

flowing to the south-east, quite independent of the Appalachian structure beneath. It was a case of superimposed drainage. We cannot here follow the subsequent development of the system, but it should be noted that the well-known Schooley peneplain truncates the arch of the Fall Zone peneplain and must be of later date.

Johnson's explanation is very much simpler than that of Davis, and consequently is more satisfying to the mind; but simplicity is not a proof of truth to nature, and for the evidence the reader must refer to Johnson's book. P. L.

PRELIMINARY NOTE ON DEVONIAN STEGOCEPHALIANS FROM EAST GREENLAND. By G. SÄVE-SÖDERBERGH. *Meddelelser om Grønland*, Bd. 94, Nr. 7, 1932. pp. 1-105, 22 text-figures, 22 pls. Price, Kr. 8.00.

THE oldest amphibia hitherto known are the Embolomeroous forms of the Carboniferous, and in the Croonian Lecture for 1924 Professor Watson suggested that they arose from a fish ancestral also both to the Osteolepids (from which it differed only in the absence of certain adaptive features) and the Dipnoans, and that the actual origin of the group took place no later than Devonian times and possibly earlier. The characters of this hypothetical fish ancestor can to some extent be deduced by a backward extension of the evolutionary trends of the *Stereospondyli*, *Rachitomi*, and *Embolomeri*. Now, by one of the more fortunate of recent discoveries, a series of Devonian amphibia has come to light through the work of the Danish East Greenland Expedition of 1931, and a preliminary report on the dermal bones of the skull is given by Dr. Söderbergh in the present monograph. The Upper Devonian age of this material has been established by the fish fauna of the same fossiliferous localities, which has been in part described by Professor Stensiö. That this new amphibian fauna should be found to constitute a separate group not lying on the main line of descent of the later Stegocephalians may seem a little disappointing, but it represents a type whose organization is of the highest importance and it gives, moreover, a somewhat greater precision to our chronology. Dr. Söderbergh places the fish ancestors of the Crossopterygians, Dipnoi, and Stegocephalians in the Lower Devonian or Silurian.

The forms here described are referred to two new genera, *Ichthyostega* and *Ichthyostegopsis*, constituting the family *Ichthyostegidae*, for which the author proposes a new Order. From the diagnosis of the family, we may note particularly the presence of an incomplete median suture to the skull roof (i.e. an unpaired parieto-extrascapular posteriorly and rostro-interrostral anteriorly), of small pre-operculars (probably present in all) and of a premaxilla fused with the lateral rostrals to form a rostro-premaxillary, of which the premaxillary component is entirely confined to the ventral surface. The external nares must have been situated on the ventral

side of the skull, opening ventro-laterally between the anterior ends of the maxillaries and the posterior ends of the tooth-bearing parts of the rostro-premaxillaries. The palate is well ossified, and the palatal vacuities small. Two rows of teeth occur in the mandible.

In the interpretation and naming of the various dermal bones of the skull roof, their relations to the sensory canals (lateral lines) are discussed as fully as possible, and comparison is made with the skulls of the Crossopterygians, Dipnoans, and later Stegocephalians. The supposition is inevitable, concludes the author, that the Ichthyostegids and primitive Crossopterygians had a common ancestor from which neither has departed to any great extent, and while we cannot enter into detail in a short abstract, the general fact emerges that this ancestral form must have possessed very numerous dermal bones (including several rostral elements, two pairs of frontals and of parietals, and five extrascapulars), which, by their different combinations, have produced the skull patterns of the various later types. In making a comparison with the Dipnoan skull, a new interpretation of the cranial roof of *Dipterus* is employed, based on unpublished work of Professor Stensiö, which again shows five extrascapular elements and a subdivision of the frontals and parietals. *Dipterus* is, in some respects, more nearly related to the Ichthyostegids than are the Crossopterygians.

Turning to a comparison with the later Stegocephalians, we note at once what is probably the most important difference, namely the position of the external nares. Those of the Stegocephalians are the displaced homologues of the Ichthyostegid external nares, which, like those of the Dipnoi, are considered to be homologous with the *posterior* external nares of primitive Crossopterygians. The median suture of the skull roof is complete in the later Stegocephalians and the unpaired parieto-extrascapular and rostro-interrostral have disappeared, as have also the anterior antorbital and the independent pre-opercular. The palate is essentially similar.

Lastly, certain characters of some of the *Embolomeri* are noted which are considered by Professor Watson to be primitive and directly inherited from a fish ancestor and yet are not found in the *Ichthyostegidae*. Among these are mentioned the loose attachment of the squamosal to the inter-temporal and supra-temporal, the presence of a deep otic notch, and the existence of a free inter-temporal bone. On the view that these features are truly primitive, it appears that the *Ichthyostegidae* and the *Embolomeri* are to some extent parallel groups, the Ichthyostegids retaining a larger number of primitive characters.

Dr. Säve-Söderbergh is to be congratulated on the work he has already accomplished; the promised account of the endocranium of this new Order may determine some of the points left undecided, and will certainly be eagerly awaited by all interested in the origin of the Tetrapods.

O. M. B. B.