



GEOLOGICAL SKETCH IN THE LAUGH OF MORAY (J.M.J.)

XXVIII.—*The Reptiliferous Sandstones of Elgin (with Map).*

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(Read 18th February 1892.)

EVER since the discovery of the *Telerpeton Elginense*, about forty years ago, there has been a doubt as to its geologic age. When M. Agassiz saw the "drawing" of a very small portion of the scutes of the next discovered Elgin reptile he named it *Stagonolepis*, under the impression that it was a fish of Devonian age. It was some time after this, and from a flag, now in the Elgin Museum, that *Stagonolepis Robertsoni* was proved to be a reptile of high organisation and of no ordinary size. (Memoirs of the Geological Survey, Monograph III., 1877. Huxley.)

It was only when Professor Huxley gave in his report on the next, or third, discovery—the *Hyperodapedon Gordoni* (see *Quarterly Journal of the Geological Society* for 1859, 1869, and 1887), that Sir R. Murchison began to advocate a *Triassic* in place of a Devonian age for these reptiles. Some time prior to this change of view, so clear was Sir Roderick as to their "Old Red" age that he said, "Let proud Palæontology bow to field Stratigraphy;" while Professor Huxley wrote to the same correspondent, "Let the battle go as it may, I'll stick to my reptiles!"

This much to show what a keen interest was taken at the time in this question among geologists. The locality became celebrated, and drew many "Knights of the Hammer" to examine it, among whom may be mentioned Sir R. Murchison, Sir C. Lyell, Sir A. Ramsay, Sir W. Jardine, Sir A. Geikie, Professors Nicol of Aberdeen, Harkness, Judd, and Page. The Rev. W. Symonds declared that he would lose faith in geology if these reptiles should turn out to be of "Old Red" age. Another gentleman with considerable difficulty admitted the sheer possibility of their being so low in the crust of the earth.

A *Dicynodon*, and a nondescript animal (reptilian?) now in Edinburgh, may be added as Elgin discoveries, together with a new reptile from Spynie, lately sent to the British Museum, but not yet described. Moreover there are eight or ten blocks, of some promise, containing reptilian remains just sent from the Elgin Museum, to be examined and reported on by E. T. Newton, Esq.

Had none of these reptilian remains been found, the Elgin Sandstones would have been held on all hands to have been the uppermost or closing beds of the Devonian era. As laid down in Sir R. Murchison's early and pithy expression, above written,

we can come to the true order in which animals or plants appeared and lived on the face of the earth, only when we read aright the sequence in which the strata or rocks that contain them were deposited.

*A priori*, or as a foregone conclusion, not a few, when they heard of these reptiles, said that they must be of Triassic age, as nothing of their order had ever been found lower down in the scale; but one great and leading difficulty, that presents itself strongly to the geological visitor of this district, is the total absence of any band or line of demarcation between the Holoptychian and Reptilian beds—such a band or break as would have naturally been expected to record itself in the lengthened interregnum that ran between the Devonian and the Trias, during which the Permian and the Carboniferous ages were passing by. There is, besides, no symptom of denudation having taken place while these fossiliferous beds were being deposited, so that it is only by actually seeing the fossil *in situ* that one can say whether it belongs to the supposed *Old Red* or the supposed *New Red*; neither is there any attending change in the dip, colour, or consistence of the beds, at the supposed point of contact, to distinguish the one set from the other. The inference seems to present itself that either the fish (Holoptychius and Glyptopomus) continued to flourish down to Triassic times, or that the reptiles appeared in Devonian strata. The latter I hold to be the more correct reading of this local page in the Book of Nature.

There was a bed of conglomerate in Cuttie's Hillock quarry, which was thought to separate the fish-bearing strata from those yielding the reptiles. This conglomerate has now been proved, by the extension of the quarry, to be of little extent. It is very unlike outside conglomerates, being composed, in its matrix, of white sandstone, and having as its contents small white quartz pebbles. There is, moreover, in the Elgin Museum, a portion of this conglomerate containing reptilian remains, showing that it must have been deposited near their times.

Although close to each other, as in Cuttie's Hillock quarry, reptilian remains have not, as yet, been found underneath, or mixed up with, those of "Old Red" fish. The Elgin Sandstones, particularly those now forming the ridge of Quarrywood, were once, most likely, in a condition similar to that in which we now know the sands of Culbin and its dunes to be. On these dunes the active *Lacerta* has been seen running about in the sunshine, and leaving its tiny "footprints in the sands of time," while recent Batrachians were croaking in the adjoining marshes, and the haddock and the flounder were swimming in the bordering firth. Upwards of thirty years ago, while viewing

this far-spreading wilderness of pure sand, and believing that the agencies now at work would, in the future, act as they have done in the past, Sir Charles Lyell exclaimed, "What a manufactory of SANDSTONE!" In several places of the upper sandstones now under notice, there is a false bedding suggestive of wind as well as water being a factor in their arrangement.

The upper beds of the Spynie quarry have yielded specimens of most of the reptiles that have been discovered. These beds lie at the top of the Sandstone system, and immediately under the cherty or "limestone" rock, which is to be seen *in situ* close by, at the Bishop's Palace. In this quarry, as yet, no "Old Red" fish have appeared.

A mile or so westward, and in the Bishopmill quarry, Holop-tychian scales have been got, and also a slab, now in the Elgin Museum, bearing footprints. At the top of the beds in this quarry, perfectly conformable, and under the well developed boulder clay, there is a stratum of whitish sandstone, which looks like the continuation of the Findrassie beds that lie about half a mile due north, and which contained some of the finest bits of *Stagonolepis* yet discovered. On the southern side of this quarry, and close by the public road, a bent and partially broken set of beds may be seen, in consistence like to the one under the boulder clay, probably part of a fold or of a fault running westwards to the Knock of Alves.

In the Lossiemouth escarpment, where so many good reptilian specimens have been found, the white sandstone beds may be traced down, conformably, to a red clayey stratum, at the back of Rockhouse, and very much resembling that of Scaat-craig. It probably contains fossils that would throw light on the question at issue, for, if it were projected westwards, it would meet a hard rock of a like colour, near the west end of the golfing ground, in which Mr Linn, of the Geological Survey, detected "Old Red" fish scales, of which there is a specimen in the Elgin Museum. (See map of Elgin by the Geological Survey.)

At the Nairn quarries there are many remains of "Old Red" fish. From these quarries there is a block of whitish sandstone, now in the Elgin Museum, which shows numerous marks, apparently reptilian footprints.

Between the Palæozoic rocks of Geanies in Ross-shire, and the Ichnites of Tarbatness, there lies one of the finest geological sections in the north of Scotland. In it no undoubted line of demarcation has been detected, such, at least, as would show the break which might be looked for between two formations so widely sundered in time as Trias and Devonian. It has, indeed, been suggested that these Tarbatness footprints may have been

made at a very different geologic period, and by a totally different class of animals from those associated with the footprints seen on the opposite, or southern, shore of the Moray Firth. But, so like was the Ross-shire shore here to that at Lossiemouth and Cummingston, that the writer urged two resident geological friends to look out for these footprints, and they were by-and-by found !

The map of this district of Moray, lately published under the auspices of the Geological Survey, represents among its strata two distinct beds or deposits of "limestone," or Cherty rock, in age so far asunder as that one is placed in the "Old Red" and the other in a supposed Trias. It is suggested, with all deference, that the indication of one such deposit, and it at the top of the system, would sufficiently meet all the circumstances of the case. This peculiar rock is a concretionary sandstone rather than a pure limestone. Sir Charles Lyell said of it, as it shows itself at Lossiemouth, that he had never met with its like. It is to be seen, in more or less extent, at Lossiemouth, Bishop's Palace of Spynie, and at Linksfield, while Elgin is built over it. It has been burned, for agricultural and other purposes, at Stonewells, Waulkmill, Glassgreen, New Elgin, Bilboahall, Palmercross, and Inverugie. It is well seen at Cothall, on the Findhorn. True it is that at Sheriffmill, near Elgin, where there once were lime-kilns, it lies at the southern foot of the the high Quarrywood ridge, but it is considered to have been brought down by a fault or by a fold. An evidence of this may be traced in the bending of some of the beds at Bishopmill, and in a somewhat fractured line that runs directly west to the Knock of Alves, and also in the *southern* dip of the limestone at Linksfield.

Sir R. Murchison, who was well acquainted with this part of Scotland, considered that this superior deposit, as an overlying shield, had, in glacial times, been the saving of the fertile flat of Moray. It had presented its tough shoulders to the icy forces that then came upon it, at least in their last raspings, from the north-north-west.

Had there been two beds of this "limestone," as represented in the map above alluded to, it is remarkable that only one appears in the Findhorn section, where the Elgin beds are otherwise so well and fully exhibited. It is likewise noteworthy that there is no vestige of them to be seen at or around Cuttie's Hillock, or the other localities where both sets of fossils nearly meet. In support of the idea that there is but one deposit of limestone, or "Cherty rock," in the district, it may be stated that galena—not a very common mineral—is found profusely in the limestone at Lossiemouth, which is mapped as Trias ; and



that this mineral is also found, though sparingly, in the limestone at Sheriffmill, which was most likely considered of Devonian age. "Salmons in both," some may quote!

This map (at least two copies of it purchased from the Edinburgh publishers) is so indistinct in its colourings and tracings of the two presumed formations that, without descriptive letter-press and sections, it is difficult to be read even by those well acquainted with the ground.

It is more with the view of reminding geologists that the period of the introduction of these reptiles is still a *questio vexata*, and to invite further inquiry, than with the prospect of directly settling it, that this paper has been put forward.

There is no "bone-bed," or leading stratum, where these remains are met with. Both sorts of fossils—fish and reptile—are sparsely scattered, and often fragmentary. If any excavation were to be made for fossils alone, in order to get more light on the subject, it should be, in the first place, in the Lossiemouth quarries, and in the platform left by the quarrymen. They did not go farther down, because the bed was softish and rubbly, but it was at this horizon more than elsewhere in the quarry that most fossils were found.

The quarrymen have really been the discoverers of these most interesting reptilian remains. They are intelligent and observant, and not likely to throw anything worth preserving into the rubbish-heap.