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LXIII.—*Brachiopod Nomenclature: the Genotype of Terebratula.* By S. S. BUCKMAN, F.G.S.

[Plate XII.]

To which author must the generic term *Terebratula* be ascribed, what species is the type of the genus, and to what formation does it belong? These are the questions which it is proposed to answer in the following communication. What opinions are held at present may be shown by citing a few noted authorities.

Davidson * says "*Terebratula*, Llhwyd, 1696, type *T. vitrea* Linn. sp."; but he states further that Llhwyd's species *Terebratula minor subrubra* is *Terebratula maxillata*. In the Appendix issued in 1856, p. 16, he speaks of *Terebratula maxillata*, Sow., as being "the fossil type" of *Terebratula*.

Dall, in his Index †, writes "*Terebratula* O. F. Müller 1776 Müller cannot be said to have settled the type. *T. vitrea*, Lam., and *T. perovalis*, Sow., are generally accepted as the types of the genus."

H. Douvillé, 'Genres de Brachiopodes,' says ‡:—"TEREBRATULA, Klein, 1753. Espèce type: *Terebratula terebratula*, Linné sp. Ce genre a été fondé par Klein pour les *Concha anomia* de Fabio Colonna; Klein reproduit une des figures de cet auteur représentant une *Térébratule* fossile du groupe des *Biplicatæ*, très-voisine de la *T. ampulla* du Pliocène d'Italie. C'est cette figure, à laquelle Linné a appliqué le nom *spécifique* de *Terebratula*, que nous prendrons pour type du genre."

He reproduces Colonna's figure and names it "*Terebratula terebratula*, Linné sp."

Hall and Clarke, in their 'Introduction to Brachiopoda,' state §:—" *Terebratula*, Klein, 1753. . . . It is inferred that the species [Linné's *Anomia terebratula*] is a fossil from the Mesozoic or Tertiary formations, though its geological horizon is not more precisely known." They reproduce Colonna-Klein's figure and give it the name "*Terebratula simplex*, Klein" ||.

Schuchert, in his 'Brachiopoda' ¶, says concisely:—

* 'Classification of the Brachiopoda,' Monograph, vol. i. part 1, p. 62 (Pal. Soc.) (1854).

† Bull. U.S. Nat. Mus. viii. 1877, p. 70.

‡ Bull. Soc. Géol. France, (3) vii. p. 264 (1880).

§ Thirteenth Ann. Report State Geologist for 1893, vol. ii. p. 875 (1894).

|| See note below, p. 530.

¶ Text-book Pal., Zittel, transl. Eastman, vol. i. p. 329 (1900).

"*Terebratula*, Klein, 1753. Genus not well known, Mesozoic or Tertiary"; and he appends a figure labelled "*Terebratula Phillipsi*, Morris."

These extracts show current opinion; but all except Dall ascribe the name to pre-Linnean authorities, which is contrary to present custom. If a pre-Linnean authority were to be taken, it would not be Klein, but Llhwyd, who was the true originator of the term*. However, modern nomenclature begins with Linné†, and as he did not use the term *Terebratula* in a generic sense, it is necessary to take the first post-Linnean authority. The following is the result of an investigation into the practice of early post-Linnean users of the term:—

1776. O. F. MULLER, Zool. Dan. Prod. p. 249.

This is the first post-Linnean use of the term *Terebratula*‡. He mentions three species, the first of which is *Terebratula cranium*§, of which he says:—"Hæc Terebratula auctorum, an vero Linnæi? Valvulas enim nec bi- nec triplicatas invenio." It is evident that Muller employs *Terebratula* as an accepted term in general use, and is not defining it or giving a type, though he indicates that what Linnæus called *Anomia terebratula* is a basis of reference.

1776. JOHANN SAMUEL SCHRÖTER, Journ. des Steinreichs und d. Konch. vol. iii. pp. 372 *et seqq.*

He speaks of species as belonging to the *Terebratulas acunosas* (p. 374), but he does not give binomial names.

1777. JOHANN SAMUEL SCHRÖTER, Abb. über versch. Gegenstände der Naturgeschichte, 20th part, p. 358.

Separates *Terebratula* from *Anomia* and defines it "Das mag also eine Terebratul seyn eine zweischalige ungleichshalige Muschel die eine durchbohrten Schnabel hat."

1785. THUNBERG, Disputationes, vi. p. 99.

He gives a definition of *Terebratula*, and mentions *T. pectinata* first and *Terebratula terebratula* sixth. For him *Terebratula* includes all Brachiopods except *Crania*.

* 1696. Lith. Brit. Iconogr.

† 1758. Linné, Systema Nat. ed. x.

‡ My authority for this statement is Mr. C. D. Sherborn's excellent 'Index Animalium.'

§ That he places *T. cranium* first is a mere chance, and of no value as indicating the type.

1788. A. J. RETZIUS, Diss. Nov. Test. Gen. p. 13.

Gives a definition of *Terebratula*. Places therein first *Tereb. caput-serpentis*, and fourth *Tereb. plicata*, to which he gives as a reference *Anomia terebratula*, Linné, though evidently a mistaken definition. On p. 13 he speaks of *Terebratulas Linneanas*, and how they differ from *Anomia*.

1792. BRUGUIÈRE, "Sur deux Nouv. Esp. de Térébratules fossiles," Journ. d'Histoire Nat. i. p. 419.

Bruguière describes, with figures, two species—*Terebratula cor* and *Terebr. pileus*—which now belong to the genus *Antinomia*, Catullo*.

1793. A. MODEER, Vetens. Acad. Nya Handl. p. 180.

He defines *Terebratula*, but gives no type.

1798. CUVIER, C., Tableau Élémentaire, p. 434.

The first species which he cites under *Terebratula* is the recent species *T. vitrea*, but he gives as a synonym of this *Anomia terebratula*, Lin. He does not fix any type.

1798. J. F. BOLTEN, Mus. boltenianum, p. 192.

Catalogues certain recent Terebratuloids under the genus "*Anomia*, Die Terebratel," and removes *Anomia ephippium* into a genus *Fenestella*.

1799. LAMARCK, "Prodr. Nouv. Classif. Coq.," Mém. Soc. d'Hist. Nat. Paris, p. 89, *Terebratula*.

He gives a description and places "*Anomia terebratula*, Lin.," as type.

There is no necessity to pursue this part of the subject further. Muller, it may be said, has given us an indication that he would regard a plicate *Terebratula* like the *Anomia terebratula*, Linné, as the typical form, and he is doubtful if *T. cranium* is a (or the) *Terebratula*, because it is not plicate. Then Thunberg definitely includes *Terebratula terebratula* among his species of the genus, and, according to the accepted zoological rule, when no selection has been made a species with the trivial name the same as the generic becomes type of the genus. Fortunately the person who first made definite

* S. Buckman, "Brachiopod Homœomorphy," Quart. Journ. Geol. Soc. lxii. p. 433 (1906).

selection—Lamarck—complied with this rule. He chose *Anomia terebratula*, Lin., to be the type; thus he may be said to have confirmed Muller and Thunberg. So we may write

Genus TEREBRATULA, Muller, 1776.

Genotype *Anomia terebratula*, Linné.

Syn. *Terebratula*, Klein, pre-Linnean.

Non *Terebratula*, Lihwyd, pre-Linnean, which = *Epithyris*, Phillips*.

It is now necessary to identify *Terebratula terebratula* (Linné). That author describes and cites figures for his species, thus:—"A. testa obovata lævi convexa; valvula altera triplicata, altera biplicata.—Column. purp. 22 f. 1. List. angl. 240 t. 8. f. 46. Klein ostr. t. 11. f. 74."

Of these figures the first and third refer to the same shell, for Colonna used the same woodcut in various places, and Klein copied it. But Lister's figure represents a very different species: it is not plicate, and therefore it does not agree with Linné's description†. As the Colonna-Klein figure does, that must be taken as the holotype, which, in fact, has been the usual practice.

In 1819 Valenciennes‡ gave the name *Terebratula Kleini* to a species, citing Klein's figures, and quoting as a synonym *Anomia terebratula*, Linné. In 1850 Davidson§ said that the name *Tereb. Kleini* covered a well-known Bajocian fossil of Normandy (it is from the Malière), and he figured, in support of his opinion, a specimen so labelled in the Lamarck collection.

In 1856 S. Hanley identified Linné's *Anomia terebratula* as *Terebr. perovalis*, Sowerby||.

In 1864 Deslongchamps followed Davidson's line, making *T. Kleini*, Davidson (? Lamarck), a variety of *Terebratula perovalis*¶.

Though Lamarck may have thought that the Bajocian fossil was the same as Klein had figured, and so may have ticketed it *T. Kleini* in his collection, yet it is not the holotype of *T. Kleini*: the specimen figured by Klein

* Ann. & Mag. Nat. Hist. ser. 7, vol. xviii. 1906, p. 322.

† Lister's smooth non-plicate Terebratulid is from near Grantham, probably therefore from Middle Lias, and it has much the aspect of one of the *T. punctata* series.

‡ In Lamarck's Anim. sans Vert. p. 252.

§ Ann. & Mag. Nat. Hist. (2) v. 1850, pl. xiii. fig. 33.

|| Ipsa Linnæi Conchylia.

¶ Pal. franç., Terr. jur. Brach. p. 197.

a.

b.

c.

$\times \frac{1}{3}$.

J. Green del et lith.

TEREBRATULA TEREBRATULA *Lyne.*

from Colonna must be that. And I find it impossible to think that the Bajocian fossil and Colonna's represent the same species. Both are biplicate, but there the similarity ends.

This Bajocian fossil is peculiar to Normandy; but Colonna figured an Italian shell—he tells that it was found “in Civitate Andriæ.” Now there are in the Tertiary (Pliocene) beds of Italy various species which are much more like Colonna's figure; and there is in the British Museum, Nat. Hist., no. 83458, a specimen from the Tertiary of Monte Mario, near Rome, which might almost be the original drawn by Colonna, so like is it to his figure. This specimen is represented in the delineations given in Plate XII.

Colonna's figure differs from the *Terebratula Kleini* of the Bajocian of Normandy in having the plications more nearly equal, running further up the valves, and in being much more plicate for its smaller size. In the Bajocian shell the frontal fold is much elevated, somewhat after the *T. sella* fashion, and the dorsal sulcus is inconspicuously developed.

Colonna's shell is distinguished from *Terebr. perovalis*, Sow., by having much more pronounced plications, extending much further up the valves. Again, it is distinguished from *Terebr. Phillipsi*, Morris, by lacking the very pronounced angular plications, by lacking the pronounced posterior acumination, and by having an incurved beak: in *T. Phillipsi* the beak is not incurved, it projects straight posteriorly.

There is one Mesozoic species to which Colonna's figure has rather more resemblance than to those mentioned above. This is *T. Stephani*, Dav.; but its folds are not so strong, do not extend so far back, and the shell is less elongate in shape.

The conclusion arrived at is that *Terebratula terebratula*—that is, Colonna's shell—is not a Mesozoic species; but it is a Tertiary fossil, closely allied to species which have been called *Terebr. bisinuata*, Lamarck, *T. sinuosa*, Brocchi, *T. ampulla*, Brocchi, and even to *T. grandis*, Blumenbach. These species may be said to belong to *Terebratula*, sensu stricto; but it may be doubted if any Mesozoic species would belong to the genus in this very limited sense.

The conclusions now arrived at confirm the results of H. Douvillé's investigations—that *Anomia terebratula*, Linné, is the genotype of *Terebratula*, that the species is a Pliocene shell near to *T. ampulla*; but they differ in the small detail that the name *Terebratula* must be ascribed to Muller, 1776, and not to Klein, 1753.

My application of the name differs from Douvillé's. He would keep *Terebratula* for the biplicate species (p. 265),

but I would restrict *Terebratula* to the species in actual genetic connexion with *T. terebratula*=? *T. bisinuata*. The forerunners of such species would be non-plicate, perhaps uniplicate, before becoming biplicate. Biplicate Terebratulids are polygenetic descendants from many non-plicate forms: sometime they must be separated from *Terebratula* into their special genetic series.

For a series of Cretaceous biplicate Terebratulids, which will no doubt prove to be separable enough from the Tertiary series, the name *Musculus*, Quenstedt, seems to be available.

Genus MUSCULUS, Quenstedt, 1868.

Type *Terebratula acuta*, Quenstedt.

Ref. Petref. Deutschl. ii. pp. 4, 27, 384, pl. xlviii. fig. 70.

For a Jurassic biplicate series, the *T. maxillata* group, very separable from other Terebratulids, the name *Epithyris*, Phillips, is available*.

My best thanks are due to Mr. B. B. Woodward, F.L.S., and to Mr. C. Davies Sherborn, F.G.S., for invaluable bibliographic assistance in connexion with the investigations for this communication; also to Mr. W. D. Lang, F.G.S., for kind answers to various enquiries.

Appended are a few of the synonyms by which *Terebratula terebratula* has been known; these names have been attached to the figures of Colonna or Klein, or else to the description by Linné.

Terebratula terebratula (Linné).

1616. *Concha ravior anomia*, &c., Colonna.

1753. *Terebratula rugosa*, Klein †.

1758. *Anomia terebratula*, Linné.

1785. *Terebratula terebratula*; Thunberg.

1787. *Lampas terebratula*; Meuschen, Mus. Geversianum, p. 438.

1788. *Terebratula plicata*, Retzius.

* See above, p. 528.

† Klein's statement is "*Terebratula* . . . § 427 species 1. *simplex*; & *rugosa*, Fab. Columnæ de Purp. Cap. xii. § 3, pag. 32 Icon exstat in Tab. Nostra xi. No. 74." *Terebratula rugosa* seems therefore to designate the biplicate shell figured by Colonna, § 3, p. 32, and reproduced by Klein; *Terebratula simplex* may have been intended to designate the non-plicate *Terebratula* figured by Colonna in p. 33, § 5.

1797. *Lampas columbina*, Humphreys, Mus. Caloneanum, p. 45.
 1798. *Terebratula vitrea*; Cuvier.
 1799. *Terebratula terebratula*; Lamarck.
 1819. *Terebratula Kleinii*, Lamarck.
 1856. *Terebratula perovalis*; Hanley, *fide* Dall.
 1880. *Terebratula terebratula*; Douvillé.
 1894. *Terebratula simplex*; Hall & Clarke.

EXPLANATION OF PLATE XII.

Terebratula terebratula (Linné).

a, drawn as seen; *b*, *c*, restored outlines.

LXIV.—*Descriptions and Records of Bees.*—XIV.
 By T. D. A. COCKERELL, University of Colorado.

Crocisa Wellmani, sp. n.

♀.—Length 14 mm. or slightly more.

Black with bluish-white hair-markings. Anterior wings very dark fuliginous, with a pair of suffused hyaline spots just beyond the third submarginal cell. Face densely white-haired; clypeus very densely finely punctured; antennæ dark; pleura with the upper half covered with bluish-white hair, the lower half apparently nude, but with scanty black hair, and with very strong well-separated punctures; pattern of thorax above simulating a face, with a median nose-like band, a pair of spots for eyes, and a transverse mark on each side anteriorly like a moustache, all strongly defined, the appearance being further aided by a stripe on each side, curving inwards posteriorly, which outlines the head and suggests hair; margin of scutellum of the -type, with a conspicuous round spot of hair on each extreme side, but no median spot; a white fringe from underneath the middle; anterior tibiæ white-haired on outer side, middle and hind tibiæ with somewhat more than the basal half white-haired on outer side; basitarsi with a good deal of white hair; first abdominal segment with a pair of large U-like lateral marks, placed laterally and not joined basally; the broad bands on the other segments also broadly interrupted, that on the second with a pointed projection anteriorly near the side of the segment; apical plate narrow; last ventral segment produced; fifth ventral not keeled.

In Friese's table (Verh. zool.-bot. Gesell. Wien, 1905, p. 174) this runs to *C. arcuata*, Vachal, but that species is