THE CRANIAL ROOF OF *DIPNORHYNCHUS SUSSMILCHI* (ETH. FIL.).

By E. Sherbon Hills,
University of Melbourne.

(Plate ix and Figures 1–6.)

Introduction.

In 1933, the writer published a description of the cranial roofing-bones of *Dipnorhynchus sussmilchi* (Eth. fil.), based on an examination of the external features of the type and only specimen, which is preserved in the Australian Museum, Sydney (Reg. No. F.10813). This dipnoan skull was discovered by Mr. C. A. Süssmilch in the Middle Devonian limestones of Taemas, New South Wales, and was originally described as (?) *Ganorhynchus sussmilchi* by R. Etheridge, Jnr., in 1906. In 1927, Jaekel erected the new genus *Dipnorhynchus* for the specimen, the name being accompanied by an unlabelled original figure, but no written description. In view of the fact that the genus *Ganorhynchus* Traquair is not capable of precise definition and is applicable only to cosmine-covered dipnoan snouts (see Traquair, 1873; Newberry, 1889; Dutertre, 1929; Gross, 1933, 1937), it is undoubtedly preferable to designate the excellently preserved skull from Taemas as a new genus, the name *Dipnorhynchus* Jaekel being here regarded as valid (see also remarks in Hills, 1933, pp. 634–5).

Since the appearance of my earlier paper on *Dipnorhynchus* there has been much discussion about the homologies and nomenclature of the cranial roofing-bones in Devonian fishes, in the course of which the situation of the sensory canals of the lateral line system of the head has assumed considerable significance. As all statements in my previous description were based on examination of the external features only, no dissection having been attempted for fear of damaging the specimen, it was not possible to compare *Dipnorhynchus* in any detail with other dipnoans. The importance of the specimen in relation to the comparative anatomy of the group was, however, obvious, and it was therefore decided to make a partial dissection of the skull in order, if possible, to trace the sensory canals. My thanks are due to Dr. Charles Anderson, former Director of the Australian Museum, for kindly authorizing preparation of the specimen, and to the present Director, Dr. A. B. Walkom, for permission to complete the examination.

The cavity of the skull is filled with massive limestone that adheres strongly to the bones, and it was not until the specimen of *Coccosteus* from the Middle Devonian limestones of Buchan, Victoria, had been studied (Hills, 1936) that a satisfactory and fairly rapid technique for the dissection of such material was developed. Serial sectioning was not favoured for either specimen because each is unique of its kind, and it was desired to preserve them intact as far as possible. In *Dipnorhynchus* the sensory canals were traced by excavating the covering bone and the calcite infilling the canals with dental probes and fine needles, cleaning being carried out by the application of hydrochloric acid with a camel-hair brush. After this treatment the specimen was not suitable for photographic representation, but Figure 1 shows the structures actually observable on the left side of the skull, without any attempt at reconstruction. A few significant details were also obtained from the right side, particularly along the exposed edges of the bones.