



### The Pterosaur Database

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**Seeley H. G., 1865, On the literature of English Pterodactyles, Annals and Magazine of Natural History, pp.1-5 (February 1865).**

This paper was written as an appraisal of the recent literature of the time, for the scientific community. It assumes that the reader has access to copies of the papers it refers to, as the scientists of the day would have.

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On  
The Literature  
of  
English Pterodactyles.<sup>1</sup>  
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The earliest remains of Pterodactyles yet figured are from the Lias. Professors Buckland, Owen, and Huxley have described the *Dimorphodon*. I therefore approach the subject with Diffidence. But my task now is not to describe these remains, but to examine the nature of the work bestowed upon them.

Prof. Buckland's is the only description of the specimen figured in pl. 27, Geol. Trans. Ser. 2, vol. iii.; and the remarks of Prof. Owen (Brit. Ass. 1858) and Prof. Huxley (Quart. Journ. Geol. Soc. 1859) both refer chiefly to a second specimen in the British Museum.

Dr. Buckland's account of the animal is too meagre to be of much service, and so inaccurate that it is much to be regretted that the eminent anatomists who have written on Pterodactyles have not done justice to remains scarcely less interesting than the *Archaeopteryx*.

I will go *seriatim* through such parts of Prof. Buckland's description as need comment.

Neck (marked *a*). The impression of this part of the skeleton, as given in the plate, tapers. The vertebrae are very long, and so slender as to be no thicker than an ordinary phalange, and not half the diameter of the dorsal vertebrae. It is moreover bordered on each side with a band of fine bony tendons. Now, in all the subclass Sauromia known to me, whether of the section *Pterosauria* or *Rhamphosauria*, the neck vertebrae are not only longer than those of the back, but also, instead of being thinner, they are thicker. Such a neck could not have supported the large head which the *Dimorphodon* possessed. Moreover the broad belt of bony supports on each side of the vertebrae is eminently characteristic of the long stiff tails of the *Rhamphosauria*, to which the genus *Dimorphodon* belongs; and if these supposed neck-vertebrae are compared with the tail-vertebrae of *Rhamphorhynchus*, they correspond exactly. Therefore what has been described as the neck is really the tail.

Vertebrae. That at C, described as showing a "convex articulating surface, as in the Crocodile," is so broken that nothing can be made of it. Buckland's figure makes it *concave*. Now, as Prof. Owen has everywhere<sup>2</sup> described the Sauromia as having procoelian vertebrae, I will state what may be seen in *Dimorphodon*. The anterior end of a vertebra is distinguished by the facets of the zygapophyses looking *upward* or *inward*, while the posterior zygapophyses look *downward* or *outward*.

The vertebra marked *b'* is, from its neural arch, clearly a dorsal. It shows the articular surface of the centrum, which is concave, though not deeply cupped; and the zygapophyses look downward. It is therefore *concave behind*. The dorsal vertebra at *d* is also concave behind. In the vertebra marked *a'*, which in proportions is like a dorsal, though it is in juxtaposition with some of the elongated caudals, the articular surface is concave, and the zygapophyses look up; therefore it is *concave in front*. The vertebra at *b* has a rounded centrum and the length of a dorsal, and is clearly *concave at both ends*. Thus the dorsal vertebrae of *Dimorphodon* are not procoelian, but certainly cupped behind, and probably biconcave.

The vertebrae at K Dr. Buckland called the tail. The centra are traversed by two basal ridges and a ridge on each side below the neural arch. They want the elevated neural spines which might be expected in cervicals. Nor have they the length or the large size common in cervicals of *Pterodactylus*, though *Rhamphorhynchus Gemmingi* (sic) has cervicals with similar depressed neural arches, and *P. brevirostris* has cervical vertebrae with centra relatively nearly as short. They are associated with the proximal end of the femur and the os innominatum. The depressed neural arches with elongated zygapophyses are like the hinder caudal of *Cyclodus*. But these are unlike any caudal vertebrae. Besides, the caudals have been described, as have the dorsals. Therefore these bones are either cervical or sacral. Long-necked animals like Celonians and birds have similar cervical vertebrae. The ridges remind one of the ridges on the neck-vertebrae of the Goosander and the Duck, and still more of those in the cervicals of wading-birds like the Heron, which also has four ridges, and nearly resembled *Dimorphodon* in the form of the neural arches. Therefore, as the bones are unlike any sacral vertebrae known to me, they are regarded as probably cervical. Each of them is clearly seen to have cup-and-ball articulations. The cup is *behind*, and the ball in *front*.

The scapular arch has been well described by Professors Huxley and Owen.

The mass marked 18, and called the sternum, is very much crushed, and I can give no account of it. The fore-arm is noticed thus:- "2. Fore-arm; showing no trace of ulna." I find ulna and radius both there: they are together, and united throughout their length, but easily traced by a deep groove. At the distal end there is a singular little splint bone attached; and, passing over the first carpal, there are similar bones in the *P. suevicus*. The distal end of the humerus appears to have three condyles.

Prof. Buckland has "four carpals," marked *f, g, h, i*. The first three are clearly carpals; but *i* is merely the distal end of the wing-metacarpal, which is overlaid by 3", a bone called the "wing-finger metacarpal." This is another important error; for it caused the Doctor to overlook an important generic character. The bone in question is the proximal phalange. And hence the plate shows that there were in the wing-finger at least four phalanges, and not three as represented in the restoration. In the second specimen in the British Museum, where the bones are more *in situ*, Prof. Owen has recognised the wing-metacarpal, which is no longer than the other metacarpals, but without remarking that, if he and Buckland were both right, their specimens must belong to different genera.

*Fibula*. It is remarked that "the left tibia is compressed so as to give a false appearance of a fibula." It, however, seems clear to me that the fibula is ankylosed at its proximal end with the tibia (*o'*), that after half an inch it becomes free, and continues so for more than an inch, when it again becomes ankylosed, and gradually thins away. The fibula is a slender bone, and exactly corresponds with the fibula in birds.

As we are indebted to the untiring industry of Prof. Owen for nearly all that has been written on Cretaceous Pterodactyls, it would be impossible to pass over labours which have tended so greatly to illustrate the osteology of these animals. I will therefore add a few elucidatory notes.

In a memoir in the 'Transactions of the Royal Society' for 1859, p. 162, Prof. Owen says, "From observations made on species of Pterosauria, extending from the period of the Lias (as exemplified by *Dimorphodon macronyx*) to the Upper Greensand (as exemplified by *Pterodactylus Sedgwickii* and *P. Fittoni*), I am now able to state that, with respect to the cervical and dorso-lumbar vertebrae, the terminal surface of the vertebral bodies are simply concave anteriorly, convex posteriorly, and that they consequently manifest the earliest instance of the procoelian type." And again, at the close of the memoir, it is asserted that the cervical vertebrae of *Dimorphodon* present the same type of structure (p. 168) as those

from the Upper Greensand. If my determination by the zygapophyses is correct, this is certainly erroneous; for in *Dimorphodon* the cervicals are opisthocoelian, while the dorsals are clearly concave behind, and appear to be biconcave. In the 'Manual of Palaeontology,' p. 273, 2nd edition, it is asserted that there is no evidence of *Dimorphodon macronyx* having had a long tail. But, as I have shown that the tail of this genus is like that of Rhamphosauria, it is evident that Prof. Owen has not recognized either the tail or the neck<sup>3</sup>. And, on the authority of this assumption that the vertebral character of the Greensand pterodactyls were constant throughout the class<sup>4</sup>, the following note is added to the paper in the 'Phil. Trans.':- "Von Meyer was led to believe, from the crushed *P. Gemmingi*, that both articular surfaces of the bodies of cervicals were concave, and that the hinder surface of a dorsal was not convex; but the error was due to the state of the specimen." I fail to find any evidence of error.

It is always stated (as, for instance, in the 'Palaeontology,' p. 272) that the hind limbs bespeak a creature unable to stand or walk like a bird. Pterodactyles certainly stood differently from most birds; for the metatarsals appear to have been placed on the ground, as in the Penguin; but in the figure of *Dimorphodon*<sup>5</sup> the hind limbs will be seen to be quite as long, and nearly as stout, as the fore limbs, while the acetabulum for the femur in the compact pelvis is much larger than the corresponding cavity in the scapular arch for the humerus.

In Prof. Owen's paper on the supposed bird-bones from the Wealden (Quart. Journ. Geol. Soc. p. 100) it is stated that Pterodactyle bones were filled with a light fluid marrow. And in the 'Palaeontographical Monograph' (1851) is a statement repeated in the 'Palaeontology' (p. 272), that the Pterodactyles had leathern wings. I have failed to find any anatomical evidence for these statements.

In Dixon's 'Geology of Sussex' (1850) the Reptiles and Pterodactyles were described by Prof. Owen. Fig. 2, pl. 39, appears to me to be the first phalange. Fig. 12, in the same plate, is the distal end of the metacarpal of the wing-finger.

In the Palaeontographical Society's Monograph for 1851, pl. 30, figs. 1, 2, 3 represent a magnificent Pterosaurian bone in the collection of Toulmin Smith, Esq. Prof. Owen says, "It is either one of the bones of the fore-arm, or more probably the first or second phalange of the wing-finger."

The reasoning by which I determine the fossil is this:- It has two unequal, concave articular facets; these evidently have worked on convex condyles. Between the facets is a large central concavity, which indicates a corresponding central concavity behind the condyles in the corresponding bone. Therefore, as the distal end of the humerus is the only surface which presents these characters, the fossil is evidently an *ulna*.

Pl. 30. fig. 5. The supposed ulna and radius need examination.

Pl. 24. fig. 1 is described as lower half of humerus, with part of ulna or radius. There is no humerus here: the bones are ulna and radius.

Pl. 24. fig. 2 is a first phalange; pl. 32. fig. 2 is the same. Pl. 24. fig. 3 is (?) the proximal end of a wing-metacarpal. Pl. 32. fig. 3 is a portion of the proximal end of a wing-metacarpal, and not a femur. Pl. 32. figs 6 & 7 is described as the proximal end of a humerus; but appears to me to be the distal end of an ulna.

Pl. 32. figs 4 & 5 is a wing-metacarpal.

Any remarks in detail on Cambridge specimens will find their place in my monograph of these animals.

To Prof. Owen's second monograph (1859) I have only to add that the (?) frontal in pl. 4 figs. 6, 7, 8 is not a frontal, but a bone from the base of the skull – seemingly the vomer. Pl. 4. figs. 1, 2, 3, called "a long bone of the wing," is the distal end of a humerus. Pl. 4, figs 4 & 5, is certainly not a "wing-metacarpal," and is unlike any bone I know.

In the third monograph (p. 6) the basi-occipital is described and figured upside down, the inside of the skull being regarded as the neural surface. But the only other error of determination is that the bone regarded as a middle caudal of a Pterodactyle (pl. 2. figs. 15, 16) is no part of a Pterodactyle.

#### Footnotes

1. Extract from a paper read before the Cambridge Philosophical Society, March 7 and May 2 and 16, 1864.
2. Brit Assoc. 1859; Phil Trans. 1859; Palaeontographica 1859-60; Palaeontology, 1862, &c.
3. See 1st Supplement to Cret. Rep. p. 7; and Brit. Assoc. Rep. 1858.
4. See 'Palaeontology.' p. 270.
5. Trans. Geol. Soc. ser. 2, vol. iii. p. 27.