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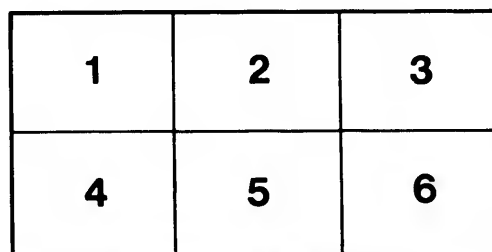
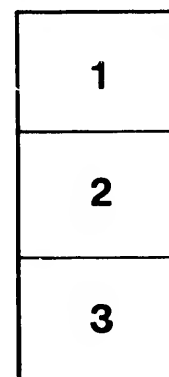
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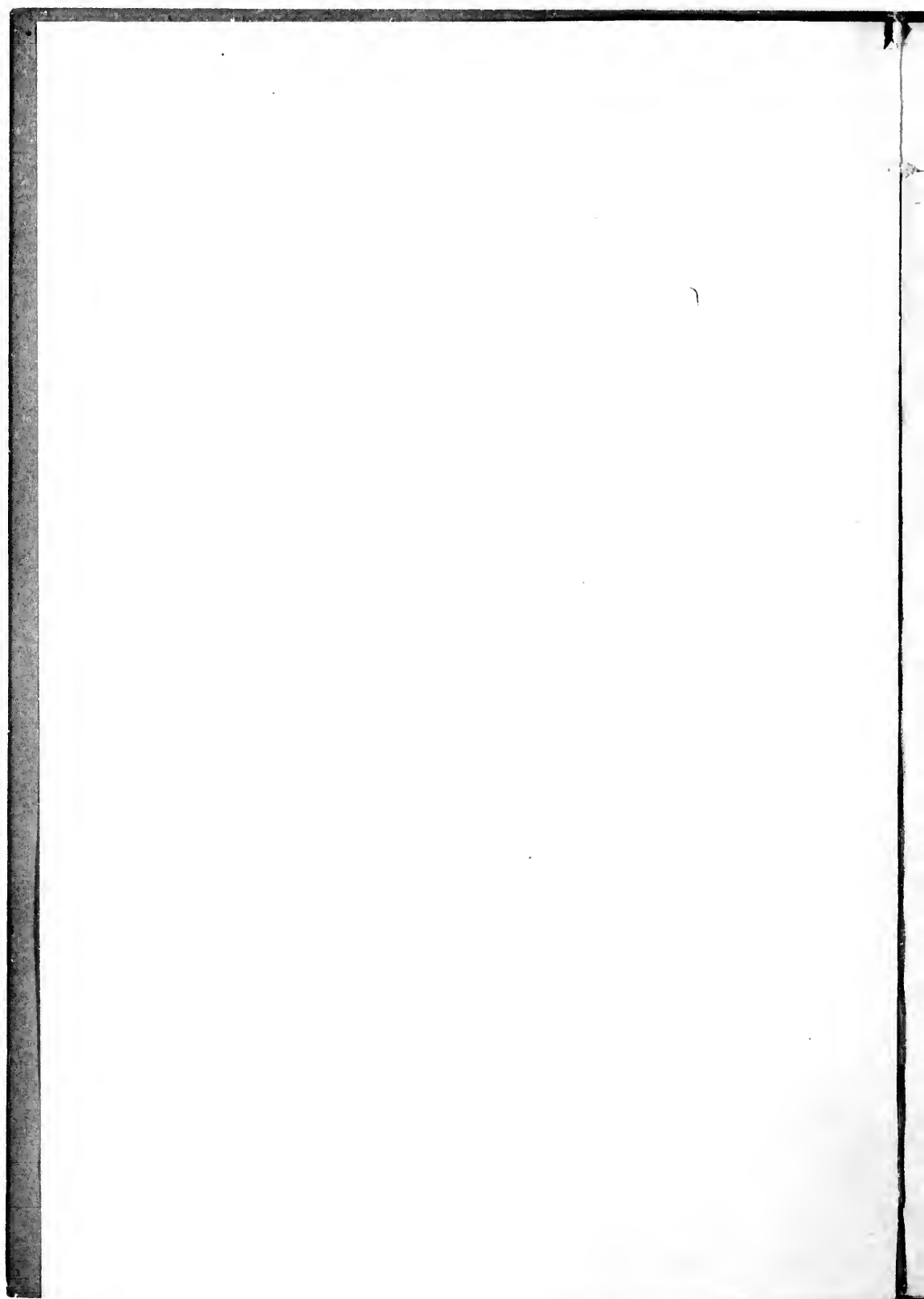
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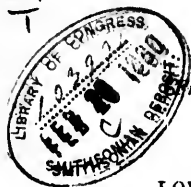
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from the *Canadian Naturalist*, Vol. VIII. No. 6.)

LOWER CARBONIFEROUS FISHES OF NEW BRUNSWICK.

By PRINCIPAL DAWSON, LL.D., F.R.S.

The recent sinking of a shaft on the property of the Beliveau Albertite and Oil Company on the Petitecodiac River, has exposed a new and interesting deposit of fossil fishes in the rich bituminous shales of that district, which contain the remarkable deposits of Albertite, described in my *Acadian Geology*, second edition, p. 231 *et seq.* The bed affording these fossils is a dark brown bituminous shale; and I am informed by Mr. E. B. Chandler, to whom I am indebted for an interesting collection of the fish remains, was from four to five feet thick. The specimens thus presented, with those previously in my collection, and one kindly given to me by Mr. F. Adams, of this University, and the valuable memoirs recently published by Dr. Newberry in the *Ohio Reports*, and by Dr. Traquair in the *Journal of the Geological Society*, enable me now to give a revision of the fishes of this locality, as described by Dr. Jackson in his Report of 1851 on the Albert mine, which I was unable to do in the second edition of *Acadian Geology*, owing to the small number of specimens to which at that time I had access.

In the collections in my possession, I recognize, in all, five species, three of them very small, and two of larger size. Of these, one, which is unusually well preserved and is the smallest of the whole, appears to be new, and I shall begin by describing it.

Palæoniscus (Rhadinichthys) Modulus, n. s.—Length, five to six centimetres; greatest breadth, 15 to 17 millimetres—the proportion of length to breadth being about five to one and a half. Head, oval and obtuse; details not preserved, except that the bones are sculptured with fine waving lines. Body gracefully curved, and upper lobe of tail long and slender. Pectoral fins small, with stout, unjointed rays. Ventral not distinctly preserved, but apparently small and nearer to pectorals than to anal. Dorsal and anal of moderate size and opposite each other. Caudal very heterocercal, with the lower lobe sharply pointed. Fins with well developed fuleral spines, especially large at the base of the caudal. Scales of the sides rhombic, coarsely toothed on the posterior edges and elaborately sculptured with flat, scaly ridges,

corresponding to the teeth of the edge. The ridges are arranged in an upper and lower series, the latter oblique to the former, so that each scale has the appearance of being composed of two distinct portions. Lower surface of scales smooth, with a few furrows corresponding to the ridges above, and the posterior edges similarly serrate. Caudal scales narrowly rhombic, pointed, and with a few central lines. The back is protected with about ten large oval scales between the head and the dorsal. They are sculptured with waving lines, curving with the edges, and are apparently truncate and serrate behind. The fish figured by Jackson, Pl. II, Fig. 5, but not named, probably belongs to the above species.

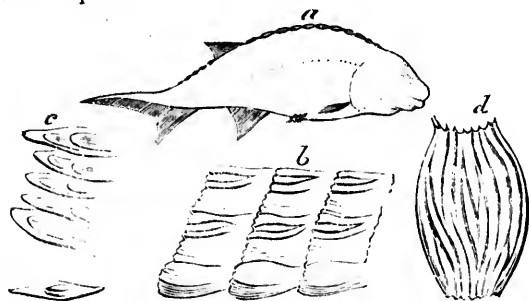


Fig. *Palaeoniscus Modulus*, N. S.

- (a) Outline, natural size.
- (b) Series of Scales enlarged, seen from inside. The lower row are those on mesial line.
- (c) Surface of exposed part of scale from side and upper lobe of tail, showing sculpture, enlarged.
- (d) One of the dorsal scales, enlarged.

This beautiful and elaborately ornamented little fish is a perfect model in miniature of that type of lower carboniferous Palaeoniscids to which it belongs, and which has recently been separated by Dr. Traquair in the genus or subgenus *Rhadinichthys*. For this reason, I have given it the specific name *modulus*. To the same genus belong the two next species, described by Jackson, of which I shall give merely distinctive marks.

P. Alberti, Jackson, is larger than the preceding. The scales have more numerous striae. The dorsal scales are rounded pos-

teriorly. The posterior edge of the anal fin approaches nearly to the caudal, and extends considerably behind the posterior edge of the dorsal.

P. Guirnsii, Jackson.—About the same size with the last, but more slender, and the head less obtuse in front. Scales thick and with few striae, and less numerous serrations. Dorsal scales pointed posteriorly. Anal fin somewhat remote from caudal and opposite dorsal.

A specimen collected by Mr. Ells, of the Geological Survey, indicates a fish of the same general form with *P. Alberti*, but about six inches long. The outline of this fish is well seen, but the details are not sufficiently clear to show if it differs in these from the smaller species.

The next species and perhaps the following one, belong to the genus *Elonichthys* of Giebel. They are much larger than the preceding.

P. Brownii, Jackson, is deep in form, with large dorsal and anal, the latter reaching almost to base of caudal. Scales of body broad and with numerous fine horizontal striato-punctate furrows, which turn abruptly upward at the anterior side of each scale. A nearly perfect specimen, collected by Mr. Ells, shows that the head was of moderate size, and the body about ten inches long and three and a quarter inches wide, the breadth at the dorsal fin being as great as at the shoulders, giving a sort of rectangular form to the fish, whose breadth suddenly diminishes toward the tail.

The crystalline lens of the eye of Mr. Ells's specimen is preserved in calcite. Under the microscope it shows concentric laminae and coarse bands or rods with indistinct denticulations; the structure being similar to that in the crystalline lens of the modern ganoid *Amia ocellicauda*. This is the first instance known to me of the preservation of the structure of the crystalline lens in a palaeozoic fish.

P. Jacksoni, n. s.—A species figured, but not described, by Jackson, is represented by many fragments in my collection. It is the largest of these fishes, reaching a length of 15 inches. It may be distinguished from the last by its more slender form, its small anal fin, more remote from the caudal, and by the character of the scales, which have many horizontal striae, and have in the broader ones a few deep and strong serrations posteriorly.

t.c. H. O. ap. 27, 12

The whole of these fishes have been preserved entire, the body being perfectly flattened and thrown into attitudes which imply that they were imbedded when living or immediately after death. The material in which they are contained is shown, by its microscopical and chemical characters, to have been a vegetable muck or mud, and the fish were either overwhelmed by it in the manner of a bursting bog, or were stifled by the non-oxygenated water mixed with this mud, and suddenly killed and imbedded in the accumulating sediment. That they occur in this perfect state and in a limited thickness of the deposit, may imply that at certain times they were overwhelmed by the irruption of this fetid organic mud into the water in which they lived. The bed is low down in the Lower Carboniferous series, being the equivalent of the Horton series of Nova Scotia; so that these fishes are among the oldest that we know in the Carboniferous period; but we know, from the Horton beds, that many far larger and predaceous ganoids were their contemporaries. No remains of these have however as yet been found in the Albert or Beliveau beds, which were probably deposited in limited fresh-water basins, perhaps not ordinarily accessible to the larger fishes.

Sir Philip Egerton* and Dr. Traquair† have both remarked on the similarity of these fishes to those found in the Lower Carboniferous of Scotland, and Dr. Newberry has described very similar species from the Carboniferous of Illinois and Ohio.‡

* Journal of Geological Society, 1853.

† *ib.* 1877.

‡ Report on Illinois, Vol. II; Palaeontology of Ohio, Vol. I.

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