

later in this period.<sup>1</sup> That it was complete before the Glacial Epoch began is generally admitted. Dr. Blanckenhorn,<sup>2</sup> adopting the three epochs of ice-extension recognised in Germany, gives this arrangement of the later history of the Jordan valley :—

(1) First ice-age (rain epoch) : greatest height of the Jordan valley lake.

(2) First interglacial (dry epoch) : probable sinking of lake to about 328 feet above present level, when the salt of Jebel Usdum was precipitated.

(3) Second ice-age : rise of lake and formation of the high terraces.

(4) Second interglacial : probably the age of the volcanic out-breaks,<sup>3</sup> so conspicuous in the northern part of the valley (also the cutting of the Ghor).

(5) Third ice-age : formation of the lower terraces.

This chronological scheme is rather hypothetical, but it deserves careful consideration. I think, however, I am right in claiming the Esdraelon valley as a fragment of a system older than the Jordan, and pronouncing that river guilty of removing its neighbour's landmark westward. Such a removal is almost inevitable, because the descent of its tributaries on the right bank is so much more rapid than the slope of the Kishon valley.

## II.—ON A NEW CROCODYLIAN GENUS (*NOTOCHAMPSA*) FROM THE UPPER STORMBERG BEDS OF SOUTH AFRICA.

By R. BROOM, M.D., Victoria Coll., Stellenbosch.

**M**R. A. L. DU TOIT, of the Cape Geological Commission, who has been for some months engaged in studying the Stormberg beds in the eastern part of the Colony, has been fortunate in making a number of discoveries of very great interest to the palæontologist. Among Vertebrates his most important finds have been the remains of two small crocodiles.

The first specimen, which was discovered by Mr. A. Isted in the Cave Sandstone at Funnystone, Barkly East, consists of the impressions of the under sides of most of the upper bones of the skull and of most of the dorsal armour. There are also preserved the remains of a scapula, a humerus, a radius and ulna, a femur, and a number of ribs. A restoration of the skull is shown in Fig. 1. When complete it probably measured 130 mm. in length, and the length of the whole crocodile was probably about 600 mm. Though the skull is too imperfectly preserved to show what are the relations to the already known families, enough is preserved to show that the crocodile belongs to the suborder Amphicelia of Owen (= *Mesosuchia*, Huxley). The skull is characterised by the very large size

<sup>1</sup> One is reminded of the east and west flexures of later Pliocene age in the southern part of England.

<sup>2</sup> "Entstehung und Gesichte des Todten Meeres": Zeitsch. d. Deutsch. Palest. Vereins, xix (1896), pp. 1-64.

<sup>3</sup> There is nothing left to give a precise date to this period, during which, according to Dr. Blanckenhorn, prehistoric man appeared. It is supposed to be contemporaneous with that of the German loess.

of the squamosal bones, by the moderate size of the supra-temporal openings, by the nasals taking little part in the formation of the snout, and by each maxillary having only a few large teeth—probably 6 or 8.

I propose to call the form *Notochampsia Istedana*.

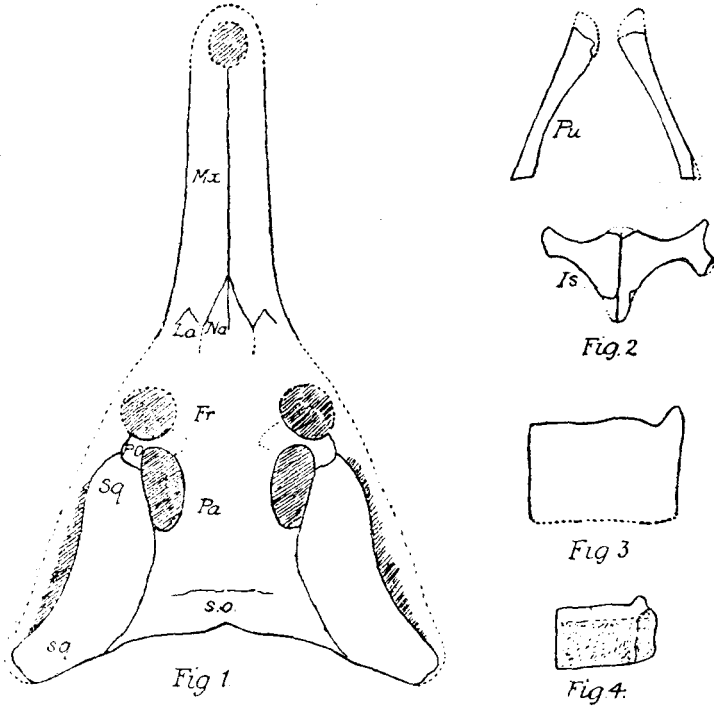


FIG. 1.—Restoration of skull of *Notochampsia Istedana*.  $\times \frac{2}{3}$ . *Fr.* frontal; *La.* lachrymal; *Mx.* maxilla; *Na.* nasal; *Pa.* parietal; *P.O.* post-orbital; *S.O.* supra-occipital; *Sq.* squamosal.  
 FIG. 2.—Pelvic bones of *Notochampsia longipes*.  $\times \frac{1}{2}$ . *Is.* ischium; *Pu.* pubis.  
 FIG. 3.—Twelfth dorsal scute of *Notochampsia Istedana*.  $\times \frac{1}{2}$ .  
 FIG. 4.—Dorsal scute of *N. longipes*.  $\times \frac{1}{2}$ .

The second specimen was found by Mr. Du Toit near the top of the Red beds at Kraai River, Eagles Crag, Barkly East. Though less is preserved than in the other specimen, the state of preservation is much better. The following bones have been displayed:—the almost perfect pubes and ischia, an imperfect ilium, the almost perfect right hind-limb, including the foot, the imperfect left hind-limb, the imperfect right fore-limb, portions of the dorsal and ventral armour, and a few imperfect vertebræ. A comparison of the dorsal plates with those of *Notochampsia Istedana* shows that the specimen from the Red beds belongs to a different species, though probably the same genus. The pelvis is typically Crocodilian in

that the pubis does not enter the acetabulum. The ilium is of small size. The limb bones are unusually long and slender. There are only four digits developed in the pes. The vertebræ are biconcave, but the concavities are shallow.

For this second species I propose the name *Notochampsia longipes*. If the two specimens are both adult, then *N. longipes* would probably be about two-thirds the size of *N. Istedana*.

The Stormberg beds until recently have usually been regarded as Triassic. Seward, however, as the result of his study of the plants of the Lower Stormberg or Molteno beds, has recently shown that these beds are of Rhætic age, and as, according to Mr. Du Toit, the horizon of the fossil crocodiles is at least 1,000 feet above the Molteno beds, we are probably safe in regarding *Notochampsia* as of Lower Jurassic age.

A full description of the remains will appear in the Annals of the South African Museum.

In view of the great interest of the discovery the Geological Commission has kindly granted me permission to communicate this preliminary notice to the GEOLOGICAL MAGAZINE.

### III.—ON THE HOMOTAXIAL EQUIVALENTS OF THE LOWER CULM OF NORTH DEVON.

By WHEELTON HIND, M.D., B.S., F.R.C.S., F.G.S.

I AM glad that my paper on the Coddon Hill beds, published in the GEOLOGICAL MAGAZINE, August, 1904, pp. 392-403, has aroused criticism, and could only have wished that Dr. Vaughan had been familiar with the Carboniferous sequence of the Pennine area and Belgium. The matter is not one to be solved by the casual appearance in any definite bed of a few Brachiopods, at one only of the many horizons at which they are known to occur in other localities, for the whole of the fossils, which are quoted by Dr. Vaughan as the foundation for his argument that the Coddon Hill Beds are low down in the Carboniferous sequence, are equivocal as far as their value as zone indices goes. And on the other hand, Dr. Vaughan completely ignores those fossils which are unequivocal and which denote a well-recognised horizon, and curiously enough, too, correspond with a marked change in lithological character of the Carboniferous sequence. In the first place, I do not see where Dr. Vaughan found any statement in Mr. Howe's and my paper on the Pendleside group at Pendle Hill (Q.J.G.S., vol. lvii) that the Pendleside series are the equivalents of the Millstone Grit of South Wales and the Mendip areas. The table on the page quoted (p. 388) distinctly shows that we consider the Pendleside series to lie universally below beds equivalent to Millstone Grit, and we do not mention the series of the Bristol and Mendip area because we were not well enough acquainted with that district to do so.

To turn to the evidence afforded by the Brachiopoda and Zaphrentoids of Coddon Hill Beds. Every species mentioned in Dr. Vaughan's list occurs in the Pendleside series in the Pendle and Bolland area