

ART. LVI.—*Lower Silurian Fossils in Northern Maine*;
by W. W. DODGE.

THE writer found graptolites in black shale in No. 3 township, of Range VII, Penobscot county, Maine, in September last. The fossils are, for the most part, mere bright films upon the dark rock, and in the small quantity of material brought away, but one or two individuals are sufficiently distinct and entire for identification. The fragments are of at least four varieties; the *Diplograptus* type predominates.

The most complete specimen is one of *Diplograptus pristis*, but of this the upper end of the axis is broken away. The cellules are about sixteen to an inch in each rank. Instead of narrowing gradually from end to end, as the drawings usually represent, the stipe retains its full width for an inch and a half and then its edges approach each other rapidly in the next half inch toward the solid, acicular radicle.

A clearly-marked fragment, three-eighths of an inch long, is of a width only half that of the preceding, the axis is much more distinct, the cellules, twenty-four to an inch on each side, although separated from one another nearly to the base by a rounded interval of about one-third their own width, are so shaped, with the denticle turned inward, that the appearance of serration in the stipe is subordinate to its linear, parallel-edged aspect. The general shape of what is visible is suggestive of *Graptolithus ramosus*, although no bifurcation appears. Close beside this is a branching fragment upon which no cellules are discernible, probably its stem.

One or two small, broadly-ovate shapes, perhaps *Phyllograptus*, and a few long, slender stems not sufficiently characteristic, or too incomplete, for their relations to be ascertainable, conclude the list of forms at present in hand.

The shale in which these remains are embedded is probably

to be referred to the level of the Utica slate or the Hudson River formation.

The locality is on the north side of the Wassatiquoik River, about a mile west of the East Branch of the Penobscot. The road to Katahdin Lake crosses the southern slope of Wassatiquoik Mountain (the eastern and smaller of the two so-called, the one which stands in Range VII upon the line between Nos. 3 and 4), while the river of that name runs at its foot. The shale is at the base of the hill on the eastern side—under its lee, with reference to glacial erosion.

The occurrence of fossiliferous rocks here is interesting as helping to correlate the Maine formations with the better understood Canadian strata, and also as narrowing the circle of known fossil-bearing beds about the Katahdin granite, whose position and age may sometime be determined by its relations to them, when a point of contact is found. Graptolites have been found in New Brunswick in that great belt of strata mapped as extending southwestward from the Bay of Chaleurs, with granite bands on its southeast side.*

The readiest cleavage of the thinly-layered shale which holds the above described fossils, is at 30° across the plane in which they lie. There is noticeable uniformity in the position of the long, slender forms, but the means is not at hand of determining through how great a thickness of accumulating strata the parallelism continued. The rock most nearly associated with the black shale is a black, or dark-blue, very hard, thick-bedded slate, of conchoidal fracture, sometimes semi-translucent in thin flakes. Another rock was too deeply weathered for examination with such tools as could be improvised. A coarse "greenstone" forms a ledge near by; and the presence of intrusives doubtless accounts for the condition of the flinty-looking slates. The only rock noticed in the three miles to the westward is a dull, greenish, hydrous-looking eruptive, mostly in boulders. Water-worn pebbles in the vicinity, apparently of this kind, are streaked with dull red, and show many cavities.

The nearest observed outcrop to the eastward is of slate with an easterly dip, on the left bank of the East Branch, near the water at its summer level, about opposite the mouth of the Wassatiquoik River. This is a mile and a half north of the Hunt farm, two miles east of which the road crosses a slate ledge where the strata dip to the westward. The outcrops of this slate along the East Branch have been examined by different observers, and its strike and dip at many points recorded.†

* J. W. Dawson, *Acadian Geology*, 1878, supplement to second edition, p. 78.

† C. T. Jackson, *Second Annual Report on the Geology of the Public Lands of Maine and Massachusetts*, 1838, pp. 20–24; C. H. Hitchcock, *Agric. and Geol. Maine*, 1861, pp. 392, 393.

One of the most noticeable facts connected with the presence of this rock between Molunkus and Sherman, along the post-road from Mattawamkeag to Patten, is the large amount of clear-white, fine-grained quartz rock scattered by the roadside.

The road from Sherman (No. 3, of Range V), to the East Branch at the Hunt farm, gives a good line of section nearly at a right angle across the line of strike there prevalent, and by comparison of the dips near the road and elsewhere, it seems to cross not less than four anticlinals and five synclinals. The western portion of the road is through woods. There is a large exposure of nearly vertical beds on the west side of Swift Brook. Between the brook and Sherman, a distance of five miles through partially cleared country, the road crosses four long ridges of high land, whose direction is that of the strike of the underlying rocks. Upon the hills the strata crop out occasionally, and in the valleys between flow small streams at regular intervals of a little over a mile from each other. On the hill just south of the village of Sherman, and near the line between Nos. 2 and 3, the slate shows a high dip westward.

Glacial.—The parallel courses to which so many of the long, narrow lakes and large and small streams of the northern part of Maine conform, appear to indicate the undeviating direction of primary glacial erosion in that region. The course of transported boulders agrees well with this, as in the case of the limestone *in situ* in No. 4, R. IX,* observed in scattered boulders upon the Wassatiquoik and at Whetstone Falls, on the East Branch, in No. 2, R. VII.† The uniform shaping of resistant ledges, such as may be seen at Mt. Kineo, and as is recorded of the slates along Webster Stream and at Grand Lake,‡ indicates in a general way the direction of the force exerted. The glacial striæ, as reported, appear to be more than usually divergent. To the two localities of the occurrence of granite boulders from an unknown source named by Professor Hitchcock—north end of Churchill Lake in No. 9 of R. XII,§ and No. 5 of R. VIII,||—may be added the site of one, high on the hillside above the East Branch opposite the Wassatiquoik. The granite pebbles in the bed of the Wassatiquoik at the dam, four miles above its mouth, may belong to the Katahdin mass, but the extent of the area occupied by this has not been definitely determined. The “porphyry” on Soper Brook,¶ in No. 8 of R. XII, may well be the source of the pebbles of porphyritic black felsite with quartz grains found at this dam.

* Agric. and Geol. Me., 1862, p. 321. † Ib. 1861, p. 393.

‡ Thoreau, Maine Woods. pp. 262, 277. § Agric. and Geol. Me., 1861, p. 411.

|| Ib. p. 401. ¶ Ib. p. 411.

Cambridge, Mass.