a narrow and sack-shaped termination on the anti-sicula side. From all this it follows that the left branch near its proximal part is not "bilaterally symmetrical," in opposition to what Moberg believed was the case in the genus *Didymograptus* (Nyagrapt. från Skåne, p. 346). The development of the following thecæ on the left branch seems to be regular. The "connecting" canal, from which, on the opposite side of the sicula (right side), the right theca and common canal of the right branch arise, crosses the sicula somewhat obliquely, so that the right branch comes to originate somewhat nearer the aperture of the sicula than does the left branch. The lines of growth on the connecting canal are quite continuous with those on the right branch. It appears from Fig. 3 that the connecting canal is really separate from the sicula. At different foci under the microscope the growth-lines of both can be seen crossing one another. In the broken and ragged part of the connecting canal the growth-lines of the sicula alone are shown. Also in the forms preserved in relief of the anti-sicula side (Fig. 2) the "connecting" canal appears, and its passage into the canal from the sicula and common canal of both branches is very conspicuous. The aperture of the sicula is always bent to the same quarter as the apertures of the thecæ of the right branch.

DIDYMOGRAPTUS GRACILIS, Törnq. Mut. Pl. XIII, Figs. 7, 8.

This specimen has not been found transparent, but the same position of relief as in *Didymograptus minutus*, Mut., is shown on both sides. Fig. 7, sicula side; Fig. 8, anti-sicula side. The "connecting" canal is here conspicuous; the proximal end of the sicula shows a fine initial apex.

(To be continued in our next Number.)

II.—A RESTORATION OF *HYÆNODON*.

By Prof. W. B. SCOTT, F.G.S.

(PLATE XIIA.)

H*YÆNODON* is one of the genera of fossil mammals which has been for a long time imperfectly known. Excellently preserved skulls have been described and figured by Leidy and Filhol, and some of the limb-bones and vertebræ by De Blainville and Schlosser. Material was, however, lacking for a satisfactory restoration of any of the species, and the specific reference of the scattered bones found has always remained more or less uncertain. In the season of 1894 Mr. Hatcher had the good fortune to discover in the White River beds (Oligocene) of South Dakota a number of remarkably fine specimens pertaining to several species of *Hyænodon*, which at length enable us to gain an idea of the appearance of this most remarkable animal.

The accompanying figure (Plate XIIA) must at once strike everyone as altogether grotesque and improbable, and were it not so largely drawn from the remains of a single individual found together in one block of matrix, I should not venture to publish it. To this individual

belong the skull, neck; nine thoracic, four lumbar, two sacral, and two caudal vertebræ; the scapula, ulna, radius, and part of the carpus; the femur, tibia, fibula, and part of the pes. The missing vertebræ were restored from a second specimen which had the skull, all the presacral vertebræ, tibia, fibula, and hind foot. This is a young animal, still retaining the milk dentition, and is very probably referable to the same species (*H. cruentus*, Leidy) as the first. Another adult specimen of the same species, slightly larger than the first, consists of the mandible, axis, humerus, ulna, pelvis, and femur, and allows the proper proportions to be accurately observed. Other more or less fragmentary skeletons, representing various species, lead to similar results, though it yet remains to be determined how far the European species, which exhibit certain constant differences from the American, were characterized by the same remarkable appearance.

As compared with any of the recent Carnivora, the head of *Hyænodon* seems large out of all proportion to the body and limbs, the neck short, the back, especially the lumbar region, quite long, the tail short, the limbs short and slender, and the feet weak.

The characteristic and peculiar physiognomy of the head is already familiar and needs no further description. The neck seems very short and slender to carry the weight of the large head, its length being hardly more than two-thirds that of the skull. The axis is the only cervical vertebra which is strongly developed, possessing a large spine; the others are weak.

The thorax is small, when compared with the skull, but measured by any other standard is quite large and capacious. The vertebral spines are developed much as in the Carnivora, and the transverse processes and rib-tubercles are very conspicuous. The lumbar region is quite long and powerful, the vertebræ having massive centra, long and heavy spines, transverse processes, etc. These features are most marked in *H. horridus*; the smaller species have much less massive loins and evidently feebler muscles. The whole back, from the neck to the sacrum, is strongly axled upward, and its parts are articulated together with unusual flexibility and strength. The tail is rather short and slender, and has about the same relative length as in the raccoons.

The scapula is small and, though with many peculiarities (especially the shape of the acromion), has a shape not unlike that found in the dogs. The humerus is short and slender, and the fore-arm bones still more so, though the ulna is relatively little reduced and has, as in nearly all creodonts, a very prominent olecranon. The manus is small, short, and broad, with five spreading digits and short phalanges, terminated by heavy claws.

The pelvis is decidedly large, even when compared with the overgrown skull, and has an expanded, flattened ilium, more carnivorous than creodont in appearance. The femur considerably exceeds the humerus in length, but is light and slender and has nearly lost the third trochanter. The tibia is short, though much longer than the radius, and the fibula is stout, with expanded ends.

The pes is pentadactyl, and the gait was probably semiplantigrade, like that of many of the recent viverrines. The remarkable peculiarities of *Hyænodon* may, as Filhol has suggested, perhaps find their explanation in the aquatic habits of the animal.

The structure of the European species of this genus is not nearly so completely known as is that of the American. In dentition and skull structure the two groups of species are nearly identical, and probably the characters of the rest of the skeleton corresponded as closely. In two points, however, the European forms, so far as they are known, deviate from the American: (1) in the presence of an alisphenoid canal, and (2) in the formation of a scapho-lunar bone in the carpus by the coalescence of the scaphoid, lunar, and central, which in the American species remain permanently separate.

This is hardly the place to enter upon a discussion of the relationships and phylogenetic descent of *Hyænodon*. It may be mentioned, however, that the problem is much modified by the discovery of *Hyænodon* in the American Upper Eocene (Uinta beds), recently announced by Osborn and Wortman.

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III.—REVIEW OF THE EVIDENCE FOR THE ANIMAL NATURE OF EOZOÖN CANADENSE.

By Sir WILLIAM DAWSON, K.C.M.G., LL.D., F.R.S., etc.

I. HISTORICAL AND STRATIGRAPHICAL.

THE writer of these notes had hoped to have been able long ago to let the vexed questions respecting Eozoön repose in peace in so far as he was concerned, and he is now induced to offer a short summary of the evidence in the case only with the view of correcting some misapprehensions that seem to have arisen in regard to points well established, and which, independently of any question as to the nature of Eozoön, belong to the certain data of geology. These misapprehensions lead to the confounding of the structures originally discovered by Logan with things in no way related to them, and from which they had been clearly distinguished by my own original studies, and by those of Hunt, Carpenter, and Rupert Jones. New facts relating to pre-Cambrian life have also been coming to light from time to time, and many of these are connected, either directly or indirectly, with the evidence respecting Eozoön.

As early as 1858, Sir William Logan had begun to suspect that the Stromatoporoid forms collected from the great Laurentian limestones in different parts of Canada must be of organic origin, and he ventured to mention them as possibly of this nature at the meeting of the American Association in 1859, and in his General Report on the Geology of Canada in 1863. The evidence on which he relied was their occurrence only in the limestones, their similarity in form and general structure to the Stromatopora, or "Layer-Corals" of the Palæozoic, and the circumstance that, while the forms and structures seemed to be identical, they were mineralized