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ORIGINAL ARTICLES.

I.—ON AN EXAMPLE OF *ACANTHOTEUTHIS SPECIOSA*, MÜNSTER, FROM
THE LITHOGRAPHIC STONE, EICHSTÄDT, BAVARIA.

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(PLATE I.)

THE genus *Acanthoteuthis* was founded by R. Wagner¹ and G. Münster upon small hooklets, sometimes isolated, sometimes associated with more or less complete remains of the animal, which are found in the Lithographic Stone of Bavaria. Münster characterized three species chiefly upon the form of these hooklets, viz., *A. speciosa*, *A. Férussacii*, and *A. Lichtensteini*, and noticed the existence of a fourth. Subsequently Münster² referred to this genus also a number of forms based principally upon the shape of the body and upon the form of the internal shell, but most of these were afterwards separated by A. Wagner³ as a new genus (*Plesioteuthis*). The genus *Acanthoteuthis* is therefore restricted to such forms as Münster described chiefly upon the form of the hooks. In two specimens of *A. speciosa* Münster says the mantle is preserved, and in it "the broad sword-like pen, devoid of any distinct ridges, is visible" (op. cit., Heft i, p. 94); and, in both of these, "hooks are to be seen near the upper or cephalic end, perfectly similar to those figured in plate ix"; but, writing at a later date (op. cit., Heft vii, p. 55), he says he is not certain what kind of mantle or pen might have belonged to this species. Münster's type and only specimen of *A. Férussacii* exhibits an elongated mantle, rather large head, and short arms (each provided with two rows of hooklets), but Münster says he had no knowledge of the pen of this species. The specimen described below is referred to Münster's *A. speciosa* on account of the shape of the hooklets of its arms.

In his "Handbuch der Palaeontologie" (vol. ii, p. 520, fig. 714), Prof. Dr. K. A. v. Zittel figures an example of *A. speciosa* from the Lithographic Stone of Eichstädt, Bavaria, in which the arms, each

¹ Münster submitted the specimens to R. Wagner, and the letter in which the latter suggested the generic name *Acanthoteuthis* is published by Münster in his "Beiträge zur Petrefacten-kunde," Heft i, 1839, p. 94.

² "Beiträge zur Petrefacten-kunde," Heft v, 1842, p. 97; and *ibid.*, Heft vii, 1846, p. 55 et seq.

³ "Die fossilen Ueberreste von nackten Dintenfischen aus dem Lithographischen Schiefer und dem Lias des süddeutschen Juragebirges": Abhandl. d. k. Akad. d. Wissensch. Berlin, math.-phys. Cl., vol. viii, p. 784.

bearing two rows of hooks, are attached to an elongated irregularly-shaped body; and at a later date, in his "Grundzüge der Palaeontologie" (p. 443), Professor Zittel also refers to this species the phragmocone and pro-ostacum which he had previously ("Handb. d. Palaeont.," pp. 510–1) assigned to a distinct genus (*Ostracoteuthis*). He states, moreover, that "in the Lithographic Stone of Eichstädt a slab has been lately found which displays the shell and the impression of the animal in association. In the body is an ink-bag; the head is surrounded by ten arms, each furnished with two rows of horny hooks."

Since remains of the animal in association with the arms are so seldom found, it seems desirable to place on record a specimen which has recently been acquired by the British Museum from the Lithographic Stone of Eichstädt, Bavaria (Plate I).

The specimen, which is exposed on the surface of a slab, has a total length (including the arms) of about 380 mm. The arms are well shown; the impression of the body is more obscure, but can be fairly well made out in a very oblique light. Seven or eight arms (*a*) can be counted, but they are so disposed upon each other, and some of them so obscured by dendritic markings, that their exact number cannot be ascertained. The longest is fully 120 mm. in length. The hooklets (*g*) are arranged in two rows on each arm; they are small near the head, gradually increase in size along two-thirds of the length of the arm, and become smaller towards the extremity. The hooklets themselves are not preserved, only their impressions. The largest (*h*) is 7.5 mm. long, and the length of its oblique base 2.75 mm. The impressions show that the central portion of each hooklet is depressed so as to leave a ridge on either side, exactly as Münster described in *A. speciosa*. At the base of the arms there is a depression filled with calcite (*b*), indicating the position of the head. Immediately behind the arms there is an oval impression, the smaller end of which is directed backwards; its outline is much more convex, and also more distinct, on the right than on the left side of the specimen; the greater part of the right side of this impression is covered with a thin whitish film, probably the remains of the mantle. Two subparallel obscure grooves extend from the mass of calcite (*b*) across this impression, and pass posteriorly into a triangular depression filled with calcite (*c*); near its anterior end the groove on the right gives off a branch which curves backward and outward, and appears to meet a groove which is continuous with the right side of the triangular depression. From the posterior portion of the oval impression already described the outline of the body gradually expands into a leaf-shaped form, the greater part of which is also covered with a thin whitish film, probably the remains of the mantle. This leaf-shaped portion appears to be formed of two lappets (*e* and *f*), each of which terminates posteriorly in a somewhat indistinct submucronate point, and bears several very shallow grooves, some of which are parallel to its margin. Posterior to the triangular mass of calcite (*c*), there is a well-marked shallow depression with subparallel sides that is

traversed by several obscure longitudinal grooves. This possibly represents a portion of the mantle-cavity, for into its posterior part opens the duct of the ink-bag (*d*). The latter is not filled with ink; the posterior portion, i.e. the portion below the dotted line *d*, is hollow and was evidently the "reservoir," while the anterior portion, i.e. the part above the dotted line *d*, has a sponge-like structure and is doubtless the remains of the "pigment-gland." There are no indications of a phragmocone or of an internal shell of any description.

Belemnoteuthis antiqua, Pearce.

a, arms with their hooklets; *o*, remains of the head, with eye; *m*, mantle, with indications of lateral fins; *i*, ink-bag, covered by the pallial integument; *ph*, remains of the phragmocone and of the rudimentary guard.

Now the arms of *Belemnoteuthis*¹ from the Oxford Clay of Christian Malford, Wilts, are furnished with hooks similar to those of *Acanthoteuthis*; and from an examination of one² of Münster's specimens, in which small hooklets were associated with a phragmocone,

¹ J. Channing Pearce, in Proc. Geol. Soc., vol. iii, 1841-2, p. 593. See also Professor Owen, "A Description of certain Belemnites found, with a great portion of their soft parts, in the Oxford Clay, at Christian Malford, in Wiltshire": Phil. Trans. 1844, pp. 65-85. J. C. Pearce, "On the Fossil Cephalopoda constituting the genus *Belemnoteuthis*, Pearce": London Geol. Journ. 1846, p. 75. W. Cunningham, "On the Fossil Cephalopoda constituting the genus *Belemnoteuthis*, Pearce": London Geol. Journ., May, 1847, p. 95. G. A. Mantell, "Observations on some Belemnites and other Fossil Remains of Cephalopoda in the Oxford Clay near Trowbridge, Wiltshire": Phil. Trans. 1848, pp. 171-181. G. A. Mantell, "Supplementary Observations, etc.": Phil. Trans. 1850, pp. 393-8.

² Described in Neues Jahrbuch, 1836, p. 583.

A. Wagner¹ considered that *Acanthoteuthis speciosa* was referable to *Belemnoteuthis*. Professor Huxley² concluded his excellent summary of the literature bearing upon this subject as follows:—

“Upon the whole it becomes plain that the *Acanthoteuthes* of Münster, so far as they are known only by hooks and impressions of soft parts, may have been either *Belemnites*, or *Belemnoteuthes*, or *Plesioteuthes*, or may have belonged to the genus *Celæno*; and that, with the evidence before us, it is impossible to say whether *Acanthoteuthis speciosa* and *Férussacii* belong to *Belemnites* or to *Belemnoteuthis*. . . . Though it is quite possible that either *A. speciosa* or *A. Férussacii* may be really a *Belemnoteuthis*, we have no certain knowledge of the fact” (p. 21).

In his “Handbuch der Palæontologie” (vol. ii, p. 520) Professor Zittel referred *Acanthoteuthis* to the Octopoda; but in his “Grundzüge der Palæontologie” (p. 443) he places the genus in the Belemnoteuthidæ and unites with it the phragmocone and pro-ostracum which in his “Handbuch” (vol. ii, pp. 510, 511) he had designated *Ostracoteuthis*.

The specimen described above exhibits no trace of a phragmocone or of a pro-ostracum; but the general form of the body closely resembles—excluding the phragmocone—that of an example of *Belemnoteuthis antiqua* (from the Oxford Clay of Christian Malford) in the British Museum Collection, the lappets at the posterior portion of the body being comparable with the lateral expansions so well shown in that specimen. But in *Belemnoteuthis* the ink-bag is very near the ends of these lateral expansions, whereas in the example of *Acanthoteuthis* described above, it is farther removed from their posterior extremities and is relatively smaller. Still we think the genus *Acanthoteuthis* is properly referred to the Belemnoteuthidæ.

EXPLANATION OF PLATE I.

Figure of *Acanthoteuthis speciosa*, Münster, from the Lithographic Stone of Eichstädt, Bavaria.—*a*, arms. *b*, mass of calcite, probably indicating position of head. *c*, triangular mass of calcite. *d*, ink-bag. *e*, *f*, leaf-shaped lappets. *g*, hooklets of arms. *h*, hooklet enlarged twice natural size.—The figure is a little less than one-half of the natural size.

II.—NOTES ON THE GEOLOGY AND PALEONTOLOGY OF ARGENTINA.

By FLORENTINO AMEGHINO.³

UNTIL a few years ago it was believed that the Territory of Patagonia was of an extremely simple and uniform geological structure; it was supposed that from the Colorado to the Straits of Magellan, and from the Atlantic to the base of the foot-hills of the

¹ Op. cit., p. 820.

² “On the Structure of the Belemnitidæ; with a description of a more complete Specimen of *Belemnites* than any hitherto known, and an account of a New Genus of Belemnitidæ, *Xiphoteuthis*”: Mem. Geol. Surv. United Kingdom, Figures and Descriptions illustrative of British Organic Remains, Monograph ii, 1864.

³ “Notas sobre Cuestiones de Geología y Paleontología Argentinas”: Bol. Inst. Geográfico Argentino. vol. xvii, 1896, pp. 87–108. Translated, with Supplementary Observations, by Arthur Smith Woodward.

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Acanthoteuthis speciosa. Münster.
Lithographic Stone. Eichstatt, Bavaria.