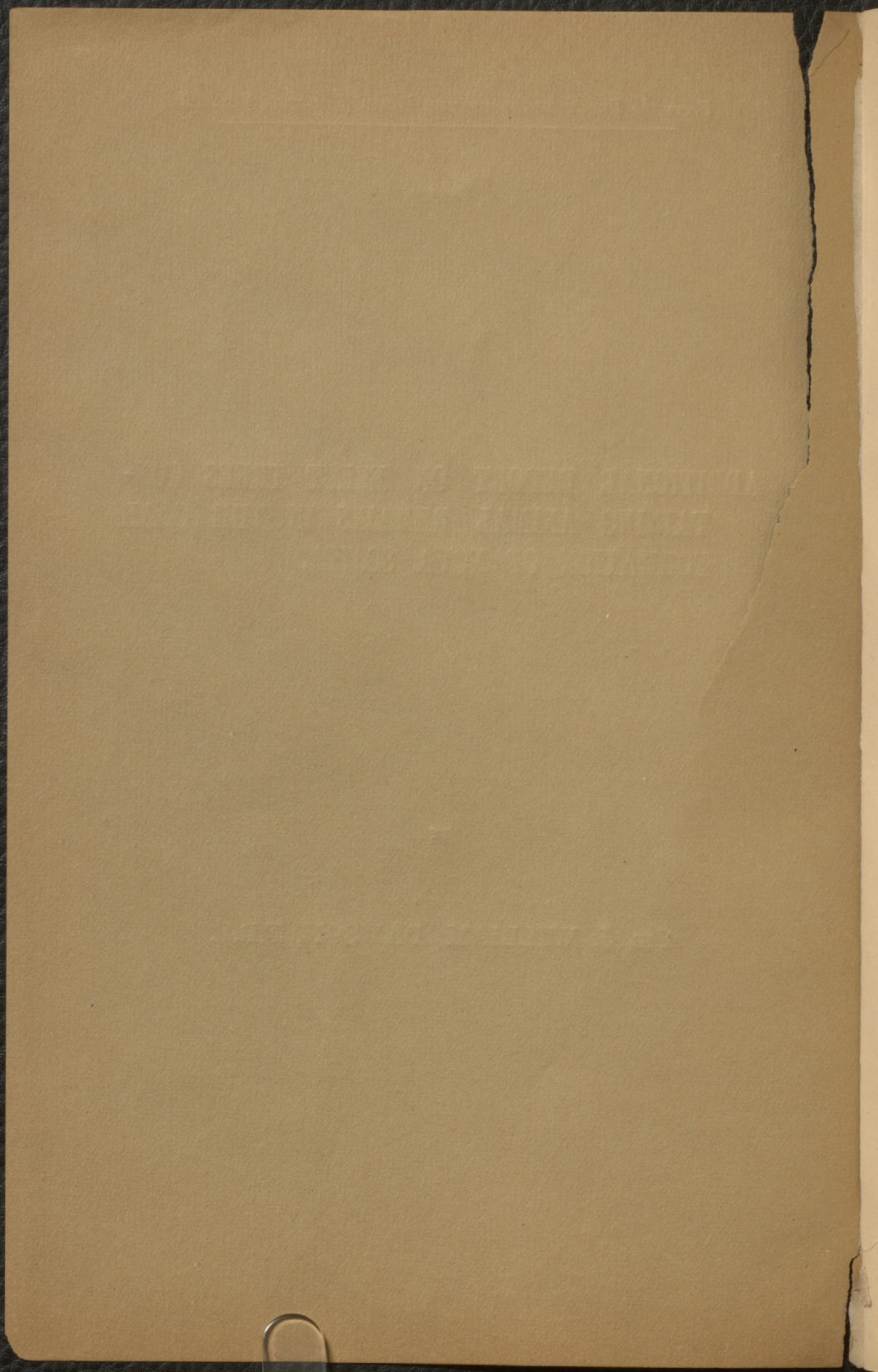


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ADDITIONAL REPORT ON ERECT TREES CONTAINING ANIMAL REMAINS IN THE COAL FORMATION OF NOVA SCOTIA.

BY

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“Additional Report on Erect Trees containing Animal Remains in the Coal Formation of Nova Scotia.” By Sir J. WILLIAM DAWSON, F.R.S. Received March 19, 1896.

In April, 1892, I communicated to this Society a report supplementary to my paper of 1882 on the above subject.* This was published in the ‘Proceedings’ of the Society, Vol. 52. In this report reference was made to the work done by Dr. Seudder, of Cambridge, U.S., on the Myriapods and Arachnids of the reptiliferous trees. Dr. Seudder’s results have now been published with two illustrative plates in the ‘Contributions to Canadian Palæontology of the Geological Survey of Canada,’ Vol. 2, Part I, 1895. In this paper Dr. Seudder describes three additional Myriapods and three Scorpions, making in all eight species of Millipedes and three of Scorpions which the erect trees of the South Joggins have added to the fauna of the Carboniferous Period.

In the spring of 1893 I was informed by Mr. P. W. McNaughton of the South Joggins, who had kindly undertaken to examine the cliff for me, that he had observed in two distinct beds considerably below that which had afforded the twenty-four erect trunks taken out of the cliff and reef at Coal-mine Point and reported on in 1882, erect stumps which he believed to contain animal remains. As I was at the time incapacitated for field work by the effects of a serious illness, I made arrangements, with the aid of Mr. McNaughton, to have the two trees in sight removed from the cliff and boxed up in as large pieces as possible and forwarded to me in Montreal.

* ‘Phil. Trans.,’ Part II, 1882, p. 621.

The material thus obtained has proved rich in Batrachian remains, but less favourably preserved for extraction and study than in some of the previous specimens; and though I published a preliminary note on the material in the 'Canadian Record of Science' in 1894, I was desirous to revisit the coast and to study the mode of occurrence of the trunks in these new beds as well as to ascertain if additional material could be obtained from them before reporting to this Society. This I was enabled to do in the summer of 1895, when I succeeded in obtaining from the reef extending seawards from one of the beds, the bases of two additional stumps, the upper parts of which had, however, been removed by the waves.

One of the trees discovered by Mr. McNaughton was in Group 4, Section XIII, and upper part of Coal-group 26 of the section in my "Acadian Geology." It was, therefore, about 190 ft. below the bed at Coal-mine Point in which the original reptiliferous trees were rooted. The lower part of the trunk was filled to the height of 18 in. with black and grey coaly and arenaceous matter of laminated structure, and containing the animal remains, which were of dark colour and much injured by the percolation of ferruginous water. Above this, to the height of about 7 ft., the trunk was filled with sandstone. It was 22 in. in diameter at the base. This tree had been rooted in a grey shale or underclay 5 ft. thick, and the stem was enclosed in a sandstone about 7 ft. in thickness. The top of the trunk is cut off by a shaly underclay, on which were seen a few obscure footprints of small reptiles, and on this rest coaly layers and clay partings, of Coal-group 20, 2 ft. 4 in. thick, and roofed by a tough, bituminous shale with shells of Naiadites, Cyprids, and fish scales. The remains of the two additional stumps found in the reef were similar to that in the cliff, but only the basal part of their productive material remained. So far as yet studied, the bones in these three stumps belong to species already known, as follows:—

Hylonomus Lyelli, { scattered bones of several individuals, and one
H. latidens, { nearly complete skeleton.

Hylerpeton longidentatum, three individuals.

H. Dawsoni, two individuals.

Dendrerpeton Acadianum, three individuals.

D. Oweni, one individual.

Fritschia curtidentata, one individual.

There are also considerable portions of cuticle with horny scales and ornamental appendages, apparently belonging to *Hylerpeton* and *Dendrerpeton*, and also specimens of their ventral armour, and a few remains of Millipedes.

The other tree, taken out by Mr. McNaughton, was rather more than 204 ft. vertically below the preceding, and, in round numbers, 400 ft. below the original bed at Coal-mine Point. It was in Divi-

sion 4, Section XII, of the general section, and in the upper part of Coal-group No. 21. It presented several interesting peculiarities. It was about 2 ft. in diameter, near the base, and stood 8 ft. high. As much as 5 ft. of its lower portion was filled with a very irregular mixture of hard arenaceous and carbonaceous matter and vegetable fragments, evidently drifted in by rain-water, while there were also layers and patches of brownish coprolitic matter, largely composed of calcium phosphate, and showing under the microscope innumerable fragments of chitinous matter, probably remains of Millipedes, with numbers of small bones and bony fragments. The great thickness of productive material and the abundance of coprolite indicated that the tree had long remained open, and that some at least of the animals contained in it had subsisted for some time on the bodies of smaller Batrachians and Millipedes which had fallen into their prison. One specimen of *Dendroperpeton*, found near the top of the mass, is the largest yet known, its head being 5 in. in length. The long duration of this tree is, perhaps, accounted for by the unusual thickness of its outer bark. It stood upon a thin, coaly layer resting on an underclay, passing downward into a gray shale, 8 ft. in thickness. The lower part of the trunk was enclosed in alternations of argillaceous shale and flaggy sandstone to the height of about 5 ft., and above this it penetrated for 3 ft. into a thick, compact sandstone, containing a few drifted trunks of trees. It would seem, therefore, either that the current conveying the sand had cleared away 3 ft. of soft deposits surrounding the hollow trunk, or that the animals had found access to the interior by a crevice or hole in the bark of a tree standing 3 ft. above the surface on which they walked.

I may remark here that the beds enclosing erect trees are often very irregular, as if deposited by local inundations, and that the thick beds of reddish, mottled, and greyish sandstones which at the Joggins separate the coal-groups, appear to be of similar origin. The great bivalve shell, *Asthenodonta Westoni*, of Whiteaves,* is found in one of these beds along with drift trees; and as it must have been a freshwater species, it was probably swept from some inland lake or pond by a land flood. This would seem to indicate excessive rains as occurring at intervals in the deposition of the coal-bearing rocks, more especially in the Cumberland coal-field, and this may have been connected with the number of erect trees, and the manner of their burial.

The tree just referred to must have entrapped at least twenty Batrachians, as well as many Millipedes and land snails, embracing most of the species hitherto found in these depositories, and two additional species, which I have named *Hylorpeton intermedium* and *Platystegos loricatum*. Their description is as follows:—

* 'Roy. Soc. of Canada, Trans.,' 1893.

Hylxerpeton intermedium, s. n.

This species is known as yet only by the mandibles and portions of the skull, which are rather shorter than those of adult individuals of *H. longidentatum*, a few scattered bones and portions of the scaly skin and ventral armature. The extremity of the mandible and the cranial bones have the same slightly waved surface as in the other species. Mandibles 3 cm. long, and the teeth, which are about fifteen in each ramus of the lower jaw, are simple, with large pulp cavities: those of the maxillary bone slightly enlarging upwards, and intermediate in form between the long slender teeth of *H. longidentatum* and the thick obtuse teeth of *H. Dawsoni*. The ventral surface was armed with thoracic plates and long oat-shaped scales closely placed in chevron. The upper parts were covered with a shining skin, in places ornamented with scales or rows of vandyked processes, as in the other species of the genus. The limbs seem to have been well developed.

Genus *Platystegos*, Dawson.

Head broad and short; orbits very large; cranial bones deeply sculptured; teeth strongly plicated and curved, with sharp edges at apices, especially the inner palatal teeth, which are very large; many minute teeth on the vomerine bones; vertebræ ossified, biconcave; limb bones imperfectly ossified, short; lower surface protected with a thoracic plate and thick, densely imbricated oval or quadrate bony scales in transverse, chevron-wise rows; body above with thin, rounded scales, concentrically marked.

Platystegos loricatum, s. n.

Characters as above. Head about 8 cm. long; when flattened, 9 cm. broad across parietal foramen; squamosal or supratemporal bones projecting backward much behind the condyles; parietal foramen small; orbits large; length of longest tooth seen 7 mm.; cranial bones closely and deeply pitted; humerus with very thin bony walls, cartilaginous within, 3.5 cm. long.

This animal seems, in its teeth and the form and sculpture of the skull, to have been intermediate between *Dendrerpeton* and *Baphetes*. The bones of the best specimen are unfortunately dispersed in a very hard matrix.

These new discoveries have not added much to our list of species; and they show that no material change of land fauna occurred during the deposition of 400 ft. of beds. I hope in the course of this year to work out, photograph, and prepare for publication the principal portions of the new species, and also some new points relating to

species previously known, more especially the ornate corneous coverings of their upper parts and their abdominal bony armour, of which some instructive specimens have been preserved in these trees.

I may add that Mr. Devine, a miner who has devoted some time to collecting on the coast, has observed footprints of Batrachians, of various forms and sizes, in many of the beds between McCairn's Cove and the abandoned Cumberland Mine, a thickness of about 2,500 ft., including the whole of the productive coal-formation. A large collection of these now exists in the Peter Redpath Museum, awaiting further study and description.

While at the South Joggins last summer, I had two erect trees taken out in other parts of the section, but they proved unproductive.

The geological structure of the region is characterized by a series of parallel ridges and valleys, which are the result of the erosion of the soft Silurian and Devonian rocks. The ridges are composed of sandstone and shale, and the valleys are filled with alluvial deposits. The highest elevations are found in the north-western part of the region, where the rocks are of the Silurian age. The rocks of the Devonian age are found in the south-eastern part of the region. The rocks of the Silurian age are of the same general character as those of the Devonian age, but they are more highly crystalline. The rocks of the Silurian age are of the same general character as those of the Devonian age, but they are more highly crystalline. The rocks of the Silurian age are of the same general character as those of the Devonian age, but they are more highly crystalline.