

ART. XXX.—*On the Parallelism of Coal Seams*; by J. S.  
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IN the first volume of the Final Report of the Geological Survey of Ohio, Professor E. B. Andrews advances a theory in regard to the successive deposition of coal strata which, if permitted to go unquestioned, might seem to commit the other members of the geological corps to its approval. whereas, as a matter of fact, Prof. Andrews stands quite alone in its support. Very briefly, his theory is this: 1st, That coal-seams have accumulated in marshes along the sea shore, and therefore at or near the water-level; 2d, That the subsidences by which several coal seams were successively formed and buried were continental and general; and 3d, That the coal-beds—from their mode

of formation—must necessarily be parallel to each other, and hence a discrepancy in the distances from a given coal-seam, taken as a base, to two or more outcrops of what might be considered the same seam, is a proof that the coal of these outcrops belongs to different seams. Prof. Andrews also says that he has never seen a coal seam dividing into two or more distinct seams, or two seams approaching each other.

While not questioning the accuracy of Prof. Andrews' report of his own observations, I am compelled to say that the facts observed by myself are not only discordant with his, but are such as seem to me to be incompatible with his theory. In the northern half of the Ohio coal-field, numerous instances of the approach and divergence of plainly continuous coal-seams might be cited. For example: On one tract of coal-land in Hubbard, Trumbull Co., the distance which separates the first from the second coal-seam varies from 44 to 100 feet; Coal No. 1 showing conspicuous waves or folds, while No. 2 is nearly horizontal (M. C. Read). At Fredericksburg, Wayne Co., the distance between the two limestone coals—Nos. 3 and 4—is only twenty feet, but on tracing these seams down the valley of the Killbuck, they are seen to gradually diverge, until at Millersburg they are eighty feet apart. At Fredericksburg again, the distance between Coals No. 4 and No. 6 is only about thirty feet; but in passing from this point eastward to Mineral Point, Tuscarawas Co., the interval increases to 104 feet, Coals No. 5 and 5*a* coming in between them. At Steubenville, the interval between Coals No. 6 and No. 8 varies from 502 to 564 feet; while going westward this interval diminishes to less than 400 feet along the western outcrop of the Pittsburg seam. On the banks of the Ohio, between Wheeling and Bellaire, the two coal seams next above the Pittsburg bed are seen, in a single exposure, to vary from 12 to 35 feet in the distance which separates them. On the banks of the Ohio, west of Wheeling, Coals No. 8 and No. 9 are about 150 feet apart; three coal seams, 8*a*, 8*b* and 8*c* being interposed between them. Thirty-five miles west of this locality, the distance between Coal 8 and Coal 9 is only 50 feet, with no intermediate seams (Stevenson). At Morgantown, West Virginia, on the east side of the Monongahela, the interval between the Pittsburg coal and the next succeeding one above (Redstone) is over 50 feet, consisting of limestone, 14 feet; shale, 3 to 10 feet; sandstone, 35 feet. On the west side of the river, three miles below, the distance between the Pittsburg and Redstone coals is less than 20 feet; the limestone remaining constant, the sandstone having entirely disappeared (Stevenson).

Any required number of cases like the preceding might be cited, but these, as it seems to me, will suffice to show that the

intervals between our coal-seams are not constant. I learn from Profs. Dawson, White, Cox and Worthen, our most experienced coal geologists, that similar examples to those I have cited are not uncommon in the coal-fields which they have so carefully studied.\*

The fallacy of the theory of Prof. Andrews, as I think, consists in the supposition that the subsidence of our coal areas has been always continental or general, whereas, as it seems to me, the evidence is varied and abundant that this subsidence was often very local, and that in the long interval which elapsed between the formation of one coal-seam and the accumulation of carbonaceous matter above it, the strata were sometimes warped and folded in the most local and complicated way. It is also apparent that the deposition of the materials forming the strata of the Coal-measures was often quite irregular. This is conspicuously shown by the limited reach of the great sandstone wedges which sometimes locally separate or replace the more constant elements, the limestones, shales and coal-seams. In some instances these beds of sandstone occupy narrow troughs of erosion; sometimes they form broad, lenticular sheets. It seems to me that we have some evidence that the local accumulation of these beds of sand produced local displacement of the mud on which they were deposited, just as they do at the mouth of the Mississippi, where the displacement results in the formation of "mud-lumps." But the theory of Prof. Andrews seems to me not simply untrue, but as calculated to do positive and practical harm, since teaching that a discrepancy of interval argues a want of identity in coal-seams, it tends to multiply their number and produce confusion in their classification.