

REDPATH MUSEUM

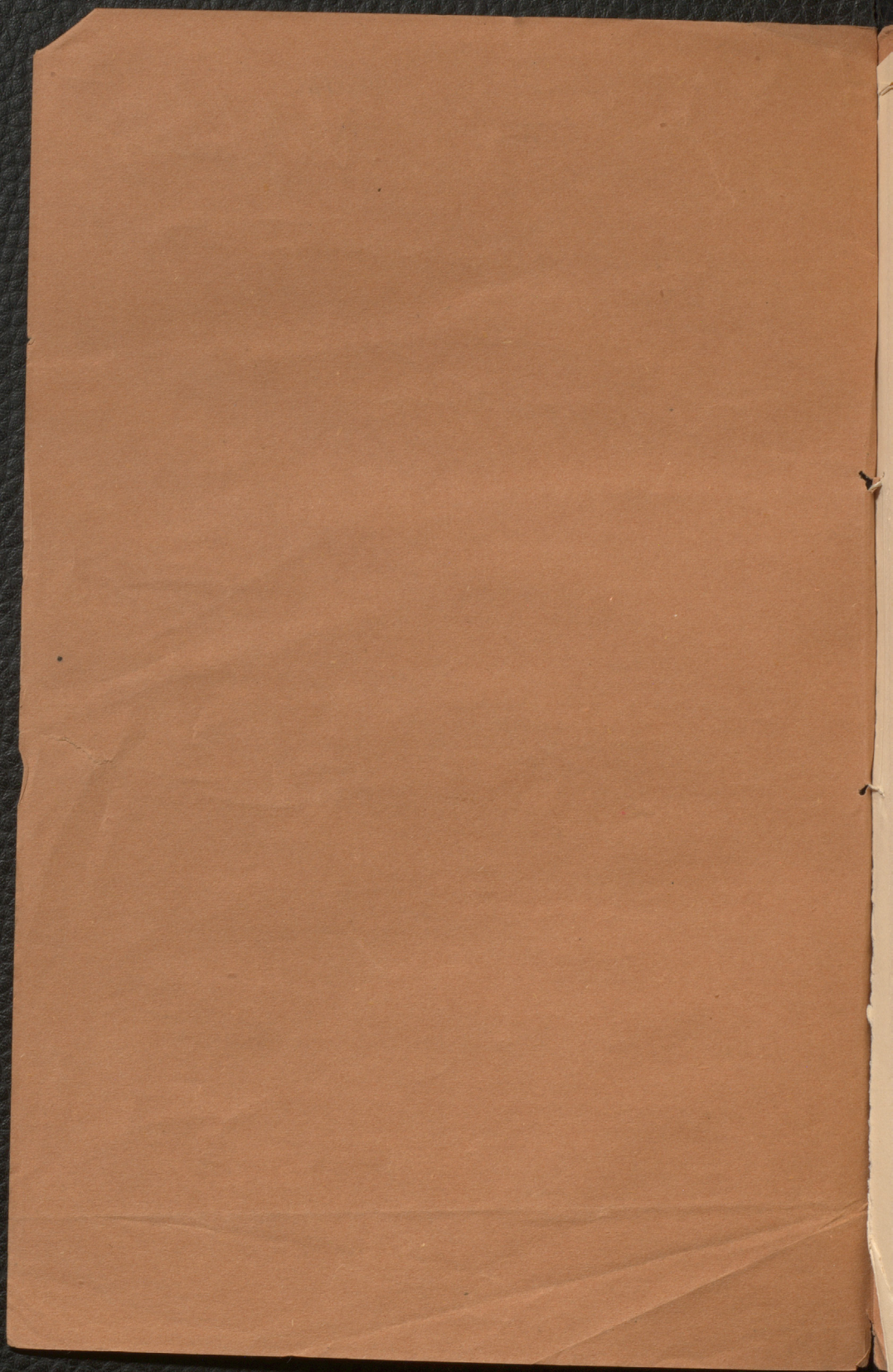
McGILL UNIVERSITY

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Leptiles

N. Sp. of Dendroepetala etc.

Jordan



- Figs. 5. Fragment of root of Conifer.
 6. Portion of pinna of *Cyclopteris Brownii*; (6 a) stipe of *C. Jacksoni*.
 7 & 8. *Sphenopteris recurva*.
 9. *Cordaites flexuosus*.
 10. Pinna of a Fern, not named; (10 a) portion magnified.
 11. *Carpolithes lunatus*.
 12 & 13. *Trichomanites filicula*.
 14. *Lycopodites comosus*; (14 a) portion magnified.
 15. *Carpolithes spicatus*.
 16. Fern, not named.
 17. Pinna of *Cyclopteris Rogersi*.
 18. Stipe of *Cyclopteris Rogersi*.

PLATE XVIII.

- Fig. 19. *Leptophloeum rhombicum*, restored; (19 a) leaf.
 20. Fragment of bark of Conifer.
 21. *Anarthrocanna Perryana*.
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PLATE XIX.

- Fig. 24. Longitudinal section of the stem of *Nematoxylon crassum*, magnified 100 diameters; (24 a) cross section; (24 b) transverse section of a few cells, magnified 200 diameters.
 25. Stem with tubercles; (25 a) magnified.
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2. Notice of a NEW SPECIES of DENDRERPETON, and of the DERMAL COVERINGS of certain CARBONIFEROUS REPTILES. By J. W. DAWSON, LL.D., F.R.S., F.G.S., Principal of McGill University, Montreal.

THE following notes relate to new facts ascertained in the course of a re-examination of the remains of Reptiles from the Coal-formation of Nova Scotia, made in the preparation of a *résumé* of the characters of these creatures, which is in course of publication. I desire now to communicate these facts to the Geological Society, as they are connected with, and supplementary to, the descriptions published at various times in its Journal.

§ I. *Dendrerpeton Oweni*, spec. nov.

Among the Reptilian remains found in erect trees at the South-Joggins, there have occurred several portions of skeletons, which, from their sculptured cranial bones, plicated teeth, and the forms of their scales and limb-bones, I have referred to the genus *Dendrerpeton*, but to individuals of much smaller size than the full-grown specimens of *Dendrerpeton Acadianum*. It did not occur to me to suppose that they were specifically distinct from the larger individuals until I observed that bones of this kind contained in the collections sent by me to the Geological Society, or represented in the figures drawn for me by Mr. Smith, were referred by Professor Owen, in his published notes on these specimens and drawings*, to the genus *Hylonomus*, or at least mentioned as probably of that genus. As the admission of these into *Hylonomus* implied a very different range of characters from those which I had attributed to that genus, and, indeed, left little distinction between it and *Dendrerpeton*, I have been induced carefully to re-examine all the specimens in my collection, with the view of determining whether they, in any respect, occupied an intermediate place between the genera in question. The result has been to convince me that there is no generic affinity between these specimens and *Hylonomus*, but to establish a probability that there was a second species of *Dendrerpeton* in the Coal-measures of Nova Scotia, differing from *D. Acadianum* in the following particulars:—(1) its much smaller size; (2) its longer and hooked teeth; (3) the greater corrugation of the dentine of the intermaxillary teeth; (4) the proportions of the skull, which seems to have been shorter and broader, with the orbits larger and more oblique. On the other hand, it differs from all the species of *Hylonomus* in the following respects:—(1) the corrugated character of the teeth, which are always simple in *Hylonomus*; (2) the presence of an inner row of large teeth, which do not occur in *Hylonomus*; (3) the sculptured surface of the cranial bones, always smooth or faintly puncto-striate in *Hylonomus*; (4) the form of the vertebræ and scales, and the short and stout limbs. In all these respects it resembles *Dendrerpeton Acadianum*, and in some of them is more remote from *Hylonomus* than that species.

On the grounds thus stated, I refer this creature, without doubt, to the genus *Dendrerpeton*, and regard it as probably a distinct species. I may add, in confirmation of the distinctness of *Dendrerpeton Oweni*, that I have recently found a specimen showing the jaw and teeth of a small individual of *D. Acadianum*, corresponding in their forms with those of the latter species, though the size is that of the former.

I refer to the present species the bones figured in Prof. Owen's paper in the Quarterly Journal of the Geological Society, vol. xviii. Plate X. figs. 3 & 4, and Plate IX. fig. 4. The maxillary bone in Plate IX. fig. 15 belongs to *D. Acadianum*, having the form of teeth and the bony sculpture of that species.

* Quart. Journ. Geol. Soc. vol. xviii. p. 242, 1862.

§ II. *Remains of Skin and Horny Scales.*

In some of my earliest explorations of the reptile-bearing stumps of the Joggins, I observed on some of the surfaces patches of a shining black substance, which, on minute examination, proved to be the remains of cuticle, with horny scales and other appendages. The fragments were preserved; but I found it impossible to determine with certainty to which of the species, whose bones occur with them, they belonged, or even to ascertain the precise relations of the several fragments to each other. I therefore merely mentioned them in general terms, and stated my belief that they must have belonged to the species of *Hylonomus* *. More recently other specimens have been obtained, and I have undertaken the detailed examination of the whole. I shall now endeavour to describe the principal fragments, and afterwards to consider the probability of their having belonged to certain of the Reptiles entombed with them.

1. One of my specimens is a flattened portion of cuticle, $2\frac{1}{4}$ inches in length, and $1\frac{1}{4}$ inch in average breadth. The greater part of the surface, though wrinkled, is smooth and shining to the naked eye; but under the microscope it shows minute pits or pores, and in places indistinct imbricated scales. A limited portion of the upper end, I suppose, anterior part is covered with imbricated scales, visible to the naked eye, and which are thin and quite free at the lower edges, though apparently attached to the skin by the whole breadth of the base. Most of them show a small spot, or pore, near the anterior edge, and smaller points, or subordinate scales, on their surfaces. In contact with the upper part of this specimen there are many fragments of the skull of *Dendroperpeton Oweni*.

2. In another portion of cuticle, similarly marked, the form of the posterior part of the animal appears to be preserved, and also a mark representing the point of attachment of the hind leg, near to which, and also along the dorsal ridge, the skin is covered with much smaller scales. The lower or abdominal side shows only a slightly pitted or porous surface. A notch in the lower or abdominal surface may perhaps represent the anus; and, immediately in advance of this, the removal of a part of the outer surface showed an interior membrane marked with rows of small pits or depressions. This was found in close proximity to a mass of bones of *Dendroperpeton Oweni* mixed with some of *Hylonomus Lyelli*, and is represented in pl. 1, fig. 5, of my work already referred to.

3. A third portion of cuticle, procured from a different trunk, presents precisely the features of that above described, but is flattened, and has on its surface a number of vertebræ and detached bones of *Hylonomus Wymani*. These, however, lie on its outer surface, and the dimensions of this species would seem to be too small to suit so large a surface of skin.

4. Another well-preserved fragment, less than 2 inches in length, presents a very different aspect from those just described.

* Quart. Journ. Geol. Soc. vol. xvi. p. 277.

Its general surface is covered with small imbricated scales, not essentially different from those already mentioned, but these are associated with other appendages. On either side of what seems to have been the middle line of the back, covered with small scales, there is a series of flat horny processes, which probably formed a double spinous crest. Outside these there are two elongated tufts of densely grouped, slender, bristle-like processes; exteriorly to which, there is, on each side, a row of flat, horny, transversely wrinkled plates. Near them was a short row of conical, truncated, horny tubercles. Sections of all these appendages show that they were horny and attached to the skin. This specimen will be figured, with enlarged views of its appendages, and a section of one of the thicker scales, in the work already mentioned.

5. Another fragment may have belonged to a different species from either of the preceding. It is about an inch in length, and rather less in breadth, and is covered with very small imbricated scales. It is crossed by six or seven obscure ridges, which, both at the lower margin and along a middle line, project in points covered with larger scales; and a row of large scales with round pores connects these points along the lower edge. If, as seems likely, this fragment represents the side of the trunk or tail, it would perhaps indicate a division of the subcutaneous muscles by a mesial line, as in Fishes and Newts. A separate fragment has a larger lobe or point, of the same structure as those above described.

6. A few separate fragments show appendages which may have been connected with some of the larger portions of integument above described. Two of these detached fragments show pointed and probably membranous appendages, marked on each side with rows of scales not overlapping, and each with a pore in its centre. The manner in which they are folded and bent shows that they must have been soft, except at the tips, which were probably horny. They are arranged in series, as if originally attached to the sides of the body of an animal of a somewhat elongated form. Another and very small fragment shows a sort of scale, perhaps abdominal, marked with transverse slightly furrowed ridges. Another and much larger portion of cuticle has a beautiful covering of imbricated scales, fringed at the lower margin with larger scales.

The whole of these specimens are chemically in the condition of highly bituminous coal, affording an example of the production of that substance from animal membrane and horny matter. They present the appearance of jet, and burn with much flame and a bituminous and ammoniacal odour. It is remarkable that in no case do the portions of cuticle contain the skeleton of the animal to which they belonged. This may be accounted for by supposing that the skins were ruptured in decay, and allowed the bones to fall out; or possibly they may in some cases have been cast while the animals were alive. Their preservation implies that the mass in which they were imbedded was wet and impervious to air, as must have ordinarily been the case in these deep pits in damp soil.

Six species of Reptiles or Batrachians have left their bones in the repositories containing these remains of cuticle. Of these, *Dendroperpeton Acadianum* was an animal too large to permit us to suppose that the integuments in question belonged to it. *Hylonomus aciedentatus* and *Hylorpeton Dawsoni* are each represented by a single specimen only, and these do not occur on the same surfaces with the remains of cuticle. Three species remain; and each of these is represented by several individuals, whose remains occur near to the fragments of cuticle, and whose size renders it possible that they may have been its owners. Of these species *Dendroperpeton Oweni* seems to have the best claim to the specimens described above as Nos. 1 and 2, and probably also to No. 3. The specimens described as Nos. 4 and 5 would then probably belong to *Hylonomus Wymani* and *H. Lyelli*, the larger portion noticed as No. 4 to the trunk of the latter, and that noticed as No. 5 to the trunk of the former. The pointed appendages, referred to as No. 6, are not attached to any of the larger fragments; but their size and associations render it likely that they belonged to *Hylonomus Lyelli*, and possibly to *H. aciedentatus*.

I have ventured, in the work above mentioned, to give rough restorations of the dermal coverings of these animals, according to what I regard as the most probable arrangement of the parts; but such attempts must be regarded as merely provisional, and to be corrected by future discoveries. I may add that I have no means of determining the arrangement of the *bony* scales which these Reptiles, or some of them, also possessed. These bony scales present, under the microscope, a structure peculiarly similar to that of the bones of *Dendroperpeton* and *Hylonomus*. They do not appear to be attached to any of the portions of cuticle, and it is most probable that they were placed on the head, neck, or abdomen, or perhaps generally over the lower surface of the body.

I have already expressed my belief that the species of *Hylonomus* may have Lacertian affinities; and I think their dermal coverings lend some countenance to this view. We may, however, suppose them to have been either true Reptiles having certain Batrachian tendencies, or Batrachians presenting some structural points now limited to true Reptiles; or, lastly, we may suppose that the specimens entombed in the erect *Sigillariae* may be the young of species of Reptiles too large and vigorous, when adult, to be entrapped in such pitfalls.

I would, however, observe that, in the case of *Hylonomus*, the smooth cranial bones, the simple teeth, the long curved ribs, the well-developed limbs, and the cutaneous appendages must absolutely prevent this genus from entering either the Order *Ganocephala* or the Order *Labyrinthodontia*, as defined by Owen. If they should prove to be really Batrachian, a new Order must be constituted for their reception, and its definition will present many points of coincidence with those of the characters of the humbler tribes of Lizards.

I propose, in the memoir already referred to, to figure and describe all the characteristic bones of these creatures in my possession, with the view of enabling naturalists to form more definite opinions on these points.

3. *On the UPPER OLD RED SANDSTONE and UPPER DEVONIAN ROCKS.*
By J. W. SALTER, Esq., F.G.S., A.L.S.

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§ 1. *Introduction.*

I was engaged for three summer months in 1854, and again for a short time last year, in examining carefully the lower beds of the Mountain Limestone and the uppermost beds of the Old Red Sandstone, with a view to establish, if possible, the correlation between the Upper Old Red and the corresponding portion of the Devonian series—a relation which has been called in question by good observers.

The memoir of Sedgwick and Murchison* was, indeed, a full statement of the identification of the Old Red Sandstone, as a mass, with the Devonian; a comparison first suggested by Lonsdale from a consideration of the fossil evidence, and ably supported by Godwin-Austen from his Rhenish explorations, though afterwards called in question by him. The identification is repeated in the later edition of 'Siluria.' Yet, over the North-European districts, there is a singular deficiency of proof of the superposition of the Devonian to the Upper Silurian rocks, and more especially of the gradual passage, at any one point, of the Old Red Sandstone into rocks of the Devonian type.

It has been argued, and with reason, by Sharpe† that in Belgium Old Red Sandstone of the ordinary type *underlies* the whole of the Devonian rocks with marine fossils. The opposite case occurs in the red conglomerates of the Catskill group in America, which themselves *overlie* the Devonian. But it has been much overlooked that, in the latter country, the whole Devonian mass, distinguished by its fossils, is clearly superposed on Upper Silurian rocks; while it has been by no means certain what part of our great Old Red Sandstone group is represented by the red conglomerates either of America or of Belgium. Nor has it been decisively shown that the Old Red Sandstone passes conformably into the strata above or below it; all that could be said with certainty was this—that the Devonian rocks contain fossils of a newer type than the Silurian and overlie them, and that the Old Red Sandstone holds some intermediate place between the Silurian and the Carboniferous rocks.

In this state of the question, the positive identification of any one part of the Old Red series with any one portion of the Devonian became of paramount consequence; since, if we could know the true succession of the Old Red beds as accurately as that of the Devonian rocks has been already traced, we might be able to prove or disprove the correlation of the two series. I have tried to do this, and have, I hope, succeeded.

* "On the Devonian Rocks of the Rhenish Provinces," Trans. Geol. Soc. 2nd ser. vol. v. pp. 633 &c.

† Quart. Journ. Geol. Soc. vol. ix. p. 18.

