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I.—On two skulls of the Ornithosaurian Rhamphothynchus

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[SEVENTH SERIES.]

"..... per litora spargite muscum,
 Naiades, et circum vitreos considite fontes:
 Pollice virgineo teneros hic carpite flores:
 Floribus et pictum, diuæ, replete canistrum.
 At vos, o Nymphæ Craterides, ite sub undas;
 Itæ, recurvato variata corallia trunco
 Vellite muscosis e rupibus, et mihi conchas
 Ferte, Deæ pelagi, et pingui conchylia succo.
N. Parthenii Giannettusi, Ecl.

No. 49. JANUARY 1902.

1.—*On Two Skulls of the Ornithosaurian Rhamphorhynchus.* By A. SMITH WOODWARD, LL.D., F.R.S.

[Plate I.]

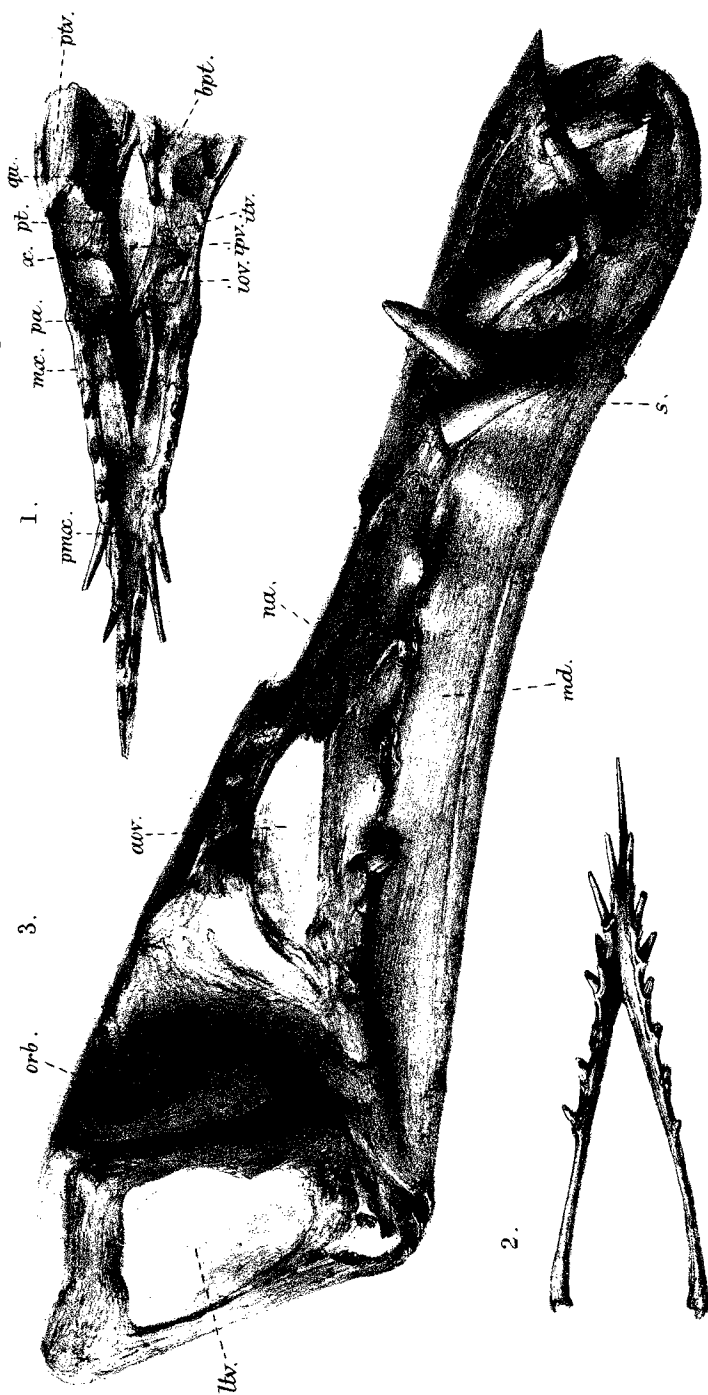
I. *Rhamphorhynchus Gemmingi*, Meyer.
 (Pl. I. figs. 1, 2.)

The palate of the Ornithosauria remains very imperfectly known. A new specimen of *Rhamphorhynchus Gemmingi* acquired by the British Museum from the Lithographic Stone of Bavaria is thus of considerable interest. It is a fragmentary skeleton preserved in the usual manner on a slab of fine-grained limestone, and among the scattered remains the skull is shown directly from beneath. The mandible is fortunately displaced, so that the palate is completely exposed, and the only imperfections in the latter result from flaking at the time when the block containing the fossil was split.

The skull (fig. 1) exhibits its elongated and attenuated form, with a slight production of the slender rostrum in advance of the foremost teeth. The premaxillæ (*pmx.*) are

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E. H. Michael del. et lith.

RHAMPHORHYNCHUS.

Mintern. Bros. imp.

shown to occupy more than half the total length of the skull, and their anterior half is much attenuated. They seem to be fused together in the median line, and their stout palatal plates are slightly divergent behind where they form the anterior border of the fossa into which the posterior nares open. The jagged suture between the premaxilla and maxilla (*mx.*) is distinct on each side of the fossil, while the palatal plate of the maxilla, doubtless followed behind by the palatine bone, lies in the same plane as the premaxillary roof of the mouth, and forms the lateral boundary of the posterior narial fossa. Crushing on the right and imperfection on the left side obscure the form of the palatine (*pa.*); but it is quite a small element and seems to be a little thickened at the rounded angle, where it abuts upon the pterygoid. Behind the palatine there is a small infraorbital vacuity (*iov.*), which is longer than broad. The pterygoids (*pt.*) are very slender bones, separated for the greater part of their length by a large interpterygoid vacuity (*ipv.*). For a considerable extent they are shown only in impression in the fossil. The hinder limit of the pterygoid element is not clear on either side, but it evidently expands into a thin vertical lamina overlapping the quadrate (*qu.*). In front of this it becomes a slender bar, expanding slightly outwards at its middle, where the infraorbital vacuity is separated by a small rod of bone from the rather larger infratemporal vacuity (*itv.*). This very small rod (*x*) is probably a transverse bone connecting the pterygoid with the hinder end of the maxilla. In front of this point the two pterygoids begin to converge forwards, first touching the palatines, and eventually meeting in the middle line as they bend upwards to the roof of the posterior narial fossa. They doubtless meet the vomers in front, but it seems impossible to remove enough matrix to expose the latter elements. At the back of the skull the small basicranial axis is scarcely seen; but a pair of long and slender basiptyergoid processes (*bpt.*) connect it with the pterygoids. The elongated quadrate (*qu.*) is inclined sharply forwards as usual, but its articulation for the mandible is broken away. The post-temporal vacuity (*ptv.*) between the quadrate and the quadratojugal is conspicuous. Teeth are confined to the margin of the jaw, where they are arranged in regular pairs. They are long, slender, smooth, and somewhat laterally compressed, with a minute pulp-cavity towards the base. They are very obliquely inserted in well-separated sockets, eight contained in each premaxilla, two in each maxilla.

The mandible (fig. 2) is remarkable for the slenderness of its anterior toothless beak, which is longer than that of the

upper jaw (unless the latter be broken and deceptive, which seems improbable). It bears only seven pairs of teeth, similar to those of the upper jaw.

The new specimen of *Rhamphorhynchus* thus shows that the palate in this genus is essentially reptilian in all respects, only modified by the great development of the premaxillary region and the small size of the brain-case. It agrees with the palate of the pterodactyl from the Whitby Lias named *Scaphognathus Purdoni**, so far as the latter can be compared. It also suggests that the so-called undivided posterior narial vacuity described by Marsh† and Williston‡ in the Cretaceous *Pteranodon* is really the fossa into which the actual and normal posterior nares will be found to open as soon as the pterygoids and vomers are completely known in that genus.

II. *Rhamphorhynchus longiceps*, sp. n. (Pl. I. fig. 3.)

The newly-prepared skull and mandible of a relatively large species of *Rhamphorhynchus* in the British Museum exhibit so many differences from the corresponding parts of *R. Gemmingi* and other known species of this genus that they seem worthy of special description. They are associated with a considerable part of the skeleton in a slab of Lithographic Stone from Eichstädt, Bavaria. The specimen was rightly referred to the genus *Rhamphorhynchus* by Lydekker in 1888§, but it was at the same time wrongly identified with the imperfectly known *Pterodactylus grandis* of Cuvier||, which seems to be a true *Pterodactylus* or an allied short-tailed genus¶.

The head is exposed from the right lateral aspect and is shown of the natural size in fig. 3. The facial region of the skull is seen to be low and much elongated, though its original profile is partly destroyed by crushing from above. The rostrum terminates in a sharp point, but its toothless

* E. T. Newton, "On the Skull, Brain, and Auditory Organ of a new Species of Pterosaurian (*Scaphognathus Purdoni*), from the Upper Lias near Whitby, Yorkshire," Phil. Trans. 1888 B, p. 504, pl. lxxvii. fig. 4.

† O. C. Marsh, "The Skull of *Pteranodon*," Amer. Journ. Sci. [3] vol. xxvii. (1884) p. 424, pl. xv. fig. 3.

‡ S. W. Williston, "On the Skull of *Ornithostoma*," Kansas Univ. Quart. vol. iv. (1896) p. 197, pl. i.

§ R. Lydekker, Catal. Foss. Rept. B. M. pt. i. (1888) p. 33 (B. M. no. 37002).

|| G. Cuvier, Ossem. Foss. ed. 2, vol. v. (1824) pt. ii. p. 382.

¶ K. A. von Zittel, Handb. Palæont. vol. iii. (1890) p. 792; H. G. Seeley, 'Dragons of the Air' (1901), p. 169.

portion is very short and deep. The external narial opening (*na.*) of each side is high on the face, perhaps dorsally placed. Its length is somewhat doubtful, but certainly less than half that of the snout in front of it. It is separated by a broad bar from the antorbital vacuity (*aov.*), which is well below but begins scarcely further back. This vacuity is also elongated and narrow, about three times as long as deep. Most of its posterior margin is broken away in the fossil, so that by accident it appears to be directly continuous with the orbit (*orb.*). The rock is traversed by a fracture across this cavity, but the bones do not seem to have been displaced. The orbit is very large, as usual, and widest above where it excavates the frontal region. Its maximum width does not much exceed its maximum depth. The length of the post-orbital region of the cranium is nearly, if not quite, equal to the maximum width of the orbit, and the lateral temporal vacuity (*ltv.*) is much larger than is usual in *Rhamphorhynchus*. This vacuity is bounded in front, above, and below by a rather broad bar; but the posterior bar is narrower. The superior temporal vacuity, though incompletely exposed, is seen to be correspondingly large. The oral border of the skull exhibits a series of well-separated protuberances for the insertion of nine teeth, and then curves slightly downwards to the mandibular articulation. The mandible (*md.*) is very slender and is exposed sufficiently from beneath to show the extent of the symphysis. The latter (*s.*) occupies one quarter of the total length of the jaw, is very much laterally compressed, and curves gently upwards in a toothless beak. The large size of the tooth-sockets in the dentary imparts a wavy appearance to the bone of the oral border of the mandible. The teeth of both jaws are large, smooth, and laterally compressed, and very obliquely inserted in the ordinary manner. Those of the two jaws alternate and interlock, the foremost pair being in the upper jaw. Only a few are preserved, but they are shown to vary in size, and the two hindmost teeth—presumably those of the maxilla—are relatively small. There are many slight fissures in the bones, but none can be definitely recognized as sutures.

This head is readily distinguished from that of *Rhamphorhynchus Gemmingeri* and the three other satisfactorily known species of *Rhamphorhynchus* by the form of the beak and the elongate proportions of the cranial region. It therefore seems to indicate a distinct species of this genus, which is larger than any hitherto discovered, and may be named *Rnamphorhynchus longiceps*, in allusion to the most remarkable feature

of its cranium. The bones associated with the head comprise some of the cervical vertebræ, the greater part of the tail, one scapula and coracoid, the greater part of one wing, remains of the other wing, and one hind foot. The scapula and coracoid are fused together. The humerus, which is imperfect distally, cannot have exceeded 0.075 m. in length, while (as already noted by Lydekker) the respective lengths of the second, third, and fourth wing-phalanges are 0.165 m., 0.140 m., and 0.136 m. respectively. The hind foot measures 0.070 m. in length, and, judging from the slenderness of its toes, the hind limb must have been as small and weak as in the other species of *Rhamphorhynchus*. Though equally long, the toes are only about half as stout as those of another portion of hind limb in the British Museum, which was also provisionally ascribed to "*Rhamphorhynchus grandis*" by Lydekker (*loc. cit.* p. 33, no. 42737).

EXPLANATION OF PLATE I.

Fig. 1. *Rhamphorhynchus Gemmügi*, Meyer; palatal aspect of skull, nat. size.—Lower Kimmeridgian (Lithographic Stone); Solenhofen, Bavaria. *bpt.*, basipterygoid processes; *iov.*, infraorbital vacuity; *ipv.*, interpterygoid vacuity; *itv.*, infratemporal vacuity; *mx.*, maxilla; *pa.*, palatine; *pmx.*, premaxilla; *pt.*, pterygoid; *ptv.*, posterotemporal vacuity; *qu.*, quadrate; *x.*, supposed transverse bone. (Brit. Mus. no. R. 2786.)

Fig. 2. Ditto; mandible of same specimen, oral aspect, nat. size.

Fig. 3. *Rhamphorhynchus longiceps*, sp. n.; skull and mandible, right lateral aspect, nat. size.—Lower Kimmeridgian (Lithographic Stone); Eichstädt, Bavaria. *aov.*, antorbital vacuity; *itv.*, lateral temporal vacuity; *md.*, mandible; *na.*, external nares; *orb.*, orbit; *s.*, hinder end of mandibular symphysis. (Brit. Mus. no. 37002.)

II.—A Revision of the Genera of the ARANEÆ or Spiders with reference to their Type Species. By F. PICKARD CAMBRIDGE, B.A.

THE following notes contain some important conclusions with regard to the signification and synonymy of various genera and species.

Many generic names which have been treated by authors as either unsuitable or superfluous, or both, will have to be restored, at all events to the extent of ascertaining what is their type species. Such, for instance, are those published by Simon in 1864 and those founded by Templeton and published by Blackwall in the same year. It is possible that