

IV.—ON THE UPPER CAMBRIAN AGE OF THE DICTYONEMA  
SLATES OF ANGUS BROOK, NEW CANAAN AND KENTVILLE,  
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In his "Acadian Geology," second edition, 1868, p. 563, Sir William Dawson figures *Dictyonema Websteri* and places it as a Silurian (Upper Silurian) species. In describing the slates from which the type-specimens of this species were obtained he writes: "Passing from the Cobequid Mountains to the slate hills of the south side of the Bay" --meaning the Bay of Fundy --"in Kings County, we find slates not very dissimilar from those of the Cobequids,"--which he had described on the previous page, 562--"in the promontory northward of the Gaspereau River. Here the direction, both of the bedding and of the slates structure, is N. E. by S. W.; but the planes of cleavage dip to the S. E., while the bedding, as indicated by lines of different color, dips to the N. W. These slates with the quartzite and coarse limestones, are continued in the hills of New Canaan, where they contain crinoidal joints, fossil shells, corals, and in some beds of fawn-coloured slate, beautiful fan-like expansions of the pretty *Dictyonema* represented in fig. 196. Very fine specimens of this fossil were found by the late Dr. Webster of Kentville. It was the habitation of thousands of minute polypes, similar apparently to those of the modern *Sertularia*. The general strike of the rocks in New Canaan is N. E. and S. W., and they extend from that place westward to the Nictaux River. Westward of Nictaux River, as already mentioned in describing the Devonian, the beds of the Upper Silurian, as well as those of the last mentioned formation, are interrupted by great masses of granite which form the hills along the south side of the Annapolis River, from a place called

Paradise to Bridgetown, and with some interruptions nearly as far as the town of Annapolis."

In my "Synopsis of the Geology of Canada,"\* the following paragraph refers to the Silurian of the region in question as presented and systematized from the accepted and available sources of information :—

"In the County of Annapolis, Nova Scotia, and in the vicinity of Nictaux, Silurian strata occur, including the *Nictaux* iron ore beds and the *Torbrook* sandstone formation, whilst near Kentville, the *Kentville* formation is seen as well as on Angus Brook in the Gaspereau Valley, also at New Canaan with *Dictyonema Websteri*, Dawson."

Slates holding *Dictyonema Websteri*, Dawson, and thus known to occur: (1) At New Canaan, the type locality; (2) At Kentville, N. S., and (3) along the upper portion of the valley of Angus Brook, a small stream entering the Gaspereau River between the village of Gaspereau and the Avon River shore.

The general section of the rocks holding the specimens of *Dictyonema* and the truly Silurian fossil-bearing strata of the district, in which corals and encrinites and brachiopods occur, as furnished me by Sir William Dawson some years ago, distinctly showed that he connected the two in a general way only, following the inclination and strike of the strata in that part of Nova Scotia which have been affected by the same physical forces that disturbed rocks belonging to various members of the Palæozoic succession. It is thus seen that the intrusive masses of the district have affected not only the Cambrian strata, but likewise the later deposits, exclusive of the rocks of the Horton and its underlying co-formation, the Gaspereau formation, and the Grand Pré formation of later Triassic Age.

Heretofore, the slates which have yielded the specimens of *Dictyonema Websteri* have been invariably referred to the Silurian system, but more recent examination of the type specimens of *D. Websteri*, have revealed a remarkable resemblance to, and the close affinity of this species with the

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\* Trans. Royal Soc. Can., 2nd Ser., 1900-1901, Vol. VI., Sect. VI., p. 203.

*Dictyonema flabelliforme*, Eichwald, which finds a synonym in the *D. sociale*, Salter, a characteristic Upper Cambrian fossil.

In his "Niagara Fossils," Part I, Graptolitidæ of the Upper Silurian, Prof. J. W. Spencer writes of *Dictyonema Websteri*, Dawson :—

"This beautiful frond occurs at New Canaan, Nova Scotia, in fawn-colored slate of the Upper Silurian System. It is celluliferous on one side, and in appearance it is more closely related to *D. retiforme* than to *D. gracile*."

In comparing the microscopical characters of *D. Websteri* with those of *D. flabelliforme*, Eichwald, especially as they are presented and illustrated in Carl Wiman's classic work† the relative size and proportions of the peculiar rope-like structure of the main skeleton in the rhabdosome is clearly discernible, so that there is practically no doubt as to the identity of the two species.

It will therefore now be necessary to refer *D. Websteri*, as a synonym of *D. flabelliforme*, Eichwald, and to refer the Kentville formation, not to the Silurian (Upper) System, but to the Cambrian. In fact, the slates of the Kentville formation of Kings and Annapolis Counties in Nova Scotia, are equivalent in age or are taxonomically similar to the slates of Barachois, and associated localities in the Mira Series of Cape Breton, as well as to the *Dictyonema* slates of Navy Island, near St. John City, and the slates of Eel River, near Benton, in New Brunswick. All of these are referable to the Upper Cambrian.

The first *rapprochement* made between *Dictyonema flabelliforme* and *D. Websteri*, took place some two years ago when the *Dictyonema*, obtained by Prof. L. W. Bailey, near Benton, along the Eel River, in York Co., N. B., was compared with the specimens of *D. Websteri*, at present in the collections of the Geological Survey Department, and they were found to be so closely related as not to be practically separable. From specimens of *D. flabelliforme*, obtained on Navy Island, and kindly

\* See Bull. Mus. Univ., State of Missouri, vol. I, no 1, p. 26, St. Louis, 1884.

† Ueber die Graptoliten, Bull. Geol. Inst. Upsala. Pl. x, figures 13 and 14, p. 55, 1892?

loaned to me for study and reference by Prof. L. W. Bailey of the University of New Brunswick, it was readily seen that the Benton specimens were also Upper Cambrian in age.

In order to ascertain definitely whether *D. Websteri*, Dawson, from New Canaan, was identical with *D. flabelliforme*, the type specimens of the former, which formed part of the Dawson collections in the Peter Redpath Museum of McGill University, were sought, and kindly loaned to the writer by Prof. F. D. Adams. These are preserved on two slabs of more or less hardened sericeous or glossy red shale or slate, and scattered over the surface of the slates in a rather fragmentary state of preservation, except in one specimen, from which the illustration on p. 563, (fig. 196,) was very probably made when the "Acadian Geology" was prepared.

From a careful study of all the material in hand, the writer is satisfied that the upper beds of the Cambrian System are thus represented in that portion of Nova Scotia where the *Dictyonema flabelliforme* beds of Kentville, New Canaan, and the Gaspereau Valley, (south side,) occur.

We thus find that the zone or horizon of *Dictyonema flabelliforme*, Eichwald, occurs at the following localities in Canada, which may consequently be referred to the Upper or Neo-Cambrian:—

- (1.) Matane, Quebec, South Shore of St. Lawrence River.
- (2.) Cape Rosier, Gaspé, Que., near Lighthouse.
- (3.) Barachois, Cape Breton, Nova Scotia.
- (4.) Navy Island, near St. John, New Brunswick.
- (5.) Shales near Benton, above Fredericton, York County, New Brunswick.
- (6.) New Canaan, Annapolis County, Nova Scotia.
- (7.) Kentville, Annapolis County, Nova Scotia.
- (8.) Angus Brook, Gaspereau Valley, Kings County, Nova Scotia.

Associated with *Dictyonema flabelliforme* at Angus Brook, are found obscure remains of a Bryograptus, allied to *B. Kjerulfi* from the Upper Cambrian of Scandinavia.