

**SECOND GEOLOGICAL SURVEY
OF PENNSYLVANIA OF THE
BITUMINOUS COAL MEASURES
OF CLEARFIELD COUNTY**

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Second Geological Survey of Pennsylvania of the Bituminous Coal Measures of Clearfield
County by H. M. Chance

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H. M. CHANCE

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OF CLEARFIELD COUNTY**

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LETTER OF TRANSMITTAL.

To His Excellency, ROBERT E. PATTISON, Governor of Pennsylvania, ex-officio Chairman of the Board of Commissioners of the Second Geological Survey of Pennsylvania:

SIR: I have the honor to submit the results of a revision of the geology of Clearfield county by Dr. Henry Martyn Chance, ordered by the Board.

The first survey of the Clearfield and Jefferson county coal fields was assigned to Mr. Franklin Platt in July, 1874, at the beginning of the State Survey. It was carried on, with an untrained corps, over too large an area to do it justice; less than two months being allowed for Clearfield and Centre, two months for Jefferson and Clarion, and one month for local examinations in Forest and McKean counties. It was, in fact, a tentative effort to organize and place in working condition a proposed detailed survey of the whole Bituminous Coal Region of Western Pennsylvania. The results, when published as Report of Progress H, were unsatisfactory, and it was arranged that when a proper occasion came, in the progress of the general survey of the State, an entire field-season should be given to Jefferson county, and that a revision of Clearfield county should be made. Jefferson county was therefore surveyed by Mr. W. G. Platt in 1880 (Report H'), and now Clearfield has been revised by Dr. Chance, with all the advantage that his experience in Beaver, Lawrence, Butler, Clarion, Venango, and Warren counties gave him, and also with the great advantage of a large accumulation of recent knowledge produced by the active opening up of the region to the north-

(v H'.)

ern markets, by reason of which the geology of Clearfield county has put on a new aspect.

A large part of the county is still a wilderness. Rocky "Barrens" stretch in various directions. The river valleys are, in fact, gorges or cañons, the streams meandering at a depth of 500 feet, more or less, beneath the average surface of a rolling table-land, the highest places of which are about 2000 feet above sea-level.

The geological formations of the region consist of the shales, sandstones, and conglomerates of the Coal Measures. They lie so nearly in their original horizontal condition, that dips in any direction cannot be observed by the eye,* but must be calculated by leveling from one exposure to another over considerable intervals.

The coal beds are only ten in number; eight of them being included between two great sandstone formations, the *Mahoning sandstone* above, and the *Homewood sandstone* below.†

These eight coal beds are lettered (from below upwards) ‡ A, A', B, C, (X,) C', D, E; and, as they vary in thickness and lie within from 20' to 40' of each other, it is by no means an easy task to trace them individually across country, except where mining operations are large and numerous. In many townships several of these beds are still mistaken for one another.

Great assistance in identification is afforded by the Upper and Lower Freeport limestones, and the Johnstown Cement bed §; and also by the Clarion sandstone. But where the limestones fail, or are too thin to attract attention, or are in the wilderness, and where the sandstone turns into shale, it becomes next to impossible for the prospector to tell when he opens an outcrop, which one of the Kittanning or Freeport coals he has hit upon.

* See figure on page 80.

† The upper member of the Pottsville Conglomerate Formation, No. XII.

‡ A, Brookville; A', Clarion; B, Kittanning Lower; C, Kittanning Middle; (X,) Gorman; C', Kittanning Upper; D, Freeport Lower; E, Freeport Upper.

§ The total absence of the *Ferriferous Limestone* (over bed A') of western Pennsylvania, is a misfortune for the explorer of Clearfield county.

The geologist must place his main dependence, therefore, on the great *Mahoning sandstone* at the top, and the great *Homewood sandstone* at the bottom of the series; for these mark the country in an unmistakable manner; and the eight coal beds lie in the interval of say 300' between them.

But the *Mahoning SS.* and the *Homewood SS.* resemble each other; and impress upon the surface of the country similar features, producing rocky "Barrens" of many miles extent—wilderness highlands, from which the small streams descend through ravines between cliff walls.

Were the geological formations of the region *absolutely* horizontal, there would be no difficulty in distinguishing between these two sand rocks; the spirit-level or the aneroid barometer would at once tell the explorer on which of them he stood; for, if the top of the Mahoning SS. ranged horizontally at 2000' above tide, the Homewood SS. could be found by descending the valleys to about 1600' A. T.

But western Pennsylvania is traversed by wide, gentle parallel anticlinal waves, the axes of which, although curved on a large scale, are nearly straight lines on any one county map. Basins lie between the waves,

The two great sandrocks, like all the other measures, rise and pass over these anticlinal axes and fall into the synclinal troughs; and the rise from the bottom of a trough to the crest of an anticlinal, and the fall again to the bottom of the next trough, although so gentle as hardly to be perceptible to the eye, amounts nevertheless to hundreds of feet.

But, besides this north-west south-east rise and fall from one basin to another, there are still gentler but decided variations of level *along the troughs and along the anticlinals* in a north-east and south-west direction.

All this makes it impossible to tell beforehand at what level above tide either the upper (*Mahoning*) sandstone or the lower (*Homewood*) sandstone will be found lying.

The consequences of this uncertainty, in the absence of sufficient means for exploration in past years, have been the gravest mistakes respecting the identity of these two sandstones; and whole townships of Clearfield county have been

condemned for colliery purposes on the misconception that their "Barrens" were produced by the *Homewood SS.* coming to the surface where, as is now known, the *Mahoning SS.* makes said "Barrens,"—the *Homewood SS.* being 400 feet underground, and of course all the coal beds being there.

This will explain the principal defects of the first report on Clearfield county (H, 1875) and the principal value of this second report by Dr. Chance.

The districts of the county affected by this revision are the highlands of the southern, western, and northern townships, bordering on Cambria, Indiana, Jefferson, and Elk counties.

1. At Janesville, in Gulich township, in the south-east corner of the county, the *Mahoning SS.* caps the hills, and the coal beds along Muddy run are mined underneath it. In Report H it was mistaken for the *Homewood* (Conglomerate No. XII), and the district was therefore supposed to be destitute of productive coal beds.

2. Around Houtzdale, in Woodward township, bed D was mistaken for bed B.

On the outcrop map of Houtzdale-Phillipsburg basin, in the pocket of this volume, Dr. Chance has traced the outcrop of this important coal bed (D, Lower Freeport bed) along the valleys of Whiteside, Beaver, Little Beaver, Coal, Mapleton, Decatur, and other runs, flowing into the Moshannon from the west, along the Houtzdale-Osceola-Phillipsburg valley, with all the mines at present opened in it, the railroad branches by which their outputs are sent to market, and the elevations above tide-water at the mouths of the mines, by which an accurate idea of the lay of the bed in the basin can be obtained. The faulted condition of the bed at many points, as described in the text of the report, is also plainly exhibited on the map.

The hypsometrical data used in constructing this map we owe to the recent accurate surveys of the basin made by Mr. C. S. d'Inwilliers and others.

3. In Chest township the high barrens between Crest creek and Clearfield creek, passing over into Cambria county, are made by the *Mahoning SS.*, and the coal beds