



This material is part of the collection of the
Philadelphia Water Department
and was downloaded from the website
www.phillyh2o.org

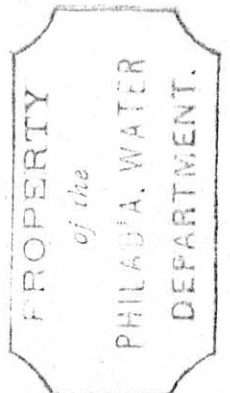
Please contact the PhillyH2O webmaster
for more information about this material.

THE
G E O L O G Y
OF
P E N N S Y L V A N I A

A GOVERNMENT SURVEY

BY
H E N R Y D A R W I N R O G E R S
STATE GEOLOGIST

PROFESSOR OF NATURAL HISTORY IN THE UNIVERSITY OF GLASGOW; HON. F.R.S.E., F.G.S.; MEMBER
OF THE AMERICAN PHILOSOPHICAL SOCIETY; FELLOW OF THE BOSTON ACADEMY OF ARTS
AND SCIENCES; MEMBER OF THE BOSTON NAT. HIST. SOCIETY, ETC. ETC.



IN TWO VOLUMES

VOL. I.

M D C C C L V I I I



Has its *source* in the N.E. corner of Delaware County, at an elevation of about 2000 feet above the sea. It *traverses* Delaware County, New York, flows between Pennsylvania and New York as far as Carpenter's Point, thence between Pennsylvania and New Jersey as far as the State-line below Chester, and thence between the State of Delaware and New Jersey to its estuary the Delaware Bay.

THE
DELAWARE

It
receives

from the right

from the left

- the Lackawanna Creek, { which *rises* in Moosick Mountain, on the Eastern borders of Wayne County, and flows Eastward through Wayne and Pike.
The *towns* washed by it and its branches are—Belmont, Mount Pleasant, Bethany, Honesdale, and Hawley.
It *empties* into the Delaware between Mount Hope and Barryville.
- the Lehigh River, { which *rises* in the table-land of the Pokono Mountains, in the swamps called the "Shades of Death," in Monroe and Lucerne counties.
It *traverses* thence between Lucerne and Carbon, and across the latter, and between Lehigh and Northampton, and through the latter.
The *towns* seated on or near it and its branches are—Stoddartsville, Whitehaven, Pennhaven, *Mauch Chunk*, Lehighon, Weissport, Parryville, Allentown, Bethlehem, and Easton.
It *empties* into the Delaware just below Easton.
- the Schuylkill River, { which *rises* in the Southern Anthracite Coal-field in Schuylkill County.
It *traverses* Schuylkill, Berks, Montgomery, and Philadelphia counties, flowing towards the S.E.
The *towns* seated on or near it are—Tuscarora, Middleport, Port Carbon, Pottsville, Schuylkill Haven, Orwigsburg, Port-Clinton, Hamburg, Reading, Pottstown, Phoenixville, Norristown, Manayunk, and Philadelphia.
It *receives* { on the *right* from Broad Mountain—Mill Creek, West Branch, Tulpehocken, and French Cr.
on the *left* from Broad Mountain—Little Schuylkill, Maiden Cr., Manatawny, Perkiomen, and Wissahickon ;
and *empties* into the tidal portion of the Delaware a few miles below Philadelphia.
- the Pawpacton, { which *rises* in the plateau of the Catskill Mountain ; *traverses* Delaware County, N. York, flowing westward ; and *empties* into the Delaware at Hancock.
- the Neversink River, { which *rises* in the North part of Ulster County ; *traverses* Ulster and Sullivan, flowing southward.
The chief *town* seated on or near it is Montecello.
It *empties* into the Delaware at Carpenter's Point, below Port Jarvis.
- several large streams in New Jersey, the chief of which is the Rancocas, { which *rises* in Monmouth and Burlington counties, New Jersey ;
and *traverses* Burlington County.
Its *towns* are—Pemberton, Mount Holley, Vincent-town, Eayrstown, Lumberton, &c.
It *empties* into the Delaware a few miles below Burlington City.

It *passes* by or near the *towns* of Narrowsburg and Port Jarvis in New York ; Milford in Pennsylvania ; Belvidere in New Jersey ; Easton and New Hope in Pennsylvania ; Trenton, Bordentown, and Burlington in New Jersey ; Philadelphia and Chester in Pennsylvania ; and Wilmington in Delaware.
It *empties* into the Delaware Bay.

HYDROGRAPHY.

THE
SUSQUEHANNA

Rises in Otsego County, New York, in and near Otsego Lake, on an elevated table-land. It traverses Otsego, Broome, and Tioga counties, in New York, and entering Pennsylvania in Bradford County, passes through it and Wyoming, Luzerne, Columbia, Montour, and Northumberland, and flows between the last and Snyder, and between Dauphin and Perry, and Cumberland, and thence between Lancaster and York to Maryland, where it presently enters the head of the Chesapeake Bay.

It receives	from the right,	the Shenango River,	which rises in Madison County, New York; traverses Shenango and Broome counties, N. Y.; washes the towns of Sherburne and Norwich; and empties into the Susquehanna at Binghampton in N. Y.
		the Chemung River,	which rises in Stenben County, N. Y.; traverses Stenben and Chemung counties, N. Y.; washes the towns of Bath and Elmira; and empties into Susq., below Athens.
		the Great West Branch of the Susquehanna, its rival in size,	which rises in Cambria County, Pennsylvania; traverses Clearfield, Clinton, and Lycoming, and divides Union from part of Northumberland to its junction with the North Branch of the Main Susq.; washes the towns of Clearfield, Lockport, Jesseyshore, Williamsport, Muncy, Milton, Lewisburg, and Northumberland; and empties into the Susq. at Northumberland;
		It receives	from the right — Clearfield Cr., Mushannon Cr., Bald Eagle Cr., Whitdeer-hole Cr., Buffalo Cr., and several lesser ones;
		from the left — the Sinnemahoning Cr., Kettle Cr., Pine Cr., Lycoming Cr., Loyalsock Cr., Muncy Cr., Chillisquaque Cr., and several lesser ones.	
		the Juniata River,	which rises on the Eastern slope of the Alleghany Mountain in Blair and Bedford counties; traverses Bedford, Huntingdon, Mifflin, Juniata, and Perry counties; passes the towns of Bedford, Huntingdon, Newton Hamilton, Lewistown, Mifflintown, and Millerstown; and empties into the Susq. at Duncan's Island, above Petersburg;
		It receives	from the right — Trough Cr., Aughwick Cr., Tuscarora Cr., Buffalo Cr., and several lesser ones;
		from the left — Frankstown Cr., Kishicoquillas Cr., Cocolamus Cr., and several lesser ones.	
		also numerous second-rate, but important streams,	such as Cayuga River, Sugar Cr., Tawanda Cr., Mahoppeny Cr., Fishing Cr., Penn's Cr., Sherman's Cr., Conedogwinit Cr., Yellow Breeches Cr., Conewago Cr., Codorus Cr., and Deer Cr.
		from the left,	the Lackawanna Creek,
the Swatara Creek,	which rises in Schuylkill County in the Southern Coal Basin; traverses the Western part of Schuylkill, also Lebanon and Dauphin counties; passes the towns of Tremont, Pinegrove, and Humel's Town; and empties into the Susq. at Middletown.		
the Connestoga Creek,	which rises in the Southern corner of Berks County, on the border of Chester; traverses Lancaster County; passes Morgantown, Churchtown, Lancaster, and Safe Harbour; and empties into the Susq., near Safe Harbour.		
and Octorara Creek,	which rises near the Eastern side of Lancaster County, South of the Copper Mine Ridge; traverses the Southern part of Lancaster County, and a small part of Cecil County, Maryland; and empties into the Susq. a few miles above Port Deposit.		
besides many smaller ones,	such as the Wyalusing Cr., Tunkhannock Cr., Nescopeck Cr., Catawissa Cr., Shamokin Cr., Mahanoy Cr., Mahantanga Cr., Wiconisco Cr., Chiques Cr., and Conewingo Cr.		

It passes by or near the towns of Unadilla, Great Bend, Binghampton, Owego, Athens, Tawanda, Tunkhannock, Pittston, Wilkesbarre, Berwick, Bloomsburg, Danville, Northumberland, Sunbury, Dauphin, Harrisburg, Marietta, Columbia, Port Deposit, and Havre-de-Grace.

It empties into the Chesapeake Bay in Maryland, about 12 miles South of the State line of Pennsylvania.

Rises in Hardy County, Virginia, at an elevation of about 2500 feet above the sea.
 It traverses Hardy County, Virginia, and Alleghany County, Maryland, and flows thence Eastward and South-eastward, between Maryland and Virginia, the whole way to its entrance into Chesapeake Bay.

THE
 POTOMAC

It
 receives

from the right

{ several rivers and important second-class streams, which, belonging wholly to Virginia, need not be here described.

from the left

no important river, but several large streams, called "Creeks," namely—

Wills' Creek,

{ which rises in Somerset County, at the East base of the Alleghany Mountain ;
 traverses the South-east corner of Somerset, North-west corner of Bedford, and the narrow part of Maryland ;
 passes no important town ;
 and empties into the Potomac at Cumberland.

Town Cr.,

{ which rises on the East slope of Tussey Mountain, in the South part of Bedford County ;
 and empties into the Potomac below Old Town.

Sideling-hill Cr.,

{ which rises in the valley West of Townhill, in the South-east corner of Bedford ;
 and empties into the Potomac above the mouth of the Cacapon River.

Licking Cr.,

{ which rises in Fulton County, East of M^cConnellstown Cove ;
 and empties into the Potomac several miles East of Hancock.

Conecocheague Cr.,

{ which rises in Franklin County in Anderson's Valley —East Branch rises in the North-west corner of Adams' county ;
 and empties into the Potomac at Williamsburg.

All these streams traverse the narrow part of Maryland, after flowing out of Pennsylvania.

THE ALLEGHANY

Rises near the centre of Potter County, at an elevation of about 1700 feet above the sea. It traverses the west part of Potter, N.E. corner of McKean, then enters New York, and returns into Pennsylvania in the N.E. corner of Warren County, which it traverses diagonally, and passes through Venango, Clarion, and Armstrong, and between Butler and Alleghany, where, at Pittsburg, it drops its name and takes that of the Ohio, passing between Butler and the rest of Alleghany County, and then across Beaver County, to become the dividing limit between the States of Ohio and Virginia.

- | | | | |
|----------------|---------------------------------------|---|--|
| It receives | from the right, | the Conewango Creek, | { which rises in Cattaraugus County, New York; traverses Cattaraugus County, New York, and the North part of Warren County, Pennsylvania; empties at Warren into the Alleghany. |
| | | the French Creek, | { which rises in Chatauque County, New York, not far from Chatauque Lake; traverses the S.W. corner of Chatauque County, New York, and Erie, Crawford, and part of Venango counties, Pennsylvania; passes at or near the town of Meadville; and empties into the Alleghany at Franklin. |
| | | the Beaver River, | { which rises under the name of Chenango, the main Pennsylvanian stem, in the N.W. corner of Crawford County, West of Conneautville; traverses West sides of Crawford, Mercer, Lawrence, and Northern half of Beaver counties; passes at or near the towns of Lawrence, Newcastle, Sharon, and Greenville; |
| | | | { from the right—the Mahoning River, which rises in the Lake Water-shed in Ohio, traverses Summit, Portage, Warren, and Mahoning counties of that State, and empties into the Beaver or Chenango in Lawrence County, below Newcastle; |
| | | the Tionesta Creek, | { It receives |
| | | | { from the left—Neshannock Creek, which traverses Mercer County, and empties into it below Newcastle and Slippery-rock Creek, which traverses Butler, a part of Lawrence, and empties into the Beaver near the North line of Beaver County; and empties into the Alleghany at Beaver. |
| | | the Clarion River, | { which rises in Warren County; traverses the S.E. portion of Warren, and Eastern part of Venango Counties; and empties into the Alleghany at Tionesta. |
| | | the Red-bank Creek, | { which rises in the South part of McKean County, at an elevation of nearly 2000 feet; traverses Elk, S. edge of Forest, and middle of Clarion counties; passes at or near the towns of Ridgeway and Clarion; and empties into the Alleghany at Foxburg. |
| | | the Mahoning Creek, | { which rises in the Western border of Clearfield County; traverses centre of Jefferson and Northern border of Armstrong counties; passes at or near the town of Brookville; and empties into the Alleghany near Vanburen. |
| | | the Crooked Creek, | { which rises in the Western border of Clearfield County; traverses Southern side of Jefferson, and Northern side of Armstrong counties; passes at or near the towns of Punxsatawney and Nicholsburgh; and empties into the Alleghany some miles above Kittanning. |
| from the left, | the Conemaugh, or Kiskiminetas River, | { which rises in the interior of Indiana County; traverses West part of Indiana, and Eastern half of Armstrong; and empties several miles below Kittanning. | |
| | the Monongahela River, | { which rises in the Eastern border of Cambrian County, in the Alleghany Mountain; traverses the breadth of Cambria County, and the whole Northern border of Westmoreland; passes at or near the towns of Johnstown, Bolivar, Blairsville, Saltsburg, and Leechburg; and empties into the Alleghany at Freeport. | |
| | the Chartiers Creek, | { which rises in Virginia, in Lewis County; traverses Lewis, Harrison, and Monongalia counties in Virginia, and divides Fayette and Westmoreland from Green and Washington, North of which it traverses Alleghany County to Pittsburg; passes at or near the towns of Morgantown, Greensburg, Brownsville, Williamsport, Elizabethtown, and McKee's Port; receives from the right the Cheat River, which rises in Virginia in the backbone of the Alleghany Mountain, and empties into it a short distance North of the Stateline, and the Youghiogheny, which rises in the Backbone Mountain, traverses Hampshire county, Virginia, northward, and Somerset, Fayette, and Alleghany counties, Pennsylvania, north-westward, emptying into it at McKee's Port; and empties into the Alleghany at Pittsburg. | |
- It passes by or near the towns of Coudersport, Olean, Warren, Franklin, Kittanning, Freeport, Pittsburg, and Beaver; It empties, or more properly, it changes its name at Pittsburg into the Ohio River, which empties into the Mississippi River at Cairo, the Southern point of the State of Illinois.

SCENERY ALONG THE PRINCIPAL RIVERS.

The Delaware River

This noble river, the eastern boundary of Pennsylvania, throughout its entire breadth exhibits, along its immediate valley, a considerable variety of topographical feature and scenery. From its head-streams in New York, to where it emerges from the Pokono or Catskill Mountain, it flows in a tortuous course through a deep narrow trough in that elevated table-land. The mean level of the plateau remaining nearly constant, and the valley growing progressively deeper, the river-hills, which are all that the traveller at the river-side usually beholds, grow higher and steeper as he descends. Meandering much more than the valley containing it, the river sweeps sometimes close by the base of the bounding hills, the lower parts of which are, in many cases, faced by high naked cliffs, exposing the reddish brown shales and sandstones of the district, in beautiful contrast with the mixed green hues of the foliage. The perspective of jutting and retreating hills, clothed for the most part with a combination of coniferous and deciduous forest to their summits, and washed at their base by long bending reaches of the broad river, are very attractive, notwithstanding a prevailing sameness in general feature. After leaving the plateau in Pike and Wayne counties, the river emerges into a broad open valley, wholly different in aspect and structure from that which it has left. The waters which carved a way for it seem to have been impelled in their momentum southward, with great energy, against the strong stony barrier of the Kittatinny or Shawangunk Mountain, and to have scooped their deepest trench near the base of that high ridge. The river, therefore, turns abruptly at Carpenter's Point, from a S.E. to a S.W. course, and follows the foot of the mountain, sometimes hugging its base, sometimes sweeping a moderate distance from it into the plain, until it finds a passage through it by the great breach called the Delaware Water-gap. The scenery along this stretch of the river is eminently beautiful. Low within the valley, the river is bordered by fertile cultivated flats, variously carved in one or more terraces ; and behind these, particularly on the N.W., rise numerous rolling hills, some under the plough, some covered with timber, all deeply cut by ravines, in the steeper of which are many beautiful waterfalls, while still beyond the hills we see ascending the long slopes or bold escarpments of the plateau of the Upper Delaware. All the way along on our left the view is bounded by the forest-covered flank and straight crest of the Kittatinny Mountain.

Turning at the Water-gap, the Delaware, in issuing through the main ridge of the mountain, passes between steep, nearly perpendicular, mural cliffs of grey sandstone, rising on either side to its very crest. The sketch of this scene from the S. will give some notion of its character.

Leaving the Water-gap, the river descends gently southward, obliquely across the entire breadth of the Appalachian Plain or Valley, to where it enters the hills called "The South Mountains," below Easton. This portion of its course is marked by no striking features, the surface of the country being elevated only 100 or 200 feet above it, and being, from the softness of the slates and limestones, smoothed down into rather inexpressive lines.

Below the mouth of the Lehigh, the Delaware is bordered by an alternation of hills and narrow intervening valleys, the river-hills being but the ends of the intersected ridges of the low chain of

the Highlands of New Jersey; but from the southern edge of these hills, at Durham, the scenery for many miles southward wears a wholly different character. It is that of a table-land, [PAGE 48] elevated 300 or 400 feet above the level of the river, cut on one or both sides of the valley into long ranges of perpendicular precipices, or extremely steep slopes. One stretch of precipice on the Pennsylvania side, known by the name of the Nockamixon Rocks, is an exceedingly striking and picturesque range of beetling cliffs, rising sheer for 200 or 300 feet from the brink of the river, with only a narrow roadway between them, through a length of nearly 3 miles. Some of the views from the base of these crags are almost grand; and the pictures they make with the river below are beautiful. Tufts of bushes and trees, and climbing vines, heighten by their green hues the rich brown tints of the rocks, to the bold faces and narrow ledges of which they lend a grace which no cliffs without vegetation ever possess. There are few more attractive drives or walks by the river borders of Pennsylvania than this one at the foot of the Nockamixon Rocks.

Further down its valley the Delaware passes, in the vicinity of New Hope, some bold ridges of trap-rock, which impart a pleasing variety to banks, elsewhere, in this part of its course, comparatively tame. Passing Trenton, its borders presently put on a totally changed aspect. Ceasing to be a gay running stream, full of bushy islands, and rocky reefs, and rapids, it becomes a wide tidal river, rising and ebbing between shores which are in many places only low banks of sand and gravel, and in others, broad slimy marshes, covered with reeds and grass. Turning at Bordentown south-westward, the river maintains these features all the way to its wide estuary, the Delaware Bay.

QUARRIES IN THE LIMESTONE, AND OTHER PRACTICAL DETAILS.

The portion of the formation which enters Abington Township is more slaty and fractured than that further to the W., and it also contains a larger amount of silicious or sandy matter. Those portions of the rock which are exposed, or are nearest to the surface, have in many places undergone partial decomposition, and have the appearance of a white calcareous sand. This sandy aspect of the limestone may be observed in all the quarries in the neighbourhood of Sandy Run, and also at many other localities. Unless the rock has undergone partial decomposition, the limestone is crystalline and granular. It varies in colour from blue to white, as a greater or less amount of carbonaceous matter chances to enter into its composition. Each of these colours is not confined to a particular stratum, but changes repeatedly in the same bed; and, indeed, the area occupied by one particular colour is usually very small.

The dip throughout the whole formation is remarkably uniform. Near Sandy Run it is towards the S. and S.S.E-. Quarries and pits have been opened on almost every farm along Sandy Run. One of the largest in this vicinity is on the farm of Mr Fitzwater, near Fitzwatertown. The limestone is chiefly blue, the dip S.S.E., at an angle of about 60°.

On the turnpike opposite Sellerstown, a limestone quarry of some size is wrought, the rock making an excellent lime. An extensive quarry of the same nearly white variety of the limestone exists on Mather's farm. There the beds are crossed by very regular joints, giving the appearance of a stratification in another direction; the true dip is towards the S.

Near the Germantown Turnpike, about a fourth of a mile above the Plymouth Meeting-house, are good limestone quarries. Much of the stone in this neighbourhood is beautifully white, though some layers occur having a more or less bluish tint. The weathered surface of many beds is rough and sandy, showing some silicious matter in the rock.

Spring Mill.—North of the Furnace 200 yards there is a large quarry in the limestone near the southern edge of the formation, in which the dip is 85° to S. 10° E. The southern side of the quarry is massive and jointed, and the dip planes are almost effaced; the northern side is more thin-bedded and talcose, of a bluish-white colour, and its structure very crystalline.

In that portion of the Limestone Valley which occupies the southern part of Upper Merion Township, especially [PAGE 214] in the immediate vicinity of the Schuylkill, there are numerous and extensive quarries, furnishing a large supply of the rock, a portion of which is transported to Philadelphia, and other places, by the several railroads and the Schuylkill navigation; but a large amount is converted into lime on the spot, designed for the same markets.

A large quarry of the limestone is wrought on the west side of the Schuylkill, two or three miles below Valley Forge, where the rock is tolerably thick-bedded, and of a light colour. The quarried stone is conveyed to the river by a railroad, and thence taken by boats to the various limekilns. Extensive quarries have also been opened near the Valley Church, where the limestone is very similar to that of the last locality, dipping steeply south, being of a light tint, and furnishing an excellent lime. On the road from Glassley to Valley Forge, near the county line, there is a small bed of slaty talcose calcareous rock extending E. and W. about three furlongs in length towards Valley

Creek. It constitutes a small hill, over the east end of which the road passes. Near Valley Forge occurs a stratum, of felspathic rock like that seen at Barren Hill. It is exposed in the Creek, and occasionally appears overlying the Primal white sandstone at the foot of the North Valley Hill, a little East of the North Valley Church, The limestone near the White Horse Tavern in East Whiteland Township is occasionally talcose and slaty. Nearer the Steamboat Tavern the more usual granular structure prevails: throughout all this range, however, the rock yields an excellent lime.

At Downington the limestone is chiefly of a light colour, and compact. Several quarries of compact, and granular limestone have been opened in this vicinity.

The width of the formation near the East Caln Church is reduced to about three-fourths of a mile. It is somewhat variable, being dependent, probably, upon the angle of the dip, which, however, is pretty constant. At Coatesville it does not exceed three furlongs. At Bell's Quarry, Midway, the rock is of a light colour. About one mile east of Trueman's Mill, we find a small bed of white clay, derived from the decomposition of an altered felspathic slate, lying between the limestone and the talc slates. In the vicinity of Buck's Run and Parkesburg the limestone becomes darker and more slaty. Passing Cloud's Mills into Lancaster County, it gradually declines in thickness, being at Cooper's Fulling Mill, in Strasburg Township, not more than two furlongs wide. At its termination in Bart Township it becomes more than usually sandy, especially near its margin. The main belt seems to terminate on Eckman's Run; but another small lenticular belt shows itself a mile and a half further to the west, on the premises of Mrs Bare, where the rock is quarried.

The practice of the landholders is to let out the right of working the quarry for a certain period, and the tenant during that time may excavate as much stone as he may require. Many quarries also are opened and worked by the proprietor for his individual supply. No record is therefore kept to enable us to ascertain the number of perches annually quarried.

TRAP-DYKES.

Near the Meeting-house, about a mile above Flowertown [Flourtown], a trap-dyke crosses the Bethlehem turnpike in a N.E. and S.W. direction. It appears to contain labradorite. It is about two and a half miles long, commencing near the north-west line of Springfield Township, and ranging past Bickell's Mill, on the Wissahickon, to the School-house half a mile further W. The protrusion of the dyke has not disturbed the adjoining strata to any serious extent. A marble quarry has been opened S. of the dyke, near Beck's Mill. The rock is granular, and its predominant colour is bluish. Crystals of flint of lime occur in this quarry. About half a furlong N. of the dyke there is another quarry on Bickell's Farm, in which the beds are somewhat contorted.

Another dyke of trap crosses the Schuylkill near Conshohocken: commencing a little E. of the Perkiomen Turnpike, about half-way between Barren Hill and Marble Hall, it crosses the Norristown or Ridge Turnpike, ranges nearly along the crest of the Conshohocken Slate Ridge, goes through the village, and passing the river, in the bed of which it may be seen, it follows the summit of Bethel Hill into Delaware County, terminating near the road leading from the Lancaster Turnpike to the King of Prussia Village. This is by far the longest and widest trap-dyke of the valley or its borders, its length being a little more than six miles.

[PAGE 215]

OF THE MARBLE OF THE LIMESTONE BASIN OF MONTGOMERY COUNTY.

The quarrying of marble in this district was commenced about 75 years ago, by Daniel Hitner. For the last 15 or 16 years the average quantity sent from the quarries of Marble Hall, owned and wrought by the present proprietor, Daniel O. Hitner, has been about 25,000 cubic feet.

The belt of marble is nearly three-fourths of a mile wide. Marble Hall, on the Perkiomen Turnpike, is the easternmost point at which good building-marble is wrought, though the belt is known to continue further. It extends thence to the Schuylkill nearly to the Chester County line.

The largest quarry of all is that of Marble Hall; here the strata dip to S. 200, E. about 85°, presenting in one or two places a flatter inclination. This quarry is not less than some 400 feet in length, and at the top is 60 or 70 feet wide. The greatest depth to which the quarry has been sunk is 265 feet. At this depth were procured the blocks of beautiful white marble sent by direction of the State of Pennsylvania, and by the City of Philadelphia, to the great monument at Washington. At this depth the stratum of white marble, for which this quarry is chiefly wrought, has a thickness of 5 feet; but the usual thickness of this bed of pure white stone is 8 feet, that of the pure and clouded white together being generally about 20 feet.

Mr Hitner has quarried blocks 6 feet in thickness, though the general thickness of the blocks readily procurable does not exceed 2-| feet.?????????

The only saccharoidal or statuary marble in this or any of the quarries, is found here at a depth of 120 feet, in a layer of only 6 inches in thickness. It is of a yellowish white colour and remarkable evenness of grain.

The white marble is used for monuments, and for the finer architectural purposes. It now sells for about one dollar per cubic foot.

To the south of the large quarry of Marble Hall, which, besides the white marble, yields much beautiful clouded or shaded stone, there is a quarry of blue and black marble, distant about 300 yards. This is owned by Mr Lentz, but now wrought by Daniel O. Hitner. This blue and black marble now sells for about 40 cents per cubic foot. It is used chiefly for fronts of buildings, for monument bases, &c. The thickness of the good blue marble in this quarry is 22 feet, and that of the black variety 8 feet.

Besides these quarries in the vicinity of Marble Hall, there are others about three-fourths of a mile north from Spring Mill; one set owned by Robert T. Potts, another adjoining his by Mr Peter Fritz. The marble of Potts' Quarry is chiefly of the clouded variety, besides a little white and some plain blue. The annual yield of this quarry is about 12,000 cubic feet.

The quarry owned by Fritz is at present but little wrought.

Next in position to the westward, but still seated in the same belt, are two quarries westward of the Schuylkill; these are Henderson's and Brook's, in Upper Merion Township.

Henderson's, the nearest to the Schuylkill, affords a plain blue marble, besides a little white. Both of these quarries are wrought at present to only a moderate extent.

A little south of the Valley Turnpike, about three and a half miles E. of Downingtown, is the extensive quarry of superior white marble which has for many years supplied Philadelphia with the beautiful article employed in so many of its public and private edifices. It is on the farm of Mr John R. Thomas. The beds on this quarry are slightly contorted. The portion worked for the marble separates into two bands. The rock occurs in massive beds, chiefly white, with sometimes a bluish tinge, and is quarried with great facility. It has been much used in the construction of the Girard College and other public buildings which adorn Philadelphia and the neighbouring towns. This marble is converted into a good lime, but its crystalline or granular structure causes it to crumble in the kiln, making it a little difficult to manage. The lime from this variety is much esteemed by masons, being sold in Philadelphia under the name of Fish-egg Lime.

The blue-mottled limestone or marble of Whitemarsh, occurring at the quarries not more than three-fourths of a mile north of the northern limit of the Primal Strata, is evidently on the south side of the trough, or folded synclinal axis of the district. This is further proved by its great steepness of dip, about 80° . It is, moreover, of the maximum degree of metamorphism or crystallisation; contains talcose or micaceous laminae, and crystals of sulphuret of iron, &c.

Strontia.—Near Mr Hitner's House, Marble Hall, there occurs a thin bed of very ponderous rock, resembling closely a white crystalline marble. It contains, however, but a moderate proportion of carbonate of lime, and consists chiefly of the carbonate of strontia.

[PAGE 216]

LOCALITIES AND STATISTICS OF THEIRON-ORE BANKS OF THE LIMESTONE BASIN OF MONTGOMERY AND CHESTER COUNTIES.

East of the Schuylkill.—The first ore ever dug in this valley E. of the Schuylkill was near Spring Mill, on the farm of J. Kirkner, at the excavation near the road leading to Barren Hill. This was about 30 years ago.

Miner's Banks, near Marble Hall—Iron ore seems to abound in great quantity in the deeper trenches or basins upon the limestone or marble north of the Conshohocken axis. From one locality near Marble Hall, Mr Hitner drew, in 1852, about 10,000 tons of good ore, and in 1853 rather more than 12,000 tons.

It is estimated by those best informed, that from the belt of country embracing the ore-pits at present wrought on this east side of the Schuylkill, the amount now taken is about 60,000 tons. This belt has a mean breadth of about one mile, extending from the Barren and Edge Hill range of Primal sandstone, northward to the middle of the valley beyond the narrower limit of the crystalline limestone or marble. Its length, as far as it has been hitherto explored by digging, is not less than seven miles. The ore is not equally plentiful all across this zone, but seems to range in long narrow

strips, following, as it were, so many deeper troughs of ferruginous soil, covering the undulating outcrop of the limestone. The most productive belts seem to be one north of the Barren Hill range, and one north of the zone of white and clouded marble.

Good iron-ore occurs in scattered localities north of the general margin of the broad belt here mentioned. Thus Mr Wood, about one mile north of Marble Hill, finds a shallow deposit of iron ore in soil overlying limestone. This limestone would seem to be very thin here, for sandstone is reached at a small depth below it.

West of the Schuylkill.—There are several excavations for iron ore in the Narrow Limestone Valley south of Bethel Hill. Two of these localities are east of the gorge by which Gulf Creek passes through that hill.

One group of pits, or that which is nearest the Schuylkill, is somewhat more than, one mile S.W. of it, and almost 150 yards S. of the road along the north side of the valley. One of the pits is mined by Mr Whitehall, and the other by Mr Fisher. The ore, which appears to be excellent, is smelted at Merion Furnace.

The old pit near the fork of the road, at the Baptist Meeting-house, has a shaft some 76 feet deep, and was soon to be reopened by the aid of a steam-engine. The ore is declared to be of superior quality. Formerly it partially supplied Merion Furnace. It is owned by Caldwell and Roberts. This ore rests on white marble. Another old opening of ore, now neglected, lies almost 200 feet further east on the S.W. side of the road.

About 100 yards N.E. of Henderson's Marble Quarry, in Upper Merion, is an ore-bank wrought by George Fisher. It is of considerable size, and until recently (1854) yielded good ore, but at present the brown hydrous oxide of iron has more earthy matter mingled with it than formerly.

George Fisher has a second ore-bank about 1250 feet N.E. of the one just named: here the ore is tolerably good. A new opening connected with this supplies ore to the iron-work, at Phoenixville. In these banks the average proportion, of dirt to ore is about three to one.

Thomas Widdart's ore-bank, situated like those of Fisher on Henderson's property, is about 800 feet S. of Fisher's second opening. The quality of the ore here does not materially differ from that of the other banks. The old bank having nearly failed, a new one has been opened within the last two or three years.

Milliton's Bank, on Jones' Land, is situated W.S.W. of Fisher's, near the School-house; the ore is pronounced good. It is smelted at Jones' Furnace, above Conshohocken. In this excavation the proportion of dirt to ore is about three to one.

Otto's Bank, on Potts' farm, contains good ore, but this has not yet been obtained in large quantities. Here the proportion of dirt to ore is about two to one. In 1854 this bank was but newly opened. Supplee and Hampton each have ore-banks in this vicinity, both of them of medium extent.

Hughes and Jones have several ore-banks in one group, leased for mining by sundry persons. No one of these excavations is large, though they form a considerable group.

The next neighbourhood in the valley at which iron ore is dug to any extent is in the vicinity of Howellville, Tredyffrin Township. South of the village there is a small newly-opened ore-bank, from which good ore has been obtained.

Another ore-bank, owned by Mr Wilson, lies N.W. of Howellville, on the Swede's Ford Road, and this was but a small digging in 1854.

Woodman's ore-bank, on land of William Roberts, situated about 500 yards W. of the Valley Forge Road, and 500 yards N. of its forking with the Swede's Ford Road, yields an excellent ore. It contains the unusual proportion of [PAGE 217] two parts ore to one part dirt. The chief drawback is a rather copious influx of water. This ore is smelted at Phoenixville.

Nathaniel Jones and Charles Beaver have ore-mines near the Baptist Church, half a mile from Centreville. Buck and King have also opened a bank. All these three are in considerable excavations.

Samuel Beaver has an ore-bank near the foot of the North Valley Hill, about half a mile S.E. of the head of Valley Forge Dam. This bank is of considerable size, and yields good ore. It is unusual to find so large a deposit so near the northern margin of the valley, though unquestionably the lower, more magnesian beds of the Auroral limestone are much the most ferruginous, and where they support a deep deposit of earth, largely derived from their own disintegration, they constitute one of the main sources of the surface brown iron-ores.

Holland's Bank, about one and a half miles N.W. of Howellville, yields an excellent ore, which has been smelted at Phoenixville. The depth of the excavation, in 1854, was 43 feet.

Still further West in the valley, or past the meridian of the Paoli, there occurs another district of successful ore-diggings: the first of these is William Buchanan's Ore-Bank, about 400 yards N. of Oakland Hotel, on the railroad, and 100 yards W. of a cross-road. This is an excellent deposit, portions of the bank yielding two parts ore to one part dirt. The ore is taken to Jones's Furnace on the Schuylkill.

G. W. Jacob's Bank, situated between the North Valley and the Columbia Railroad, about two miles E. of Oakland, is a comparatively new excavation, but a promising one. The same proprietor has two other banks, about one-fourth of a mile S. of the Ship Tavern, both yielding well.

Maquire's Bank, on a cross-road, one mile N. of the Ship, is rather a large excavation of good ore.

Mr Evans has an ore-bank three-fourths of a mile E. of the Ship, which yields ore of a superior quality, and gave indications, in 1854, of a large deposit.

Frederick Neal's Ore-Banks, extending one-fourth of a mile upon a cross road, include three pits yielding good ore. He has a second opening on Lea's estate, near the North Valley Railroad. When seen it was a small newly-opened digging, yielding a good ore. A mile or more N.W. of

Downingtown there is an ore-digging very near the foot of the North Valley Hill, but this has never been extensively opened, nor does it promise a large supply.

West of Coatesville there have been two or three excavations for ore towards the southern side of the valley between the West Branch of the Brandywine and Buck Run, but these have never furnished large supplies.