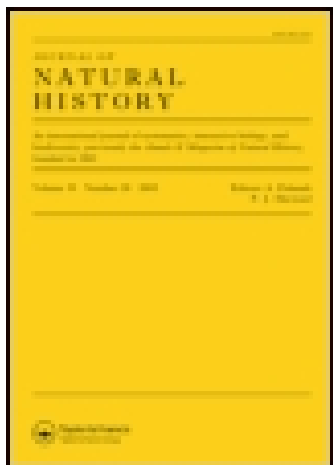


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XXXI.—On the muscular impressions of some species of Carboniferous and Jurassic Nautiloids compared with those of the recent Nautilus

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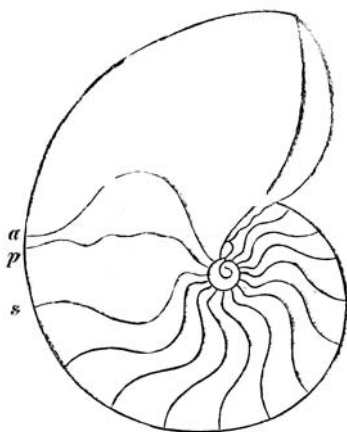
XXXI.—On the Muscular Impressions of some Species of Carboniferous and Jurassic Nautiloids compared with those of the recent Nautilus. By ARTHUR H. FOORD, F.G.S., and G. C. CRICK, Assoc. R.S.M., F.G.S., of the British Museum (Natural History).

IN the 'Geological Magazine' for November 1889 we described and figured the impressions of the shell-muscles of *Caelonutilus cariniferus*, J. de C. Sowerby, sp.*; from the Carboniferous Limestone of Ireland. We have since had the good fortune to meet with other species in the British Museum Collection, both of Carboniferous and Jurassic Nautiloids, in which similar impressions are more or less completely preserved.

In the figures *a* indicates the anterior boundary of the muscular impression, *p* the posterior, and *s* the last-formed septum.

The accompanying figure (fig. 1) † of a cast ‡ of the interior of the shell of a recent Nautilus (*N. pompilius*) is

Fig. 1.



here introduced for comparison with the fossil forms to be described below. Upon the side of the body-chamber is seen the impression of the ear-shaped shell-muscle, together with part of the "annulus" or band that connects it with

* Min. Conch. vol. v. 1825, p. 130, pl. cccclxxxii. fig. 3 (excl. fig. 4).

† Figs. 1-4 inclusive were all drawn on a reduced scale with the camera from the original specimens.

‡ To obtain the cast, the shell having been longitudinally sectioned, one half was filled with paraffin and then immersed in dilute hydrochloric acid until the shell was completely dissolved.

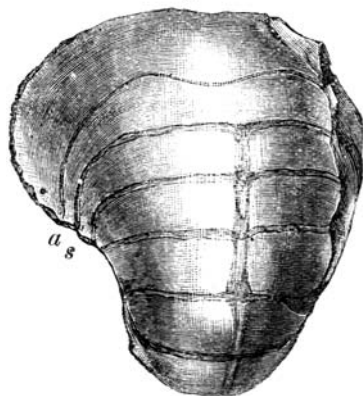
the corresponding impression on the other side*. Both in recent and fossil species the upper or anterior boundary of the impression (*a*) is much more distinctly marked than the lower or posterior (*p*), and accordingly the latter, as would naturally be expected, is rarely preserved in fossil forms. On the inner surface of the shell the anterior boundary of the impression is marked by a very fine sharp ridge, which therefore in the cast appears as a distinct groove. The impression of the annulus is not quite so distinctly marked.

(a) *Carboniferous Species.*

Solenocheilus latiseptatus, de Koninck, sp.†

Fig. 2 represents a natural cast ($\frac{1}{3}$ nat. size) of *Solenocheilus latiseptatus* from the Cement-stone of Carboniferous age of the Arden Quarries, Nitshill, near Glasgow (B.M. No. c. 2549 *b*). Only the anterior boundary (*a*) of the mus-

Fig. 2.



cular impression is preserved, and that in the shape of a groove; but it shows that in this highly inflated form, with an evenly rounded periphery, the annulus connecting the two muscles of attachment was very short on the ventral side, so that the muscles were rather more ventral than lateral; whereas in those species having a more or less flattened periphery, e. g. *N. pompilius*, *N. polygonalis*, &c., the reverse is the case, the annulus being much longer on the ventral side.

* The appearance of the shell-muscle and annulus as seen on the body of the *Nautilus*, with which the impression here figured closely agrees, is admirably figured in Sir Richard Owen's 'Memoir on the Pearly Nautilus,' 1832, plate 1.

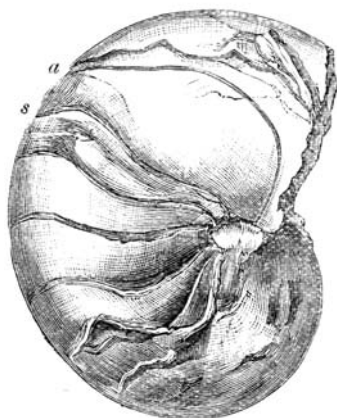
† 'Faune du Calcaire Carbonifère de la Belgique' (Ann. du Mus. Roy. d'Hist. Nat. de Belgique, tom. ii.), 1878, p. 110, pl. xxii. figs. 1, 2, 3.

(b) *Jurassic Species.*

Nautilus, sp. nov.

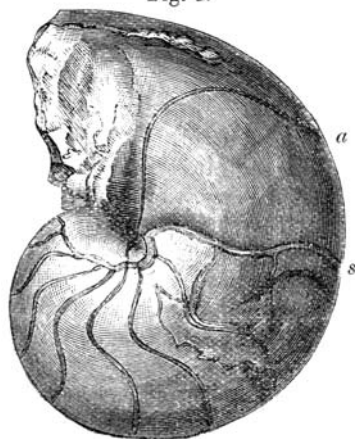
Fig. 3 illustrates ($\frac{1}{3}$ nat. size) a specimen (B.M. no. 69767) of a new species of *Nautilus* from the Inferior Oolite of Sherborne, in Dorsetshire. On the side of the specimen that is

Fig. 3.



figured the anterior boundary of the muscular impression can be traced as a groove from the umbilicus with but slight interruption to the periphery. Upon the opposite side, which is denuded of the shell and much eroded, only traces of the impression can be made out.

Fig. 4.



Nautilus polygonalis, J. de C. Sowerby *.

Fig. 4 represents ($\frac{1}{3}$ nat. size) a specimen of *Nautilus*

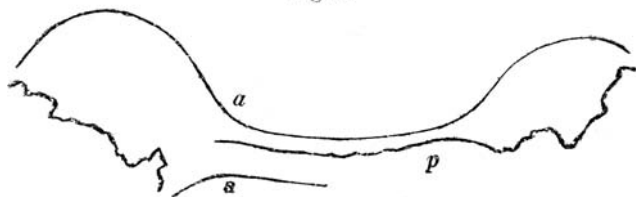
* Min. Conch. vol. vi. 1826, p. 56, pl. dxxx.

polygonalis (B.M. no. c. 2847) from the Inferior Oolite; the locality is not recorded. It is a longitudinal section of a shell and shows the course of the anterior boundary (*a*) of the muscular impression from the umbilicus to the periphery. Not only does this muscular impression greatly resemble that of the recent *Nautilus* (*N. pompilius*), but the curvatures of the sutures are also nearly identical, as may be seen by comparing them with those of fig. 1.

Nautilus obesus?, J. Sowerby *.

The only example of this species known to us which shows any trace of the muscular impression is a cast of a large, crushed, and much broken body-chamber from the Ironstone (Inferior Oolite) of Duston, Northamptonshire (B.M. no. 82328 *b*). This measures 14 inches along the curve of the periphery, the last-formed septum being $4\frac{3}{4}$ inches wide, and the width of the aperture $9\frac{1}{2}$ inches. Fig. 5 has

Fig. 5.



been reduced with the camera from a tracing of the actual impression: *a* indicates the anterior and *p* the posterior boundary; *s* indicates a portion of the last-formed septum. The irregular line on either side of the figure represents merely the broken edge of the umbilicus. Although the specimen is so badly preserved, not only can the anterior boundary of the muscular impressions and annulus be made out, but a portion also of the posterior boundary. On one side of the body-chamber several lines close to and concentric with the anterior boundary of the impression indicate former points of attachment of the anterior edge of the shell-muscle, and may be compared with similar lines to be observed in the shell of the recent *Nautilus* †.

Nautilus clausus, d'Orbigny ‡.

Fig. 6 was traced from a young specimen (2 inches in

* *Ibid.* vol. ii. 1816, p. 51, pl. cxxiv.

† See Geol. Mag. dec. iii. vol. vi. p. 495 (Nov. 1889), fig. E.

‡ 'Paléontologie Française, Terr. Jurassiques,' tom. i. 1842, p. 158, pl. xxxiii.

diameter) of this species from the Inferior Oolite of Caen, Normandy (B.M. no. 37024). The anterior boundary (*a*) of the impression can be distinctly followed from the umbili-

Fig. 6.



cus on the one side across the periphery to the umbilicus on the other side; but no trace exists of the posterior boundary.

The above figures (3-6) show how closely the Jurassic species of *Nautilus* approximate, as regards their muscular attachment, to the recent *Nautilus*; and this analogy may be carried still further back in geological time judging by the figure of a Triassic species (*N. salinarius*) given by Mojsisovics*, in which a considerable portion of the anterior boundary of the shell-muscle is preserved.

We are indebted to the kindness of Dr. H. Woodward, F.R.S., for the use of the woodcuts illustrating this paper.

XXXII.—*Description of a new Papilio from the West Coast of Africa.* By H. GROSE SMITH.

Pupilio harpagon.

Male.—*Upperside.* Both wings blackish brown, with brownish-white spots and bands, as in *P. ucalegon*, Hew., but on the anterior wings the spot towards the end of the cell, and the band, below the median nervure, is broader, and in the middle of the cell is an indistinct brownish-white spot. On posterior wings the band is broader and extends externally as far as the end of the cell.

Underside. Anterior wings as on the upperside. Posterior wings with an orange-coloured spot at the base inside the precostal nervure and another beyond it divided by the costal nervure, followed by three large, indistinct, black spots; a short indistinct streak of orange colour below the median nervure at its base.

Expanse of wings $3\frac{1}{4}$ inches.

Hab. Gaboon.

Very near to *P. ucalegon*, but blacker, with wider bands, and otherwise differing as above described.

In the collections of Mr. Crowley and H. Grose Smith.

* "Die Cephalopoden der Mediterranen Trias-Provinz" (Abh. d. k. k. geol. Reichsanst. Band x.), 1882, pl. xci. fig. 3 a.