On Rhamphocephalus prestwichi, Seeley, an ornithosaurian from the Stonesfield slate of Kineton / by H.G. Seeley.

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On Rhamphocephalus Prestwichi, *Seeley, an* Ornithosaurian *from the* Stonesfield Slate *of* Kineton.

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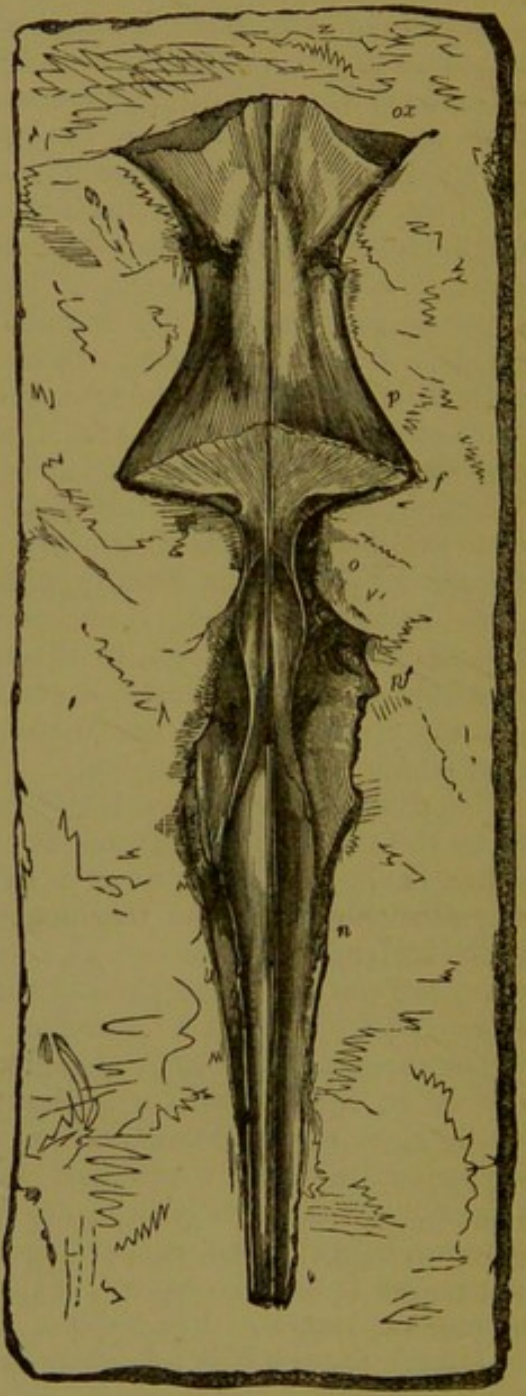
Prof. Prestwich has obtained from the Stonesfield slate of Kineton, near Stow-on-the-Wold, a small slab which makes a valuable contribution to our knowledge of the structure of the skull in Ornithosaurs from the British Lower Secondary rocks. This specimen is little more than a cast from the upper surface of the cranium, not unlike in general character to the form originally described by Goldfuss as *Ornithocephalus Münsteri*. The skull itself was unfortunately in the corresponding slab, which has not been preserved; but a few slight fragments of bone remain sufficient to show the dense osseous tissue which is usual in Pterodactyles. The specimen yields a clear impression, which displays the proportions of the cranial bones, and the sutures between them, in a way so distinct as to enable me to state that this animal was certainly different generically from every other type which has hitherto been described. Whether, however, it pertained to a distinct species from those indicated by the fossils from Stonesfield which have already been figured by Professors Huxley and Owen is a matter upon which some doubt may be felt; but bearing in mind the relatively large size of the jaws and teeth in those fossils, I am strongly of opinion that this specimen indicates a smaller kind of animal, in which the dentary apparatus was less developed, and I therefore venture to suggest for it a specific name.

The remarkable feature which leads me to consider this specimen to be the type of a new genus is its singular analogy to the Crocodilian skull, which has never been displayed to the same degree in any other Ornithosaur. The fragment shows the parietal, frontal, prefrontal, and nasal bones; all these are arranged on the Crocodilian plan, and yet the proportions of the parietal and frontal regions are in no respect those of a Crocodile. All the bones are smooth on the upper surface. The parietal region is long, flattened above, slightly convex in length, with a moderate median depression posteriorly, where there are some longitudinal striations, as though the end of a supraoccipital here overlapped the parietal bone; but the bone terminates transversely in a sharp clean posterior edge, which is sinuous, being convex in the middle and concave towards the sides, where the bone widens out, giving off lateral wings towards the squamosal region. The median suture of the parietal bones can be traced, though it is not quite in the middle line. The bones become constricted from side to side, the constriction being greatest behind the middle, where they appear to be naturally notched on each side. I do not see the signification of these notches, unless they indicate the anterior termination of squamosal bones which

overlapped the posterior portion of the parietals and curved with them backward and outward. There is on the lateral portions of the parietal a slight impression of the bone, which also suggests to me this interpretation. The parietal (*p*) terminates anteriorly in a transverse suture in which it joins the frontal bones (*f*); this suture is nearly straight, being curved slightly backward. The length of the parietal bone is exactly 3 centimetres; its posterior width, as preserved (which is less than the real width), is about 25 millimetres; the greatest constriction of the bone from side to side just in front of the notches appears to be about 8 millimetres or rather more, while the anterior width of the bones at their union with the frontal bones is 23 millimetres.

Cast of upper surface of Skull of Rhamphocephalus Prestwichi, *natural size.*



ox, articular surface for occipital bone *p*, parietal; *f*, frontal; *o*, orbit; *pf*, prefrontal; *n*, nasal.

There is a moderate transverse depression on the skull where the parietal bones join the frontal. Unfortunately there is no indication of the character of this long cerebral region, though it is evident that there was a concavity below the slender squamosal arch. The parietal appears where it joined the frontal bone to have given attachment to the postfrontal, at the back of the orbit, in the usual way; but, apparently from the sharp downward curve of the postfrontal bone, no trace of it is preserved. The width of its union with the roof-bones of the skull was about 5 millimetres. The frontal bones measure in length 18 millimetres, are greatly constricted in the orbital region and cupped with almost semicircular borders for the orbits. The width of the interorbital part of the bones is 5 millimetres, and the extent of the bone posterior to the orbit at its outer border is 4 mil-

limetres. The bone widens in front a little, but the front of the orbit is formed, as usual, by the prefrontal bone (*pf*). The median suture between the frontals is clear. There is a deep concavity between the orbits in front, which is formed by the margins of the frontal bone being elevated so as to form an upper orbital border, which recalls the condition in Crocodiles. There are also elevated ridges behind the orbits. The little that is seen of the inner orbital border is smooth, vertical, and concave in length. The orbits appear to have been oblique and to have looked upward and forward. The length of that on the left side is about 16 millimetres. The frontal bone (*f*) terminates anteriorly in a forked suture, which receives the ends of the nasal bones (*n*) in the middle, and the prefrontal bones (*pf*) on the oblique external margins. The prefrontal bones, however, are not very distinct from the nasal bones, though the suture appears to run on the inner side of sharp ridges which form their inner borders. But of this I cannot speak positively, as the anterior termination of the suture cannot be distinguished.

These prefrontal bones (*pf*), or prefrontal elements of the nasal, are channelled in length; they reach backward to the orbit and are about 2 centimetres long. The exact width of the specimen in front of the orbit does not represent the width of the bones during life. As preserved, the width is not more than 16 millimetres. During life the width may have been $2\frac{1}{2}$ centimetres. The nasal bones, as preserved, are 56 millimetres long. Where they join the frontal elements they are about 4 millimetres wide. They attain their greatest width where the slightly diverging prefrontal ridges terminate on their sides, and are there about 9 millimetres wide at rather more than a centimetre from the frontal suture. The longitudinal median suture between the nasal bones is well marked and wider than in the frontal region; yet the nasal bones form an elevated median keel slightly convex in length and defined by a well-marked channel on each side. The bones converge slowly anteriorly and may have extended a little further than is indicated by the specimen, if they terminated in a point. The circumstance that the maxillary bones are not preserved is strong presumptive evidence that the maxillaries were vertical, or at least formed a sharp angle with the roof of the skull. It is perhaps remarkable that no portion of the nasal bones can be identified as having entered into the external nares, though in many Pterodactyles, such as *Cycnorhamphus suevicus*, there is no lateral indentation of the bones in the nasal region. If we were to regard these nasal bones as having extended to within an inch of the extremity of the skull the total length of the head would not have been more than $5\frac{1}{2}$ inches, and the toothed portion of jaw would probably not have exceeded 2 inches. The teeth I should infer to have been of about the size of those of *Cycnorhamphus suevicus* of Quenstedt, which stood about 15 inches high.

The characters which especially distinguish this animal are, first, the remarkable length of the roof of the skull, posterior to the orbits (*o*), which amounts to about 38 millimetres; so that if the orbits bounded the anterior part of the cerebral region, as is usual in Pterodactyles,

there is here evidence of a cerebral elongation to which no other Pterodactyle even approximates; and it is difficult to believe that a brain-cavity so long and narrow, as shown by the median constriction, could have contained a brain of Avian plan such as is evidenced by almost every specimen from Solenhofen in which an internal mould of this region is preserved, as may be seen in the museums at Munich, Heidelberg, and Haarlem.

Secondly, I do not remember in any other Pterodactyle any thing like so great a constriction of the frontal region between the orbits; thirdly, the sutures between the bones are better marked than in any other Pterodactyle which I have examined; and, fourthly, the plan of structure of the roof-bones of this skull is so entirely Reptilian as to suggest the existence of Ornithosaurian animals of lower grade than any which I have hitherto seen. The slender material does not, however, justify speculation; and it is quite possible that this may prove to be a genus closely allied to some of those animals for which the name *Rhamphorhynchus* has been appropriated; and I shall be quite prepared to find that all the Ornithosaurians from Stonesfield belong to this or an allied genus which had *Rhamphorhynchus* for its nearest ally, and which resembled that genus in the characters of the postorbital arches.

There are indications, however, in the Stonesfield fossils of important differences from the German types now included in *Rhamphorhynchus* in the characters of the mandible and dentition, and the relatively large size of the hind limbs, the femur being, in one of these animals, 94 millimetres long, while the tibia has a length of 90 millimetres. This is far beyond the size of any species of *Rhamphorhynchus*, and, indeed, is only to be paralleled in *Dimorphodon* and the larger short-tailed German Pterodactyles, which have long hind legs and form the genus *Cycnorhamphus*. The wing-phalanges in these Stonesfield animals are, however, unusually long, longer than in any German species except perhaps *Pterodactylus vulturinus*, which is imperfectly known. The first phalange of the wing-finger of the largest Stonesfield specimen is nearly 5 inches long, while the second and third phalanges measure about $7\frac{3}{4}$ inches each, while the fourth is $6\frac{1}{2}$ inches long. But the Oxford specimens appear to indicate, from the different proportions of cervical vertebræ, lower jaws, and bones of the fore and hind limb, two or three well-defined species. To these may be added another from the Great Oolitic of Sarsden, of which the mandible has already been figured in this Journal by Prof. Huxley*. Although in the latter specimen nearly the whole skeleton appears to have occurred in the same spot, no trace of a long tail of the *Rhamphorhynchus* type has been met with. Among the Stonesfield specimens the sacrum consists of at least five vertebræ, and there are cervical and dorsal vertebræ, including the atlas, which apparently is not ankylosed to the axis, but no trace of a tail. These facts, taken in conjunction with the relatively large size of the hind limb and sacrum and the cranial differences, will, I believe, justify me in instituting a new genus for this cranium and the other Stonesfield Ornithosaurs.

* Quart. Journ. Geol. Soc. vol. xv. p. 658