennsylvania and Lehigh Zinc Works, Bethlehem, Pennsylvania." The analyses found no lead, a trace of cadmium and in one sample a little arsenic. The arsenic is believed to be present in the blende and pyrites but not in the calamine.

HENRY, M. S. History of the Lehigh Valley.
436 pp., illustrations, Easton, 1860.
Numerous references to various geological features of Lehigh County: Lehigh Water Gap (pp. 308-310), iron mines and iron works (pp. 162-166), pottery and tile at Bethlehem (one half mile northwest of Bethlehem on Monocacy Creek (pp. 205, 214), zinc (pp. 226-238), Bower’s Rock (Big or Mammoth Rock) (p. 277), springs (p. 277), water supply of Allentown (p. 284), of Catasauqua (p. 292), of Slatington (p. 306), Ironon iron mines (p. 301), slate (pp. 306-307), Lehigh Coal & Navigation Company and Lehigh Canal (pp. 375-394, 412-416).

1863
ANONYMOUS (Possibly Thomas Scattergood).
Incidents of the Freshet in the Lehigh River, Sixth Month, 4th and 5th, 1862.
Descriptions of flood conditions and damage done.

1864
120 pp., New York, 1864.
Contains some interesting descriptions of the features and industries of the Lehigh Valley.

PERCY, JOHN. Metallurgy; Iron and Steel.
934 pp., London, 1864.
Brief description of the iron furnaces along the Lehigh River.

1865
LESLEY, J. P. (No title) Comment on a lignite deposit in Franklin County, Pa.
Mentions that the Lehigh River below Allentown flows close to the southern edge of the limestone—up against the mountain (p. 470).

1869
MARTIN, JOHN HILL. Historical Sketch of Bethlehem in Pennsylvania, with some account of the Moravian Church.
Some account of the early industries of the region with descriptions of many geographic features.
Says that name of island (Calypso) in the river was properly catalpa from the number of catalpa trees there.

1871
DRINKER, H. S. Mines and Works of the Lehigh Zinc Co.
A description of the Friedensville zinc mines in which the ores and minerals are discussed. Particular attention is given to the methods of mining and utilization.
BIBLIOGRAPHY

1872

ANONYMOUS. Friedensville Zinc Mines.
The speech of B. C. Webster at the ceremony of starting of the President (large pump). Statistics of production of zinc, depth of mine, capacity of pump, etc. (pp. 65-66). Editorial regarding the above address, and praising the management of the company (p. 73). Editorial on the pump, noting that it is performing well, and commending an ingenious device to regulate pumping to the amount of water present (p. 329).

HECKEWEDELER, JOHN. Names which the Lenni Lennape or Delaware Indians gave to Rivers, Streams and Localities within the States of Pennsylvania, New Jersey, Maryland and Virginia with their significations.
Prepared from a manuscript of John Heckewelder, 1822, by William C. Reichel.
Gives meaning of a number of Indian names applied to geographic features of Lehigh County.

C., L. (Probably Chamberlain, Lloyd). Guide-Book of the Lehigh Valley Railroad and its several branches and connections; with an account, descriptive and historical, of the Places Along their Route.
175 pp., Philadelphia, 1872.
Numerous facts concerning the physical features and industries of the Lehigh Valley.

162 pp., Philadelphia, 1872.
Account of the discovery of zinc ore at Friedensville by W. T. Roepper. A short history of the early attempts to work the mine and statistics of annual yield (pp. 141-144). Short descriptions of the Lehigh Mountain (Oppelt's) Springs Water Cure established in 1846, the Lehigh Zinc Company. Refers to Tinsley Jeter's brick yard a short distance southwest of Bishopthorpe. Gives a short description of the Lehigh Valley and North Pennsylvania railroads. Contains "Map, showing the condition of the 'Moravian Tract' on the South side of the Lehigh, opposite Bethlehem, at various times. Based upon Wm. Th. Roepper's Map of said Tract, drawn in 1854, and on drafts drawn by C. G. Reutter and others in 1753 and 1757 and by G. W. Golikowsky in 1760; and so prepared as to illustrate the history of the old Crown Inn."

1873

ANONYMOUS. Guide Book of the Lehigh Valley Railroad and its several branches and connections; with an account, descriptive and historical of the places along their route; including also a history of the company from its first organization, and interesting facts concerning the origin and growth of the coal and iron trade in the Lehigh and Wyoming regions.
186 pp., map, Philadelphia, 1873.
Contains brief descriptions of the mines and mineral industries of Lehigh and Northampton Counties.

MARTIN, JOHN HILL. Historical sketch of Bethlehem in Pennsylvania, with some account of the Moravian Church.

1875

CLARK, ELLIS, Jr. The Subterranean Watercourses in the Magnesian Limestones of Lehigh County, Pa.
An account of three springs in a line in Upper and Lower Macungie Townships. Believes that the streams are running in solution tunnels.

Lists the following minerals, giving localities and descriptions, on the pages indicated by number: Allophane 107, aragonite 162-3, asbestos 89, calamine 196,
calcite 154, damourite 126, dolomite 155, e spinite 149, fluorite 29, go a rite 149, graphite 8, greenockite 18-19, halloysite 122, kaolinite 120, lanthanite 165, lignite 272, limonite 49-50, marcasite 22, martite 35, melanterite 149, psilomelane 53, pyrite 20, pyroxene 66, quartz 57-58, quartz, fetid 59, 2177, serpentine (pinitite?) 115, siderite 159, smithsonite 161, sphalerite 15, turgite 47, wad 53-54.

MCCREATH, ANDREW S. Report of Progress in the Laboratory of the Survey at Harrisburg.
Contains analyses, most of which were also published elsewhere, of iron ores from Lehigh County (pp. 48-54, 89-90), four analyses of limestones (p. 76), damourite slate (p. 92), and two analyses of other (p. 92).

General discussion of iron ores of Great Valley, with special reference to lines of outcrop and cause of accumulation of ore. Mention of damourite slates and theories of siderite replacement of limestone.

PRIME, FREDERICK, Jr. Report of Progress on the Brown Hematite Ore Ranges of Lehigh County with a description of the mines lying between Emmaus, Alburtis and Fogelsville.
Describes briefly the geology of Lehigh County. Locates and gives brief descriptions of 98 iron mines between Emmaus, Alburtis and Fogelsville. In a note on the district by the State Geologist, J. P. Lesley, the following sentence appears: "What seems so smooth and regular a surface conceals one of the most contorted, twisted, fractured, cleft, pilcated, complicated and even overturned set of subsoil rocks in the world" (p. 59).

Describes the limonite ores of the Great Valley. Says they were probably formed by the oxidation of iron pyrites but not in situ.

26 pp., 1 col. map 23"x40". Hist. Soc. of Pennsylvania, Philadelphia, 1875.
Some early geographic names are given. Contains several errors.

1876

ANONYMOUS. Pumping-Engine at the Lehigh Zinc Works, Friedensville, Penna.
Complete description of the great engine at Friedensville, giving weights of the different parts. States that the engine is the largest in the world at the date of writing. Contains two excellent engravings of the engine.

ANONYMOUS. Friedensville Zinc Mines.
Reports that the Bethlehem Zinc Company has contracted for ore for five years from New Jersey Zinc Company. It will abandon its Friedensville mine. For some time it has cost $4 a ton to keep the mine water-free. 30,000,000 gallons of water per day pumped out (Sept. 30, 1876) (p. 216). An historical sketch of the Friedensville mines, with the measurements and history of the "President," the large Cornish pumping engine. The reasons for stoppage, and the qualities of the ore discussed (pp. 325-326).

72 +37 pp., 50 maps. Reading Publishing Co., Reading, Pa., 1876.
72 pp. dealing with Lehigh Co. followed by 37 pp. of maps and descriptions of the Countries of the World.
Contains a complete series of township and borough maps on which iron ore mines and furnaces, quarries, brick yards, etc., are located.

HALL, CHARLES E. Notes on Glacial Action Visible along the Kittatinny or Blue Mountain, Carbon, Northampton and Monroe Counties, Pennsylvania.
Evidence for the contention that the glaciation came from the north or northwest and proceeded farther to the southwest than the Lehigh Gap. Slates south of gap show direction of ice by drag indications.

RAYMOND, ROSSITER W. Zinc.
Gives considerable information regarding the zinc deposits at Friedensville and the metallurgical processes.

1877

Describes the process of smelting the Friedensville zinc ores at Bethlehem.

FRITTS, PETER. History of Northampton County, Pennsylvania.
293 pp., Philadelphia, 1877.
Contains a description of the Friedensville zinc mines (pp. 211-212), Lechauweki Springs (p. 215).

1878

ALLEN, CHARLES. Two Hundred Tables of Elevations above tide-level in and around Pennsylvania.
Gives elevation of many points along the following railroads—Lehigh Valley, Lehigh and Susquehanna (Central of New Jersey), Lehigh and Lackawanna (Lehigh and New England), East Pennsylvania (Reading), North Pennsylvania (Reading), Catasaqua and Fogelsville. Also levels of various places along the Delaware River.

FRAZER, PERSIFOR, JR. Remarks on Prof. Prime's Paper (on the Paleozoic Rocks of Lehigh and Northampton Counties, Pa.).
Remarks on origin of iron ores—results of chemical experiment. Relations of hydro-mica slate to limonite.

GROTH, P. Die Mineraliensammlung der Kaiser-Wilhelms-Universitat, Strassburg.
271 pp., Strassburg, 1878.
Lists zinblende and greenockite from Friedensville and smithsonite and calamine from Bethlehem (Friedensville?), and gives brief descriptions of specimens. Describes crystallography of calamine from Friedensville and gives a drawing showing crystallographic forms.

Contains a list of rock specimens collected in the Lehigh Gap and in the slate belt to the south (pp. 155-160).

PRIME, FREDERICK, JR. The Brown Hematite Deposits of the Siluro-Cambrian Limestones of Lehigh County lying between Shimersville, Millerstown, Schnecksville and the Lehigh River.
The various chapters of the report treat the topography, the Laurentian (precambrian), Poisdam (Hardyston), Damourite slates (Tomstown), magnesian limestones (Tomstown, Allenstown, Breckmantown), Trenton limestone (Jacksonburg), Hudson River and Utica slates (Martinsburg) and Glacial deposits. On the map, 202 iron mines are located, most of which are briefly described. Four cement plants along the Lehigh River are described. Includes analyses of limestones and iron ores.

See next title.
PRIME, FREDERICK, Jr. On the Discovery of Lower Silurian Fossils in Lime-
stone associated with Hydro-mica Slates, and on other points in the
Geology of Lehigh and Northampton Counties, Eastern Pennsylvania.
A very good description of the Potsdam (Hardyston) sandstones and quartzites,
the hydro-mica slates (Tomstown), the No. II or Magnesian limestones (Allentown
and Beekmantown), Trenton (Jacksonburg) limestones, and No. III (Martinsburg)
slates. Discusses the characteristics and origin of the brown hematite (limonite)
iron ores of the region. A few fossils found in Northampton County are described.
This paper was first published in Proceedings of the American Philosophical Society
under the title "On the Paleozoic Rocks of Lehigh and Northampton Counties,
Pennsylvania."

1879

CLAUDER, H. J. Clauder's Year-Book and Home Almanac for 1879.
Pamphlet, 88 pp., Bethlehem, 1879.
Compilation of interesting information including descriptions of the Bethlehem
Water Works, Lehigh Zinc Co., Bethlehem Iron Co., Calypso Island, etc.

McCReATH, ANDREW S. Second Report of Progress in the Laboratory of the
Survey at Harrisburg.
Pennsylvania Second Geol. Survey, Report MM, 438 pp., Harrisburg,
1879.
Contains many analyses of products of Lehigh County, including 32 analyses of
limonite (brown hematite) ores (pp. 213-218), clay associated with iron ore
(p. 268), 3 limestones (p. 310).

PRIME, FREDERICK, Jr. Moraines and Surface Drift Deposits of Northampton
County, Pa.
Absence of moraine immediately north of the Lehigh River. Drift prominent at
West Bethlehem. Moraine in Saucon Valley. No trace of glacial action on South
Mountain.

1880

HALL, CHARLES E. Catalogue of the Geological Museum, Part II.
Pennsylvania Second Geol. Survey, Report NO, 272 pp., Harrisburg,
1880.
Contains list of mineral and rock specimens and localities where collected in Le-
high County (pp. 90-31, 97-106).

1882

1882.
Describes strata exposed in the Lehigh Water Gap and gives section showing the
succession and structure of the strata.

GENTH, F. A. Contributions to Mineralogy.
Describes and gives analysis of crystals of menaccanite associated with corundum
crystals from Shimersville.

L(ESLEY), J. P. Bake Oven Knob.
Foot-note in Pennsylvania Second Geol. Survey, Report G6, p. 63,
Harrisburg, 1882.
Suggests that the Bake Oven was formed by water from the top of the glacial
ice sheet pouring over the top of Blue Mountain.

SMITH, EDGAR F. and THOMAS, N. WILEY. Corundum and Wavellite.
Describes some corundum crystals found near Shimersville and wavellite near
Macungie. An analysis of the latter is given.
1883


LESLEY, J. P., SANDERS, R. N., CHANCE, H. M., PRIME, F. and HALL, C. E. The Geology of Lehigh and Northampton Counties. Pennsylvania Second Geol. Survey, Report D3, vol. 1, 283 pp., atlas of maps. Harrisburg, 1883. Contains much information on Lehigh County including the following: eight analyses of iron ores (pp. XII-XIV), geographical description (pp. 7-12), streams in Lehigh County (pp. 18-22), slate region (pp. 31-35, 83-86), drift deposits (pp. 37-54), geological structures of the limestones (pp. 54-58), slate quarries (pp. 113-123), geological structures of slate region (pp. 124-128), slate excavation, quarrying, statistics (pp. 129-148), slate belt along Lehigh River in 1875 (pp. 151-159), occasional references to Lehigh County localities in discussion of age, various members, character and analyses of limestones (pp. 161-190), Potsdam (Hardyston) sandstone (pp. 205-214), South Mountain gneiss and associated rocks and mines (pp. 215-241, 254-258). Atlas contains a colored geological map (scale: 2 miles to 1 inch) of Lehigh and Northampton counties and part of Berks County, a topographical map of the Durham and Reading Hills (scale: 1600 feet to 1 inch) between Delaware and Schuylkill rivers in 18 sheets, a colored geological index map (scale: 2 miles to 1 inch), a colored geological and topographic map of southern Northampton County with part of Lehigh County (scale: 1600 feet to 1 inch) in 6 sheets showing location of iron mines.


1884

D'INVILLIERS, E. V. Geology of Lehigh County. History of the Counties of Lehigh and Carbon in the Commonwealth of Pennsylvania by Alfred Mathews and Austin N. Hungerford. Chapter XV, pp. 114-119, geologic map, Philadelphia, 1884. A brief discussion of the geological formations mainly taken from the reports of the Second Geological Survey of Pennsylvania. Includes analyses of limestones and iron ores. The structure is described as follows: "The thickness of the limestone formation in Lehigh County is uncertain, for the apparently regular surface of the valley conceals a very troubled and irregular floor, from three to seven miles wide, so complicated and contorted as to defy accurate measurement or interpretation of dips. "Its general structure is a series of tightly compressed rolls and basins, some regular, some overturned, twisted, and even snapped." (p. 116.)


LEHIGH COUNTY

LEWIS, H. CARVILL. On supposed Glaciation in Pennsylvania, south of the Terminal Moraine.


Examines the evidence that has been brought forth by others to indicate an extension of the glacial ice sheet beyond the “Terminal Moraine” passing through Penn Argyl and Belvidere and concludes that it is not valid. Believes that all the so-called glacial till beyond this point in Lehigh and Northampton counties was laid down by glacial streams. Briefly describes the Bake Oven on Blue Mountain and concludes that it is not of glacial origin.

MATHEWS, ALFRED and HUNGERFORD, AUSTIN N. History of the Counties of Lehigh and Carbon in the Commonwealth of Pennsylvania.


Contains a chapter by E. V. d’Invilliers on the geology of Lehigh County with a geologic map (pp. 114-115). The iron ores and limestones are described briefly and several analyses given. In a history of the Friedensville zinc mines (pp. 439-440) Andrew K. Wittman is given credit for the discovery in 1845 and T. H. Rooper for bringing attention to the deposit, which resulted in the formation of mining companies. A sketch with photograph of Dr. Martin H. Boye, a Coopersburg geologist, is also included (pp. 440-442). Descriptions include the great floods of 1841 and 1862 (pp. 130 and 237); the water works of Allentown and sources of supply (pp. 136-139), of Catassauqua (pp. 247-249); the furnaces and iron industry of Allentown (pp. 155-161); of Catassauqua (pp. 237-245); of Lower Macungie Township (pp. 328-329); the Bake Oven and Bear Rocks, two miles to the west (p. 279). The derivations of many place names are given and the industries of different sections—mines, quarries, mills, etc. Iron Ore of Upper Milford Township (pp. 345-346). Emmaus and Hampton furnaces (pp. 391-392). Of Whitehall Township (pp. 501-505), ore mines of North Whitehall Township (pp. 522-523). Lehigh furnace of Washington Township (553). The Coplay Cement Works and Lehigh Valley Portland Cement Co. are described (pp. 505-507), and slate quarries (pp. 523-524, 553-555, 559).

1885

ANONYMOUS. Friedensville Zinc Mines.


The zinc mines at Friedensville, operated by Osgood and Company, New York, have shut down. (Feb. 7, 1885.)

CHANCE, H. M. Brown Hematite Ore Mining.


An excellent description of methods employed in the mining of the limonite iron ores of the region, both by open cut and by shaft. The Zeigler mine located near the Berks-Lehigh county line is used as an illustration. A line drawing accompanies the article.

LESLEY, J. P. A geological hand atlas of the sixty-seven counties of Pennsylvania.


Contains a geologic map of Lehigh and Northampton counties, 6 miles to the inch and a brief description (pp. XLVII-XLIX) of the geology and mineral resources of the county.

SMITH, EDGAR F. Mineralogical notes: Pectolite and Titanite.


Describes pectolite at Hosensack Station with analysis (p. 411), and titanite 2 miles from Hosensack Station (p. 412) with analysis.

1886

ANONYMOUS. Friedensville Zinc Mines.


Lehigh zinc spelter, Friedensville, has a world-wide reputation as the purest zinc in the world. It is the only zinc in the world that will not expand and make a cartridge stick in a gun while firing. Almost all European nations realized this and bought here, except England. The English have learned by bitter experience and have placed an order for zinc with the Bergenport Zinc Co.

MERRIMAN, MANSFIELD, WELLS, J. H., and ROWLEY, H. W. Map of Bethlehem, South Bethlehem and West Bethlehem compiled from recent surveys by J. H. Wells, C. E., and H. W. Rowley, M. E., under the supervision of
Mansfield Merriman, Professor of Civil Engineering in the Lehigh University. Scale: 1 inch = 400 feet. (Map folded in cover.)

Published by Edwin G. Close, Manager, Bethlehem, Pa., 1886.

In margin gives dates of several important events in the history of Bethlehem.


Vol. 15, Tenth Census, 1025 pp., Washington, 1886.

Much data concerning iron mines of Lehigh County, including magnetite (p. 180), limonite ore analyses (pp. 182-185), carbonate (p. 202), and directory (pp. 966-968). Some notes on hydraulic cement (pp. 841, 848, 884) and on zinc (pp. 804-805, 978).


260 pp., Allentown, 1886.

Consists of 82 sketches published in the "Friedens-Bote," Allentown, between 1880 and 1886. Mainly historical sketches but with a number of articles containing geographic descriptions of parts of the Lehigh Valley, such as Blue Mountain, Bake Oven, "Bare" (Bear) Rocks. Derivation of various place names.

1887


Eng. and Min. Jour., vol. 43, p. 84, New York, 1887.

All mines in the vicinity of Friedensville have shut down because of the stoppage of the pump, "The President" (Jan. 29, 1887). Many ore pits for many miles around are now flooded.

Hill, Frank A. Lehigh River section continued from Lock 11, southward to the Blue Mountains.


Gives section of the Onedal conglomerate in the Lehigh Water Gap (pp. 1378-1379).

Hochklin, Rev. S. F. A Pocket Gazeteer of Pennsylvania.

174 pp., Philadelphia, Pa., 1887.

Contains a concise description of Lehigh County (pp. 103-106).

1888

McGee, W. J. Three Formations of the Middle Atlantic Slope.


Brief descriptions of the Quaternary deposits along the Delaware and Lehigh Rivers in the Lehigh Valley (pp. 379-381, 384, etc.).

1889


Describes the physiographic history of the Lehigh and Delaware Rivers. Concludes that "the Susquehanna, Schuylkill, Lehigh and Delaware are compound, composite and highly complex rivers, of repeated mature adjustment."

EyerMan, John. Notes on Geology and Mineralogy.


Gives an analysis of calamine from Friedensville.


54 pp., Easton, 1889.

Minerals described from Lehigh County, some with analyses, are: allophane, andradite, calamine, chloropal, corundum, dolomite, fluorite, goethite, menacanite, pectolite, psilomelane, pyrite, pyrolusite, siderite, stilbite, sulphur, tourmaline, wavellite, zircon.
Figures and describes fossils found in Pennsylvania. *Scolithus linearis* (pp. 944-945) and *Maclurea magna* (pp. 369-370) are described from Lehigh County.

Describes some of the slate quarries especially those of Slattington, quarrying methods, character of slate, etc.

In several places refers to glacial phenomena in Lehigh County, especially at the Lehigh Gap.

1890

The zinc mines at Friedensville are being actively worked (Nov. 5, 1890). The large pump, the "President" is again pumping after several years idleness. It has nearly drained the mine since the latter part of September. Mining to start when the mine is dry.

1891

In several places refers to the development of the peneplains of eastern Pennsylvania. Describes particularly the Cretaceous peneplain now preserved on the top of Blue Mountain, as well as the water gaps and wind gaps that cut through this ridge.

Observation by Prime at Balliets' ore bank near Allentown. Notes alteration of limestone to iron carbonate particle by particle, or, "a pseudomorph by replacement."

1892

ANONYMOUS. Pleasant Places on the Reading Railroad. A Directory of Summer Resorts, Hotels, Boarding Houses on the Reading Railroad System. 64 pp., 1892.
Describes advantages and accommodations for summer tourists in Coopersburg and Centre Valley.

Believes that "the present courses of the streams have a very specialized relation to the structures that they flow over" but that same may be antecedent and not consequent streams.

A general summary of information obtained during the progress of the Second Geological Survey of Pennsylvania. Many references to Lehigh County, especially the following: Archean (pp. 74-75), South Mountain (p. 144), iron mines (pp. 231-235, 254-255, 341-350, 450), Great Valley (pp. 270-293), Limestones (pp. 301-308), cement (pp. 337-340), zinc mine (pp. 436-443), slate (pp. 574-587, 604-609), Lehigh water gap (pp. 633-638, 674-675), argument against erosion interval at top of slate (Martinsburg) (pp. 710-711), no metallic wealth in North (Blue)
BIBLIOGRAPHY

Mountain (pp. 712-713). The geological map of Bucks and Montgomery counties contained in the atlas shows part of Lehigh County in the vicinity of Coopersburg in which the mapping is partly incorrect according to present views.

Describes glacial boulders south of the Lehigh River (p. 179).

1893

BARRELL, JOSEPH. A preliminary survey of the South Mountains, with the valleys adjacent, in the vicinity of Lehigh University in respect to glaciation.
Many observations in Saucon Valley.

BERLIN, A. F. Lehigh Island and Its Relics.
Describes many Indian objects found on the island at Allentown.

FOERSTE, AUG. F. New fossil localities in the early Paleozoics of Pennsylvania, New Jersey and Vermont, with remarks on the close similarity of the lithologic features of these Paleozoics.
Brief descriptions of the lithologic and paleontologic features of the Cambrian (Hardyston) sandstones and Cambro-Ordovician limestones along or near the Lehigh River.

KEMP, J. F. Ore Deposits of the United States and Canada.
Mentions the occurrence of zinc ore at Friedensville, describing the deposit, and sketching its history briefly. Notes the high grade of spelter produced.

MERCE, HENRY C. Prehistoric Jasper Quarries in the Lehigh Hills.
Describes the jasper quarries near Vera Cruz and Macungie.

Describes particularly the Indian jasper quarries of Vera Cruz and Macungie.

WILLIAMS, EDWARD H., Jr. Glaciation in Pennsylvania.
Presents evidence to prove that a glacial ice sheet actually passed over South Mountain in the vicinity of Lehigh University.

1894

MERCE, H. C. Indian Jasper Mines in the Lehigh Hills.
An excellent description of old Indian jasper diggings near Limeport, Vera Cruz, and Macungie.

PENROSE, R. A. F., Jr. The Superficial Alteration of Ore Deposits.
Brief mention (p. 304) of iron deposits in the Cambrian, Lower Silurian, and Carboniferous rocks of the Appalachian Valley. Many can be shown to be due to superficial replacement of limestones, or even of shales.

WILLIAMS, EDWARD H., Jr. Extramorainic Drift between the Delaware and Schuylkill.
Summary of age of till (p. 293). Post glacial interval short. Moraine formed when
ice withdrew from the Lehigh—it and extra-morainic deposits contemporaneous and
recent.

WILLIAMS, EDWARD H., Jr. The Age of the Extra-Moraine Fringe in Eastern
Pennsylvania.


Presents evidence in support of the view that “as far as Eastern Pennsylvania is
concerned, the extra-moraine fringe is of extremely recent origin and, as it antedates
the formation of the great moraine, all glacial deposits in this region are of extreme recency.”

1895


Flint Hill is described as “formerly supposed to be made up of New Red rocks . . . but it seems rather to consist of the quartzitic early Paleozoic and sandrock
called Chikis (Hardyston of present classification) Sandstone, or No. 1, which is
here more or less reddish and covers the ground with a reddish hard gritty sand
similar in color but different in character from the New Red materials” (p. 2602).
This idea is no longer held.


Describes briefly glacial deposits of the Lehigh Valley and gives map showing their extent.

1896

WALCOTT, CHARLES DOOLITTLE. The Cambrian Rocks of Pennsylvania.


Contains brief descriptions of the Cambrian strata of the Lehigh Valley.

1897

WILLIAMS, EDWARD H., Jr. Greenland glaciers.


Phenomena of ice action at Bethlehem cited to prove that “the finding of angular
ridges or peaks . . . is . . . no sign of the absence of ice from the locality.”

1898

EBEN, CARL THEO. Gottlieb Mittelberger’s Journey to Pennsylvania in the
year 1750 and Return to Germany in the year 1754, containing not
only a description of the country according to its present condition,
but also a detailed account of the sad and unfortunate circumstances
of most of the Germans that have emigrated, or are emigrating to
that country.

129 pp., Phila. 1898. English translation of German publication, 1756.

Contains several brief references to the region now embraced in Lehigh County.
Describes plants, wild animals, birds, Indians, etc. Black snakes in the Blue
Mountains (evidently what is now known as South Mountain or the Reading Hills)
are said to be 12 to 15 feet long and rattlesnakes “more than 18 feet long and
as thick as a hay pole.” The “Blue Mountains” range “begins at the Delaware
River, and passes to the left across the country, and reaches as far as the great
river Ohio.”

“In the Blue Mountains various rich ores have been found which are kept concealed
as yet as much as possible; this ore consists for the most part in copper, sulphur
and iron and promises a rich yield.” (pp. 100-101.)

HEILPRIN, ANGELO. The Earth and Its Story.

267 pp., Boston, 1898.
The Delaware Water Gap and the Lehigh Gap are briefly described (p. 58).

MERRIMAN, MANSFIELD. The Slate Regions of Pennsylvania.

Stone for July, 1898. 16 pp., 5 figures. Chicago, 1898.

Short descriptions of the slates and the slate industry of Lehigh County.
WILLIAMS, EDWARD H., Jr. Notes on Kansan Drift in Pennsylvania. 
Brief statement that "the Lehigh and its tributaries acquired their present level in pre-Kansan times."

1899

BORHEK, HENRY T. An attempt to determine the preglacial course of the Manokisy (Monocacy). 
Unpublished student thesis, 34 pp., 1 map, 1 chart, 1899, Lehigh University Library. 
Prepares evidence to show that Manokisy Creek at one time turned to the southwest in the northwest part of Bethlehem, cutting a channel in what is now West Bethlehem, and joined a westward flowing tributary of Lehigh River which then flowed southwestward into Perkiomen Creek.

1900

ANONYMOUS. The Development and Future Prospects of Portland Cement Manufacture in America. 
An editorial discussing the history of portland cement.

HOPKINS, THOMAS C. The Clays of the Great Valley and South Mountain Areas in Pennsylvania. 
Pennsylvania State College Annual Report, 1899-1900, Appendix, 45 pp., Harrisburg, 1900. 
Describes a few occurrences of white clay in Lehigh County (pp. 24-25), red brick clay plants of Bethlehem and Allentown (pp. 30-35), and a vitrified paving brick plant at Guth's Station (pp. 36-39). Mentions iron ores, cement, slate and zinc of Lehigh County.

HOPKINS, T. C. Cambro-Silurian Limonite Ores of Pennsylvania. 
An excellent account of the occurrence, characteristics and origin of the limonite ores of the State with occasional mention of those of Lehigh County. Includes an annotated bibliography.

HOPKINS, T. C. The White Clays of Southeastern Penna. 
Brief reference to white clay in some of the iron ore pits of Lehigh County.

Descriptions of the early iron furnaces of the region.

1901

HOPKINS, T. C. Limonite Ores of Pennsylvania. 
Gives list by counties of limonite ore pits, idle and operated, of the Cambro-Ordovician areas of Pennsylvania. Lehigh County is easily first on the list.

1902

128 pp., Allentown, 1902. 
An earlier edition was published in 1901. 
Contains much material of geographic interest in addition to historical data.

Says the Lehigh originally flowed southward from Allentown through Leibert's (Leibert's) Gap and into the Perkiomen "the portion of the stream between Allentown
and Easton being a case of piracy on the part of the Delaware, cutting more rapidly
than the Lehigh and forcing the low col about Glendon westward till the Lehigh
drainage level was reached. 2 Describes a thickness of 165 feet of glacial deposits
in West Bethlehem resting on the pre-Cambrian crystalline rocks. Believes that
the "Monokisy (Monocacy) flowed westward into the Lehigh and passed under West
Bethlehem ridge on a line running through the intersection of 12th avenue and
Broad street."

1903

CAMPBELL, MARIUS R. Geographic Development of Northern Pennsylvania
and Southern New York.
Describes the Harrisburg and Somerville peneplanes as developed in Lehigh
County. Says they are probably of early Tertiary age.

DALE, T. NELSON. The Slate Industry at Slatington, Pa., and Martinsburg,
W. Va.
Short account of the physical characteristics, mineral composition and structure
of the slate of the Slatington region.

LEVERING, JOSEPH MORTIMER. A History of Bethlehem, Pennsylvania, 1741-
1892.
809 pp., 86 plates. Bethlehem, 1903.
Contains much geographic information and descriptions of the industries of the
Lehigh Valley.

PECK, FREDERICK B. Basal Conglomerate in Lehigh and Northampton Coun-
ties, Pennsylvania.
Geology, vol. 11, pp. 108-109, Chicago, 1903; Eng. and Min. Jour., vol. 75,
p. 154, New York, 1903.
A short description of the distribution and characteristics of the Cambrian quartz-
ites, sandstones and conglomerates composing the Hardyston formation as developed
in Lehigh and Northampton Counties.

1904

ANONYMOUS. The Thomas Iron Company, 1854-1904.
98 pp., illustrated, New York, 1904.
Contains much historical matter concerning the iron industry of the Lehigh
Valley.

ECKEL, EDWIN C. Cement-rock deposits of the Lehigh District of Pennsyl-
avania and New Jersey.
A short description of the geology of the Lehigh cement district with several
analyses of cement rock.

GARRISON, F. LYNWOOD. The Genesis of Limonite Ores in the Appalachians.
Discussion of origin of limonite ores with brief mention of Lehigh County.

PECK, F. B. The Cement Belt in Lehigh and Northampton Counties of
Pennsylvania.
Lists and describes the following formations of the Lehigh Valley: Pre-Cambrian
crystalline rocks, Cambrian basal conglomerate, Trenton limestone, cement rock,
Hudson River slate, Oneida and Medina sandstone. Gives several chemical analyses.

1905

JORDAN, JOHN W., GREEN, EDGAR MOORE, and ETTINGER, GEORGE T. Historic
Homes and Institutions and Genealogical and Personal Memoirs of the
Lehigh Valley, Pennsylvania.
Contains biographic sketches of many men who were concerned in the develop-
ment of the mineral resources of the Lehigh Valley.

Discusses origin, composition and structure of slate and describes the slate deposits. The individual quarries of Lehigh County and the microscopic characteristics of the slate obtained from them are described (pp. 81-85). Contains tests on slates by Mansfield Merriman.


In praise of Schantz's Spring, five miles west of Allentown, the author writes as follows: "In this marvelous spring, which is supposed to be connected by a subterranean channel with Lake Erie, the water pours from an opening three feet in diameter and apparently bottomless".

TOWER, WALTER S. Regional and Economic Geography of Pennsylvania, Part I, Physiography.


In the general descriptions of the physiographic regions of the State, many references are made to the features in Lehigh County.

1908


A discussion of the stratigraphy of the region with especial descriptions and analyses of the limestones used in the manufacture of portland cement.


Gives a history of Hampton (Mary Ann) Furnace, which was located on Perkiomen Creek, Upper Milford Township, Lehigh County. It was built in 1809 and was operated (not continuously apparently) until 1867 or 1868. The iron ore, limestones and charcoal came from the immediate vicinity.

1909


Discussion by Charles Catlett in same volume, pp. 916-920.

Describes the occurrence of limonite ores of the Great Valley with specific references to some mines in Lehigh County. Claims the ore bodies are gossan deposits. States that pyrite deposits of commercial importance probably underlie the limonite ores.


Mentions the Shawangunk formation thinning southward from 700 feet at the Delaware Water Gap to 400 feet at the Lehigh Gap. Indicates non-marine overlap.

The Shawangunk strata of Blue Mountain are referred to the Salina formation.


Announces the division of the Cambro-Ordovician limestones of the Lehigh Valley into five formations. Erroneously reports two areas of Shawangunk conglomerate "some twenty miles south of the main exposure in the Blue Ridge."
1910

Briefly describes the Lehigh cement district.

Contains brief descriptions of the slates of the Lehigh Valley (pp. 194-195, 400-401, 484-488).

STODDARD, JESSE C., and CALLEN, ALFRED C. Ocher Deposits of Eastern Pennsylvania.
Discusses the origin of ocher and describes deposits near Alburtis and Breinigsville.

1911

Gives an analysis of calamine from Friedensville, descriptions of allophane and fluorite from Ironton, and an excellent photograph and brief description of the Ueberroth zinc mine at Friedensville.

MILLER, BENJAMIN L. Paint Shales of Pennsylvania.
Brief statement of the use of Martinsburg slates of Lehigh County for black paint.

Short descriptions of the pre-Cambrian, Cambrian, and Ordovician formations of Lehigh County. Some ocher and black slate deposits of the county are described.

The Cambrian, Ordovician, and early Silurian strata of the Lehigh Valley are described, also the cement industry of the region.

SCHÖEF, JOHANN DAVID. Travels in the Confederation (1783-1784). Translation of "Reise durch einige der mittlern und sudlichen vereinigten nord amerikanischen staatenunternomm.e in den Jahren 1783 und 1784."
The author spent some time at Bethlehem and Nazareth and has described the topography, geology of the soils, and industries of the inhabitants of these as well as the areas crossed by him in journeying to the Wind Gap. Describes streams, springs, sink holes, rocks, etc. He speaks of the "Lehigh River" as "a soft, clear, pure stream flowing over a rocky bottom." Says the limestone valley was covered with forests consisting "for the greater part of white, red, and black oak" and the slate hills covered with the "bush oak" seldom over three to four feet in height.

ULRICH, E. O. Revision of the Paleozoic Systems.
Contains references to the Cambrian and Ordovician strata of the Lehigh Valley. The Upper Cambrian limestones are considered to be Ozarkian (pp. 644-646, 655, 665-666, etc.).

1912

GLACE, WILLIAM H. A Narrative of Hydraulic Cement Mined in the Lehigh Valley.
16 pp., 3 plates, Catasauqua, 1912.
A sketch of the beginning of cement manufacture in the Lehigh Valley.
MILLER, BENJAMIN LEROY. The Geology of the Graphite Deposits of Pennsylvania.
Brief mention of Lehigh County graphite occurrences.

MILLER, BENJAMIN L. Graphite Deposits of Pennsylvania.
Localities in Lehigh County where graphite occurs are described, especially near Vera Cruz and Emmaus where graphite mines have been operated.

WHERRY, EDGAR T. The Triassic of Pennsylvania.

1913

BARRELL, JOSEPH. Piedmont terraces of the northern Appalachian and their origin.
Post-Jurassic history of the northern Appalachians.
In these two papers Barrell suggested the formation of the terraces (peneplains) of the Appalachians by marineplanation instead of fluvial erosion.

BLISS, ELEANORA F. Glaucophane from Eastern Pennsylvania.
Describes a blue mineral occurring in pre-Cambrian rocks of Lehigh and other counties which is identified as glaucophane. (Later called crocidolite by Wherry, 1922.)

BROWN, AMOS P., and EHRENFEILD, FREDERICK. Minerals of Pennsylvania.
Describes the important minerals and rocks of Pennsylvania and gives the principal localities where they occur. Many localities in Lehigh County are cited.

COONS, A. T. Slate.
Includes statistics and a general discussion of the economics of the slate industry and methods of working. Frequent references to the slate of Lehigh County.

DALE, T. NELSON. The Commercial Qualities of the Slates of the United States, and Their Localities.
Describes the distribution and characteristics of the "soft vein" and "hard vein" slates of Lehigh and Northampton Counties with brief descriptions of some quarries.

ECKEL, EDWIN C. Portland Cement Materials and Industry in the United States; with contributions by E. F. Burchard and others.
Contains a short chapter on the cement materials and cement industry of the Lehigh District (pp. 310-322) with a generalized map of the region.

FREAR, WILLIAM, and EEB, E. S. The Lime Resources of Pennsylvania.
Gives analyses of limestones and dolomites from eleven different quarries in Lehigh County (pp. 313-318).

FREAR, WILLIAM. Pennsylvania Limestone and Lime Supplies.
Contains 25 analyses of Lehigh County limestones (pp. 91-92).
GRAEBAU, AMADEUS W. Early Paleozoic Delta Deposits of North America. 
Discusses the origin and correlation of various Paleozoic formations represented in Lehigh County, particularly the Martinsburg and Shawangunk and mentions specifically a few localities within the county.

HICE, RICHARD R. Mineral Production of Pennsylvania for 1911. 
Statistics of mineral production with lists of producers.

WHERBY, EDGAR T. North Border Relations of the Triassic in Pennsylvania. 
Describes the conglomerates occurring in the north border of the Triassic in the extreme southeast portion of Lehigh County. Thinks that the cobbles of the conglomerate were transported by floating ice in streams coming from the Appalachian Mountains to the north.

1914

DALE, T. NELSON, and others. Slate in the United States. 
Discusses origin, composition, texture, structure, and economic geology of slate. Lehigh County quarries are described (pp. 104-108).

HICE, RICHARD R. Mineral Production of Pennsylvania in 1912. 
Pennsylvania Topog. and Geol. Survey, Biennial Report for the two years ending June 1, 1914, pp. 79-232, Harrisburg, 1914.
Statistics of the mineral production of the county, with short descriptions of each product.

MILLER, BENJAMIN L. Anniversary History of Lehigh County, Pennsylvania, Chapter 1, Geology, pp. 1-14, Allentown, 1914.
A non-technical account of the geology and mineral resources of Lehigh County.

ROBERTS, CHARLES RHEGDS; STOUT, JOHN BAER; KRECK, THOMAS H.; and DIETRICH, WILLIAM J. History of Lehigh County, Pennsylvania, three volumes.
Vol. 1, 1101 pp., Allentown, 1914.
Contains many descriptions of the geological features and mineral resources of Lehigh County (see separate title for chapter on Geology by B. L. Miller). Some of the most important are the following: jasper quarries (p. 28), floods of the Lehigh River (pp. 428-430, 472-474, 601-602), springs (pp. 431-432, 865-866, 902), water works and artesian wells (pp. 858-860, 658, 656, 677, 737, 821, 1011-1012), iron ores and iron works (pp. 555-559, 575-579, 592-594, 633, 658, 671, 696, 707, 785, 785, 853-854, 897-898, 956-957, 1007-1010, 1018, 1038-1039), brick works (pp. 574-575, 578, 654, 712, 731, 783, 838, 1071-1072), stone quarries, lime, cement (pp. 584, 712, 728, 801, 855, 862, 911-913, 1011, 1015, 1064-1069), slate (pp. 674-675, 696-697, 820, 827-828, 854-855, 962-965, 1054-1056), corundum (p. 785), zinc (pp. 938-940), sand (p. 864), pottery (p. 80), Bake Oven Knob (p. 737).

SALISBURY, S. H., Jr., and BECK, GEORGE C. A Study of the Dolomitic Limestones of the Allentown Quadrangle. 
A chemical investigation of some dolomitic limestones of the Lehigh Valley. Many analyses and discussions of origin of the dolomites.

1915

CARTER, W. T., Jr., and KERR, J. A. Soil Survey of Lehigh County, Pennsylvania. 
A description of the soil types represented within the county and their adaptabilities. Briefly describes the geology and the industries of the region.
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1916


1917


52 LEHIGH COUNTY

Lusite, molding sand, saucnite, yellow shale, slate, smithsonite, sphalerite, wad, wavellite, whetstone.

WATER SUPPLY COMMISSION OF PENNSYLVANIA. Water Resources Inventory Report.
Part III, Gazetteer of Streams, 657 pp., Harrisburg, 1917.
Gives natural and artificial features of Lehigh River and Trout, Spring, Little Lehigh, and Jordan creeks.
Describes floods of the Lehigh River.

WATSON, THOMAS L. Weathering of Allanite.
Describes the occurrence of lanthanite “resulting from the decomposition of allanite” at Colesville (pp. 471-472).

WILLIAMS, EDWARD HIGGINSON, Jr. Pennsylvania glaciation; first phase.
101 pp., map, 56 figures, Woodstock, Vermont, 1917.
Contains many descriptions of the glacial deposits of Lehigh County.

1918

HINTZE, F. F. Age of the Martinsburg Shale as Interpreted from its Structural and Stratigraphical Relations in Eastern Pennsylvania (abstract).
The author, having in mind some isolated occurrences of Martinsburg shale in Bucks and Lehigh counties, particularly the one at Limeport, suggests a probable unconformity within the Martinsburg with the upper part distinctly younger than the lower.

SHAW, EUGENE WESLEY. Ages of Peneplains of the Appalachian Province.
Presents evidence to show that the oldest peneplains now represented in the Appalachian region are no older than Tertiary and perhaps Middle Tertiary.

WHERRY, EDGAR T. Pre-Cambrian Sedimentary Rocks in the Highlands of Eastern Pennsylvania.
Describes quartz-mica schists, graphite-bearing quartzite, and basic (amphibolite) gneiss of Pre-Cambrian age in Lehigh County and argues for their sedimentary origin. Article illustrated by photomicrographs and other figures.

1920

BARRELL, JOSEPH. The Piedmont Terraces of the Northern Appalachians.
Describes peneplains, wind gaps, and water gaps in eastern Pennsylvania, with specific references to Lehigh Gap.

HELLER, WILLIAM J. History of Northampton County and the Grand Valley of the Lehigh.
Describes the Friedensville zinc mines and works.

WATER SUPPLY COMMISSION OF PENNSYLVANIA. Water Resources Inventory Report.
Describes water supplies of Allentown, Bethlehem, Northampton, North Catasauqua, Coopersburg, Emmaus, Emerald, Stateldale, Macungie, Slaton, Fountain Hill and Salisbury Township (part).

WILLIAMS, EDWARD H., Jr. The Deep Kansan Pondings in Pennsylvania and the Deposits Therein.
Brief mention of glacial phenomena in the Lehigh Valley.
BIBLIOGRAPHY

1921

Describes five peneplanes in Pennsylvania all of which should be represented in Lehigh County although only a few localities within the county are specifically mentioned. Peneplanes described are Kittatinny (1600'-1160'), Schooley (1800'-900'), Honeybrook (860'-700'), Harrisburg (800'-500'), and Early Brandywine (500'-350').

PETERS, RICHARD, Jr. Two Centuries of Iron Smelting in Pennsylvania. 83 pp., illustrated, Philadelphia, 1921.
Contains considerable information concerning the early iron industry in the Lehigh Valley.

1922

Describes the geology of the Bake Oven. Most of the information was obtained from the writings of Prof. E. H. Williams, Jr.

Deals with the technology of the slate industry but contains numerous descriptions of geologic features observed in quarries in Lehigh County.

Describes all the minerals known to occur in the State and gives list of minerals and specific localities for each county with literature references. Cites many minerals from Lehigh County.

Traveled from Bethlehem to Reading, stopping at Allentown and Trexlertown, etc. Brief descriptions of physical features. Refers to Big Spring, ½ mile west of Trexler’s Tavern.

A blue mineral, previously called glaucophane, occurring near Limeport and in other localities, is determined to be crocidolite.

WYER, SAMUEL S. The Smithsonian Institution’s Study of Natural Resources Applied to Pennsylvania’s Resources. 150 pp., Washington, 1922.
Interesting generalizations concerning Pennsylvania’s resources. Discussions of limestones, lime, and cement apply to Lehigh County.

1923

Describes the jasper occurrences of Vera Cruz and Macungie, and others in Berks and Bucks Counties.

1924

Structures described are applicable to the interpretation of the Martinsburg strata of Lehigh County.

BROWN, THOMAS CLACHER. Origin of Oolites and the Oolitic Texture in Rocks.
LEHIGH COUNTY


Refers briefly to calcareous and siliceous oolites in the vicinity of Allentown and Bethlehem.

Evans, W. F. Friedensville Zinc Mines.
Concise description of the history of the operations of the Friedensville zinc mines.

Fox, R. L. and Grosshart, L. J. H. Water Supply of the Lehigh Valley.
Engineers Club of the Lehigh Valley Proc., Spring Issue, 6 pp., 1924.
A discussion of the water situation in the Lehigh Valley with a brief statement concerning the source of supply of each municipality.

Knope, Eleanor B. Correlation of residual erosion surfaces in the eastern Appalachian Highlands.
Identifies and correlates remnants of 10 erosion surfaces in Pennsylvania of which 7 are represented in Lehigh County. They are in order of decreasing elevation and decreasing age—Kittatinny (1650'), Schooley (1400'-1300'), Mine Ridge (1200'-1000'), Honeybrook (900'-840'), Sunbury (700'-600'), Harrisburg (600'-500'), Lancaster (Brandywine, Somerville) (440'-400'). Presents maps of different periods showing development of present drainage.

Lesley, Robert W. History of the Portland Cement Industry in the United States.
330 pp., plates and figures, Chicago, 1924.
An excellent account of the history of the Portland cement industry in the Lehigh District of Lehigh and Northampton Counties.

Miller, Benjamin LeRoy. Lead and Zinc Ores of Pennsylvania.
Describes the Friedensville zinc region of Lehigh County.

Moore, E. S., and Taylor, T. G. The Silica Refractories of Pennsylvania.
Brief mention is made of the siliceous sediments of Blue Mountain.

1925

Ashley, George H. Silurian Stratigraphy at Lehigh Gap, Pennsylvania.
Pennsylvania Topog. and Geol. Survey Bull. 58, 6 pp., Harrisburg, 1925.
Gives measurements at Lehigh Gap of 250 feet of Tuscarora sandstone, 555 feet of Juniata sandstone and shale, and 464 feet of Oswego sandstone.

Behre, Charles H., Jr. Taconic Folding in the Martinsburg Shales (abstract).
Evidence presented to show that the Taconic disturbance was in eastern Pennsylvania "almost if not quite as violent as the Appalachian revolution."

Espinshade, A. Howry. Pennsylvania Place Names.
375 pp., State College, 1925.
Contains considerable geographic information concerning Lehigh County.

Miller, Benjamin LeRoy. Limestones of Pennsylvania.
Contains much data concerning the limestones of Lehigh County and their adaptabilities.

Miller, Benjamin LeRoy. Mineral Resources of the Allentown Quadrangle.
A description of the mineral resources of that portion of Lehigh County embraced within the Allentown quadrangle.

Miller, Benjamin LeRoy. Taconic Folding in Pennsylvania (abstract).
Attention called to a marked unconformity at the base of the Shawangunk.
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1926

BEHRE, CHAS. H., Jr. Structures in the Slates of Northeastern Pennsylvania (abstract).
Brief descriptions of the different members of the Martinsburg formation and prevailing structures.

Contains descriptions of the raw materials and the processes of manufacture of portland cement in the Lehigh District.

MILLER, B. L. Taconic Folding in Pennsylvania.
Evidence presented to prove period of orogenic activity at close of Martinsburg deposition and pronounced unconformity between Martinsburg and Shawangunk formations.

1927

BEHRE, CHARLES H., Jr. Slate in Northampton County, Pennsylvania.
An exhaustive account of the stratigraphy, structure, and economic features of the slate region of Northampton County. Most of the features described apply equally to the slate district of Lehigh County.

STOSE, GEORGE W., and JONAS, ANNA I. Ordovician shale and associated lava in southeastern Pennsylvania.
Discusses relations of the Martinsburg, Leesport, and Allentown formations in the Egypt and Limeport regions.

STOSE, GEORGE W. Possible Post-Cretaceous Faulting in the Appalachians.
Suggests the correlation of the Kittatinny and Schooley peneplanes. The greater elevation of the peneplane on Kittatinny Mountain as compared with the one developed on Scott and Schooley Mountains (N. J.) is explained by normal faulting in post-Cretaceous and pre-Harrisburg peneplanation time.

1928

Describes particularly the structural features of the Martinsburg slates of the Lehigh slate district.

DONEHOO, GEORGE P. A History of the Indian Villages and Place Names in Pennsylvania.
390 pp., Harrisburg, 1928.
Important geographic information concerning Lehigh County. The following topics are discussed: Delaware Indians, Hockendauqua, Lehigh, Muncie, Monocacy, Saucon, etc.

ECKEL, EDWIN C. Cements, Limes and Plasters.
Contains many descriptions of the cement industry of the Lehigh Valley.

FENNEMAN, NEVIN M. Physiographic Divisions of the United States, 3d ed.
Map shows the different physiographic divisions represented in eastern Pennsylvania, with brief descriptions in the text.
Discussion tests for molding sand, origin and geology and descriptions of samples tested, including materials from three localities in Lehigh County.

Contains description of stratigraphy in Delaware and Lehigh water gaps.

1929

Contains considerable geographic information and copies of early maps. Excellent bibliography.

Discusses the peneplanes and physiographic development of southeastern Pennsylvania, including Lehigh County. Presents generalized maps.

A summary of events during late Ordovician and early Silurian as interpreted from the geologic sections at Delaware Water Gap and Lehigh Gap.

1930

Short account of the old Indian jasper workings at Macungie and Vera Cruz.

PIRSON, LOUIS V., and LONGWELL, CHESTER R. Outlines of Physical Geology. 376 pp., New York, 1930.
Formation of water gaps described, with cut of Lehigh Water Gap as an example. Gives cut showing slaty cleavage in slate quarry at Slatington.

A general account of the ceramic industries of the State, with a list of producers. Contains some facts regarding the clay, brick, and cement plants of Lehigh County.

States that the Martinsburg shale is made up of two members and the Medina unconformably overlies the lower member.


Attributes the development of the so-called "Somerville peneplane" to the work of solution rather than ordinary surface erosion.
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WOOLF, D. O. The Results of Physical Tests of Road-Building Rock.
Gives physical tests of seven samples of dolomite, ''diorite,'' gneiss, and syenite from Lehigh County (p. 97).

1931

ASHLEY, GEORGE H. A Syllabus of Pennsylvania Geology and Mineral Resources.
Contains many brief descriptions of the geology and mineral products of Lehigh County.

BLANK, EUGENE W. The Old Friedensville Zinc Mine.

STOSE, GEORGE W., and LJUNGSTEDT, O. A. Geologic Map of Pennsylvania.
Pennsylvania Topog. and Geol. Survey, scale: 1 inch = 6 miles, Harrisburg, 1931.
Shows generalized geologic formation lines of Lehigh County.

SWARTZ, CHARLES K., and SWARTZ, FRANK M. Early Silurian Formations of Southeastern Pennsylvania.
Gives a detailed geologic section through Lehigh Gap (pp. 641-644).

VER STEEG, KARL. Warping of Appalachian Penepanes.
Concludes that ''the uplift of the Harrisburg surface appears to have been, in eastern Pennsylvania, a vertical one unaccompanied by widespread warping.''

1932

Contains a mass of useful information concerning the Lehigh River.

BURKHARDT, F. A. Tracks, Trails and Traces of Lehigh Valley Regions.
Says an Indian village was located where Central Park now is.

DEISHER, HENRY K. Quarrying.
Brief descriptions of the jasper quarries at Vera Cruz and Macungie (pp. 33-34) and the slate quarries near Slatington (pp. 37-38).

DEISHER, HENRY K. South Mountain Indian Quarries.
Further descriptions of the Indian jasper quarries at Vera Cruz and Macungie (pp. 387-389).

Descriptions of the Delaware and Lehigh Rivers and the Lehigh Canal.

JOHNSON, DOUGLAS, BASCOM, FLORENCE, and SHARP, HENRY S. Geomorphology of the Central Appalachians.
Describes the physiographic divisions represented in Lehigh County.

Various physical properties of several specimens of slate from different slate companies in Lehigh County were determined and general conclusions stated.

Believes that the Triassic conglomerate along the southeast border of Lehigh County is of Brunswick age.

A concise description of the geology, history, and processes of manufacture.

Lehigh Water Gap mentioned and cut of slate strata exposed.

Describes different kinds of stone, uses, character, geology, and some important quarries of building stone in Lehigh County (pp. 196-199).

Shows peneplane in eastern Pennsylvania by means of contours. Identifies Kittatinny and Schooley peneplanes as the same.

1933

Contains descriptions of the peneplanes developed in Lehigh County. Summarizes the work of F. Leverett and F. Ward on the glacial ice sheets of the region.

An extensive report on slate, with many descriptions of the deposits of Lehigh County.

Brief description of the Lehigh County locations where the Indians quarried jasper near Limeport, Vera Cruz, and Macungie.

Concludes that the wind gaps of the Appalachians in Pennsylvania “fall into narrow horizontal zones which may indicate the presence of several erosion surfaces between 800 feet and 1,650 feet elevation.”

Disagrees with Hickok. Concludes that in the Appalachian region “there is no accordance in wind gap elevations and that they do not mark fluvial base levels.”

1934

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Brief description and analyses of the water supply of Allentown and Bethlehem.

FEETZ, A. HENRY. The Burden of Lehigh River in One Year.
Gives statistics of the amount of soluble and insoluble material carried past Bethlehem during a year of observation.

FULLER, J. OSBORN. Preliminary Staining Studies of the Lehigh Valley Dolomitic Limestones.
Describes results obtained in staining specimens of the Cambrian and Ordovician limestones of the Lehigh Valley.

HALL, GEORGE M. Ground Water in Southeastern Pennsylvania.
Describes the underground water conditions in Lehigh County.

LEVERETT, FRANK. Glacial Deposits Outside the Wisconsin Terminal Moraine in Pennsylvania.
Discusses particularly the Illinoian ice sheet in the vicinity of Emmaus.

"The Appalachian region of Pennsylvania contains the record of several erosional levels of fluvial origin. The positions of these levels are indicated with moderate accuracy by groups of water gaps and wind gaps."

MILLER, BENJAMIN LEROY. Limestones of Pennsylvania.
Contains descriptions of the limestone resources of Lehigh County.

The microscopic characteristics of the jasper of the Hardyston formation are described and their origin discussed.

TORREY, RAYMOND H., and others. Guide to the Appalachian Trail, from the Housatonic River to the Susquehanna River.
88 pp., New York, 1934.
Describes the trail on the crest of Blue Mountain from the Lehigh River to the Berks County line (pp. 58-61) with route map.

WARMKESSEL, CARL A. Burden of Lehigh River During the Flood of August, 1933.
Gives figures of kind and amount of material carried past Allentown and Bethlehem during the 1933 flood.

1935

ASHLEY, GEORGE H. Studies in Appalachian Mountain Sculpture.
Discusses the peneplain problem and specifically refers to Lehigh County localities. Concludes that there has been only one period of peneplanation.

BUTLER, ROBERT D. Mylonitic Sphalerite from Friedensville, Pennsylvania.
From the study of polished sections of the homogeneous massive sphalerite from Friedensville, the author concludes that "plastic deformation and granulation subsequent to the emplacement of the ore produced the fine-grained or mylonitic facies."
LEHIGH COUNTY


A short description of a cave containing fine aragonite specimens. Cave was in the Ziegenfuss quarry in southwest part of Allentown.


Concludes that "silica solutions, later richer in sulphides, invaded the limestone, quartz first intimately replaced the limestone and was deposited in veins; later, sphalerite replaced the carbonate and in places quartz."


Petrographic studies of some of the pre-Cambrian metamorphic rocks near Macungie have furnished evidence of mineralogic changes due to successive igneous intrusions.


Among others the work of Lewis Evans, Nicholas Scull, William Scull, and Reading Howell is described. All of these include the area now comprising Lehigh County.


The limestones exposed along the Delaware and Lehigh Rivers were studied in considerable detail. Concludes that "while the method of insoluble residues can not be recommended for independent use in regions of complex structure, it is very valuable as an adjunct to conventional field methods in determining stratigraphic succession and establishing more exact lithological correlations."


An excellent historical account.


Advances the theory that the crystalline rocks of the Reading region and extending northeastward into Lehigh County constitute a part of a great overthrust block.


Reviews the work of Bascom (1921), Barrell (1920), Knopf (1924), Stose (1928), Meyerhoff and Olmsted (1934). States that "since the water gaps of today have varying elevation and are known not to represent a peneplane of fluvial base level, the still more irregular wind gaps cannot be regarded as reliable evidence of former base levels." See Ver Steeg, 1930.

1936


A brief historical account of the operations of the companies concerned with the Friedensville zinc deposits.


Describes the formation of sericite in schist and gneiss in the pre-Cambrian metamorphic rocks of the Reading Hills.


Discusses ancient drainage systems of eastern Pennsylvania and New Jersey, including Lehigh County.
Further discussion of relation between wind gap elevations and fluvial erosion surfaces. See Ver Steeg, 1930.

A discussion of the major streams of the Appalachian area, including Delaware River. The Triassic conglomerates of Plint Hill are believed to have been formed by the Triassic Lehigh River.

Specific facts are presented to disprove the overthrust theory.

Roberts, Charles R. Place Names of Lehigh County and Their Origin.
Gives origin of many of the Lehigh County geographic names.

Ryder, C. E. The Floods of March 1936 in Pennsylvania.
Describes the floods of the Lehigh River during March, 1936.

1937

Fraser, Donald M. Replacement of Hardyston Quartzite by Jasper.
Presents petrographic evidence to show that jasper found in Lehigh and Northampton counties has been formed by the replacement of quartz grains.

Miller, Ralph L. Martinsburg limestones in eastern Pennsylvania.
Descriptions are pertinent to geologic problems in Lehigh County.

Miller, Ralph L. Stratigraphy of the Jacksonburg Limestone.
Discusses paleontologic, stratigraphic, and structural characteristics of the Jacksonburg.

Sherman, L. D. Lehigh River Flood Control Survey.
A series of forty-seven blueprint topographic charts of the flood plains of the Lehigh River and lower portions of tributaries from Easton to Laurys. Also profiles of Lehigh and Delaware Rivers and tributaries. Charts on scales of 1 inch = 100 or 200 feet and 1 to 5,000.

1938

Mackin, J. Hoover. The Origin of Appalachian Drainage—A Reply.
Discusses paper by Meyerhoff and Olmsted published in 1936. Disagrees with the authors and accepts theory of D. Johnson.

Miller, Benjamin L. Breathing Caverns of the Lehigh Valley.
Describes in-going and out-going air currents in limestone cavities in East Allentown and along Club Avenue.
1939

FRASER, DONALD M., and GETZ, ALBERT J. Notes on Hardyston Quartzite.
Contains petrographic descriptions of some specimens of Hardyston quartzites from the Reading and Durham Hills. Conclude that hydrothermal waters have been active agents.

GIPSON, LAWRENCE HENRY. Lewis Evans.
219 pp., maps, Philadelphia, 1939.
Contains facsimiles of Evans’ maps and writings, described in this bibliography under the years 1749, 1750, 1753, and 1755.

MILLER, BENJAMIN L., FRASER, DONALD M., and MILLER, RALPH L. Northampton County, Pennsylvania.
Contains descriptions of the geography and geology of Northampton County. Many of the features described are present in Lehigh County.

MILLER, BENJAMIN L. Scolithus Tubes in Hardyston Sandstone.
Describes three types of Scolithus tubes found in the Hardyston sandstones of Lehigh and Northampton counties.

Contains short descriptions of the geologic features of the Lehigh Valley. Details are given of two itineraries mainly within the limits of Lehigh County; viz., Allentown to Center Valley and Allentown to Treichlers.

MILLER, BENJAMIN L. Rock (“Desert”) Varnish in Eastern Pennsylvania.
Proposes that the limonite coating prominently developed on surface rocks in the Lehigh Valley should be designated “rock varnish” instead of “desert varnish” in view of the fact that the region has an annual rainfall of 42.94 inches.

WILLARD, BRADFORD. Ordovician Shales of Southeastern Pennsylvania.
Presents evidence in support of the belief that the Martinsburg should be regarded as a Group rather than a Formation. Some of the data were obtained from Lehigh County localities.

WILLARD, BRADFORD, and CLEAVES, ARTHUR B. Ordovician-Silurian relations in Pennsylvania.
A discussion of the stratigraphy of the Upper Ordovician.

1940

FRASER, DONALD M. Silicification and Local Granitization in the Reading Hills (Abstract).
“Quartz and microcline replacing minerals in pre-Cambrian and Cambrian formations in the Reading Hills indicate a magmatic source for solutions that have introduced large volumes of material. This introduction was likely in post-Hardyston time.”

MACCLINTOCK, PAUL. Weathering of the Jerseyan Till.
Refers to glacial deposits near Emmaus. Approves of Leverett’s correlation of the pre-Wisconsin glacial deposits, such as occur in Lehigh County, to the Illinoian and Kansan ice sheets.

MYERS, RICHMOND E. The Hardyston Jasper of the Reading Hills in Pennsylvania.
A discussion of the character and origin of jasper with descriptions on several localities where it can be found.