

On the Discovery of true Batrachians in Palæozoic Rocks.

By M. A. GAUDRY.

Hitherto Batrachians of existing types seemed to be of recent geological date; most palæontologists believed that these animals did not occur in any formations more ancient than the Tertiaries. There was some ground for astonishment that Vertebrata of such low organization should have come upon the earth so late; and this fact seemed to be in opposition to most of those which palæontology has registered.

I have the honour to bring before the Academy some remains of Batrachians which have just been discovered in Palæozoic rocks. One of them was communicated to me some months since by M. Loustau, engineer on the Northern Railway; it was collected by M. Roche in the bituminous schists of Permian age at Igornay (Saône-et-Loire). A few days ago M. François Delille brought me a slab upon which may be seen seven little Batrachians, which closely resemble those of Igornay. He obtained it at Millery (Saône-et-Loire); and, like the specimen from Igornay, this slab was procured from bituminous schists of Permian age.

I propose to give the Batrachians of Igornay and Millery the name of *Salamandrella petrolei*, to indicate that they have affinities with the salamanders, and to note that they have been buried in deposits from which petroleum is extracted. They are very small: the individual communicated to me by M. Loustau is 30 millims. in length from the outer edge of the muzzle to the extremity of the tail; and the largest of the individuals found by M. Delille is only 35 millims. Notwithstanding their small size, it is probable that they were adult; for the heads, tails, and limbs of the different examples are clearly of the same proportions. The heads are broader than long, triangular, and much flattened: as not one of them is placed on its side, I think that this flattening is natural and not merely the result of the compression of the beds. The orbits are very large and elongated; we see no place for the postorbitals and suprasquamosals, which are so much developed in the Ganocephali. The vertebræ have the centrum ossified: I count 29 of them, viz. 3 cervical, 10 dorsal, 8 lumbar, and 8 caudal, the last very much reduced. The cervical and dorsal vertebræ have arched ribs, much shorter than those of the Ganocephali. I have not been able to perceive any indications of the entosternum and episterna, so remarkable in the Ganocephali and Labyrinthodonts. The fore and hind limbs are nearly of the same size; both are furnished with four digits. I see no traces of scales which could be attributed to the *Salamandrella*; and, indeed, I cannot distinguish around the skeleton any deposit or coloration indicating a hardened skin, which would have persisted longer than the other soft organs.

One cannot help being struck by the resemblance of the little Batrachians of Igornay and Millery to the terrestrial salamanders. Nevertheless their head is a little broader; the bones of their limbs seem to have had the extremities less well-defined; the hind limbs

are directed backward, as in swimming animals. The dorsal and lumbar vertebræ are shorter and more numerous; the lumbar vertebræ bear no ribs; the tail represents only one fifth of the whole length of the body, whilst in the salamanders it equals nearly the half.

The *Salamandrella* is very distinct from the reptiles of the Carboniferous formation which have been described under the names of Labyrinthodonts, Ganocephali, and Microsaurians (such as *Dendroperon*, *Hylorperon*, *Hylonomus*, *Parabatrachus*, *Anthracherperon*, *Urocordylus*, *Ceraterperon*, *Sauropleuræ*, *Molgophis*, &c.); but it differs less widely from *Raniceps* (*Pelion*) *Lyelli* from Ohio.

Now that the existence of true Batrachians in the Palæozoic rocks seems to be proved, probably no difficulty will be raised to placing *Raniceps* among those animals, as was proposed by Mr. Wyman in 1858. It is probable that *Raniceps* had a naked skin, and that it possessed no entosternum, episternum, postorbital, or subsquamosal. Nevertheless it cannot belong to the same genus as the fossils of MM. Loustau and Delille; its vertebræ are much more elongated, its frontals are less widened, the supraoccipital is thrown less backwards, and its mandibles are more prolonged. Lastly, the animal from Ohio is three times as large.

In 1844 Hermann von Meyer described, under the name of *Apateon pedestris*, the impression of a reptile found in the Carboniferous formation of Münster-Appel. Notwithstanding the opinion of this talented palæontologist, I think that it belonged to an animal of the group of salamanders; and if it were allowable to form a judgment from an impression so vague as that of *Apateon*, I should be inclined to believe this fossil to be identical with *Salamandrella petrolei*. Thus we should be acquainted with true Batrachians in the Palæozoic rocks of France, the United States, and Germany.

The bituminous schists which contain *Salamandrella petrolei* also include remains of plants, numerous coprolites, and fishes (*Palæoniscus*). M. Loustau has communicated to me a small crustacean derived from them, a series of well-ossified vertebræ of a still unknown reptile, and a fragment of a humerus or femur agreeing in size with that of *Actinodon Frossardi*, a curious Ganocephalous reptile, also collected in the bituminous schist, at Muse, not far from Igornay and Millery, which I brought before the Academy in 1866.

To complete the list of Palæozoic reptiles found in France, I must remark that M. Paul Gervais has described a reptile from the Permian schists of Lodève under the name of *Aphelosaurus*; that learned naturalist has shown that it is very distinct from the Batrachians.—*Comptes Rendus*, February 15, 1875, p. 441.

On the Motive Power of Diatoms. By Prof. J. LEIDY.

While the cause of motion remains unknown, some of the uses are obvious. The power is considerable, and enables these minute organisms, when mingled with mud, readily to extricate themselves and rise to the surface, where they may receive the influence of



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