

NOTES ON THE MOLLUSCAN GENERA
CLAVILITHES SWAINSON, 1840
 AND
RHOPALITHES GRABAU, 1904
 (GASTROPODA, FASCIOLARIIDAE)

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The fasciolariid gastropod genera *Clavilithes* Swainson, 1840 and *Rhopalithes* Grabau, 1904 have the same type species and hence are objective synonyms. The situation is complicated by the fact that most authors have used the wrong type species designation for *Clavilithes* and thus most of the species which are actually *Clavilithes* (*s. str.*) have been placed in *Rhopalithes*. Most of the species presently regarded as *Clavilithes* (*s. str.*) must in fact be placed in a different genus or subgenus: *Clavellofusius* Grabau, 1904 is used for this purpose.

Key words — Gastropoda, Fasciolariidae, taxonomy.

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INTRODUCTION

Having the same type species, the fasciolariid gastropod genera *Clavilithes* Swainson, 1840 and *Rhopalithes* Grabau, 1904 are here shown to be objective synonyms. Most previous authors have used the wrong type species designation for *Clavilithes*, which means that most of the species which are actually *Clavilithes* (*s. str.*) have been placed in *Rhopalithes*. The majority of species presently regarded as belonging in *Clavilithes* (*s. str.*) must in fact be placed in a different genus or subgenus. For this purpose *Clavellofusius* Grabau, 1904 may be used.

TAXONOMIC NOTES

The genus *Clavella* was proposed by Swainson (1835, p. 21) but no species were placed in it. The name had already been used by Oken (1815, p. 358) for a crustacean genus. Swainson (1840, p. 304) emended the genus name to *Clavilithes* but did not designate a type species. He substituted the new name *Clavilithes*, however, not because it was a homonym, but because he thought it too

closely resembled *Clavagella* and *Clavatula* (Swainson, 1840, p. 78 footnote). He placed four species in the genus, viz. *Fusus clavellatus* Lamarck, 1816 (pl. 425, fig. 2), *F. longaevus* Lamarck, 1816 (pl. 425, fig. 3), *F. noae* Lamarck, 1816 (pl. 425, fig. 5), and *Clavilithes ponderosa* Swainson, 1840 (p. 304; see also Lamarck, 1816, pl. 425, fig. 4).

The modern citation of these species is as follows: *Fusus clavellatus* Lamarck, 1803 (p. 317, pl. 5, fig. 8a-c), *F. (Cyrtulus) parisiensis* Mayer-Eymar, 1876 (p. 89, based on the species misidentified as *F. longaevus* (Solander in Brander, 1766) by Lamarck (1803, p. 317, pl. 5, figs 9, 14), *Murex noae* Holten, 1802 (p. 62, a senior synonym of *Fusus noae* Lamarck, 1803 (p. 317, pl. 5, fig. 13, ex Chemnitz), and *Clavilithes ponderosa* Swainson, 1840 (p. 304; see also Lamarck, 1816, pl. 425, fig. 4).

The type species, when designated, had to be chosen from among these four taxa. The type species of *Clavilithes*, designated by Herrmannsen (1846, p. 246) was *Fusus noae* Chemnitz (subsequently of Holten, 1802, and Lamarck, 1803). This designation was reiterated by Cossmann (1901, p. 18), and correctly noted by MacNeil & Dockery (1984, p. 148).

Gray (1847, p. 13) stated the type species of *Clavilithes* to be *Fusus longaevus* (Solander in Brander, 1766). This designation was followed by H. and A. Adams (1853, p. 85) and Cossmann (1889, p. 172; see Palmer, 1937, p. 356 footnote 551).

Most authors have designated *Fusus (Cyrtulus) parisiensis* Mayer-Eymar, 1876, based on the species misidentified as *Fusus longaevus* (Solander in Brander,

1766) by Lamarck (1803, p. 317, pl. 5, figs 9, 14), as the type species of *Clavilithes*. This subsequent type designation was made by Grabau (1904, p. 104), and followed by Wrigley (1927, p. 224), Palmer (1937, pp. 356, 357), Glibert (1938, p. 108), and Wenz (1943, p. 1251).

Rhopalithes was proposed as a new genus by Grabau (1904, p. 135) with the type species designated as *Fusus noae* Lamarck, 1803 (a junior synonym of *Murex noae* Holten, 1802; see Winckworth, 1943). This genus was discussed and accepted as valid by Cossmann (1904, p. 234) and Wenz (1943, p. 1252, as *Rhopalites*). Since both *Clavilithes* and *Rhopalithes* have the same type species, these genera are objective synonyms and the latter is a junior synonym of the former. Some authors have treated *Rhopalithes* as a subgenus of *Clavilithes*.

There are a variety of genera or subgenera closely related to *Clavilithes*:

- *Chiralithes* Olsson, 1930 (type species *Clavilithes (Chiralithes) cynosuris* Olsson, 1930, Eocene of Peru; introduced as subgenus of *Clavilithes*);
- *Perulithes* Olsson, 1930 (type species *Clavilithes peruvianus* Woods, 1922, Eocene of Peru; introduced as subgenus of *Clavilithes*);
- *Austrolithes* Finlay, 1931 (type species *Fusus bulbodes* Tate, 1888, as emended by Pritchard, 1904, pp. 320-322, Eocene of Australia); placed as a subgenus of *Clavilithes* by Wenz (1943, p. 1253);
- *Cosmolithes* Grabau, 1904 (type species *Fusus uniplicatus* Lamarck, 1803, Eocene of France); placed as a subgenus of *Clavilithes* by Cossmann (1907, p. 264);
- *Mancorus* Olsson, 1931 (type species *Mancorus grabaui* Olsson, 1931, Oligocene of Peru and Columbia; placed as a subgenus of *Clavilithes* by Wenz (1943, p. 1253);
- *Africolithes* Eames, 1957 (type species *Rhopalithes africanus* Newton, 1922, Eocene of Nigeria);
- *Cyrtulus* Hinds, 1843 (type species *Cyrtulus serotinus* Hinds, 1843, Recent of Polynesia).

This entire group is in need of revision. The resolution of the *Clavilithes-Rhopalithes* problem in the present paper should be viewed as a first step in this direction, with the recognition of the need for further revisions.

There are roughly 160 potentially valid taxa in this entire group. It is possible to properly place some of these in *Clavilithes (s. str.)* and in the substitute genus for *Rhopalithes*, and this is done below, but the resulting lists are assuredly not complete.

Clavilithes (s. str.), with type species *Murex noae* Holten, 1802, is characterised by fusiform shells with two or more oblique plicae on the columella. The body is ribbed with crossing spiral striae. According to Grabau (1904, p. 135) the protoconch consists of one and a half whorls.

A (possibly incomplete) list of species either named in or assigned to *Rhopalithes*, all of which are *Clavilithes (s. str.)*, is as follows:

- angulatus (Fusus)* Lamarck, 1803, p. 385, pl. 6, fig. o (a and b), placed in *Clavilithes* by Cossmann (1889, p. 173); placed in *Rhopalithes* by Grabau (1904, p. 136), renamed *Rhopalithes lamarcki* Wrigley, 1927, Eocene of France;
- bolivarensis (Rhopalithes)* Clark in Clark & Durham, 1946 (p. 39, pl. 22, fig. 1), Eocene of Columbia;
- clavelloides (Rhopalithes)* Grabau, 1904, p. 137, pl. 9, fig. 22, placed as a variety of *Clavilithes noae* (Lamarck, 1803) by Cossmann (1907, p. 264), Eocene of France;
- diptychophorus (Clavilithes)* Cossmann, 1897, p. 299, pl. 5 [10], figs 11, 12, placed in *Clavilithes (Rhopalithes)* by Cossmann (1919, p. 71), Eocene of France;
- goniophorus (Fusus)* Bellardi, 1854, p. 13, pl. 1, fig. 8, placed in *Clavilithes* by Oppenheim (1906, p. 315), and in *Rhopalithes* by Newton (1912, p. 76), Cenozoic of Egypt;
- incertus (Clavilithes)* Woods, 1922, p. 100, pl. 14, fig. 3, placed in *Rhopalithes* by Clark & Durham (1946, p. 39), Eocene of Peru;
- japeti (Fusus)* Tournouër, 1872, p. 501, pl. 6, fig. 7, placed in *Clavilithes* by Vinassa de Regny (1898, p. 193), and in *Rhopalithes* by Grabau (1904, p. 141), Cenozoic of central Europe;
- lagunitensis (Clavilithes)* Olsson, 1928, p. 88, pl. 21, figs 4, 7, placed in *Rhopalithes* by Olsson (1928, p. 88), Eocene of Peru;
- lamarcki (Rhopalithes)* Wrigley, 1927, p. 237, new name for *Fusus angulatus* Lamarck, 1803, *non* Röding, 1798; Eocene of England;
- loiseli (Fusus (Clavilithes) [sic])* Chédeville, 1904, p. 87, pl. 4, fig. 5, 5bis, placed in *Clavilithes (Rhopalithes)* by Cossmann (1907, p. 264), Eocene of France;
- montanus (Fusus (Cyrtulus))* Mayer-Eymar, 1887, pp. 57, 110, pl. 5, fig. 10, placed in 'the same group as *Clavella noae*' by Cossmann (1888, p. 779), and in *Clavella* (a synonym of *Clavilithes*) by Cossmann (1901, p. 20), Eocene of France;
- noae (Murex)* Holten, 1802, p. 62, type species of *Clavilithes* Swainson, 1840; type species of *Rhopalithes* Grabau, 1904, Eocene of England and France;
- pachyrhaphe (Fusus (Clavella))* Bayan, 1870, p. 50, pl. 6, fig. 5, placed in *Clavella* (a synonym of *Clavilithes*) by Cossmann (1901, p. 20), placed in synonymy with *Clavilithes goniophorus* (Bellardi, 1854) [in *Rhopalithes*] by Oppenheim (1906, p. 315), Cenozoic of Europe and Egypt;
- rugoides (Rhopalithes)* Grabau, 1904, pl. 9, figs 9-12, Eocene of France;
- rugosus (Fusus)* Lamarck, 1803, p. 316, pl. 5, fig. 11, placed in *Clavella* by Bellardi (1873, p. 217), and in *Clavilithes (Rhopalithes)* by Le Renard & Pacaud (1995, p. 117), Eocene of Europe;
- superbus (Clavilithes (Rhopalithes))* Traub, 1938, p. 89, pl. 7, fig. 13a, b, Palaeocene of Europe;
- toyeyi (Clavilithes (Rhopalithes))* Adegoke, 1977, p. 178, pl. 28, figs 1-3, Palaeocene of Nigeria;
- tuberculoides (Rhopalithes)* Grabau, 1904, p. 138, pl. 9, figs 23, 24, Eocene of France;
- villatae (Clavilithes (Rhopalithes))* Staid-Stadt in Malian & Staid-Stadt (1968, p. 112, pl. 1, figs 4-7), Eocene of Spain.

All of these species must be assigned to *Clavilithes* (*s. str.*). Two other species assigned to *Rhopalithes* at one time have subsequently been assigned otherwise, *viz.*

africanus (*Rhopalithes*) Newton, 1922, p. 32, pl. 2, figs 9, 10, type species of *Africolithes* Eames, 1957, Eocene of Nigeria;
dameriacensis (*Fusus*) Deshayes, 1864, atlas 2, pl. 85, figs 23, 24; 1865, p. 256, placed in *Clavilithes* by Cossmann (1889, p. 174), in *Clavilithes* (*Rhopalithes*) by Cossmann & Pissarro (1911, pl. 41, fig. 198-8), removed from this subgenus and placed in *Clavilithes* (*s. str.*) by Glibert (1963, p. 137), Eocene of France.

Clavilithes parisiensis (Mayer-Eymar, 1876) has a markedly different shell morphology from *C. noae* (Holten, 1802). The general shell form is as in *Clavilithes* (*s. str.*) but the columella is smooth, lacking plicae. The protoconch has from two and a half to four whorls (see Grabau, 1904, p. 104). It was, of course, these differences which led Grabau to erect the genus *Rhopalithes*. Those species originally placed in *Clavilithes* (*s. str.*), based upon the mistaken type species designation of *Clavilithes parisiensis*, must now be placed in a separate genus, or possibly subgenus.

There is an available generic name, *Clavellofus* Grabau, 1904, and this will here be used for this purpose. Grabau (1904, p. 99) proposed the genus *Clavellofus*, with the type species designated as *Clavellofus spiratus* Grabau, 1904 (p. 99). He placed two other species in this genus, *C. macrospiratus* Grabau, 1904 (p. 102), and *C. tuberculatus* Grabau, 1904 (p. 101). All three taxa are from the Lower Eocene of the Paris Basin, and are illustrated in Grabau's (1904) monograph.

Cossmann (1904, p. 234) reviewed Grabau's 1904 work, and found the genus *Clavellofus* 'difficult to accept', finding all three species assigned to it difficult to distinguish from various forms of *Fusus longaevus*. He concluded that *Clavellofus* was generically identical to *Clavilithes*; as such it becomes the next available name to be used for the species grouped with *Clavilithes parisiensis*. It may also be noted that Wrigley (1927, p. 236) rejected *Clavellofus* as a distinct genus, sharing Cossmann's view that the genus was founded on juvenile specimens exhibiting only slight differences in the protoconchs, as seems to be the case. Wenz (1943, p. 1252) also synonymised *Clavellofus* with *Clavilithes* (*s. str.*), with the presumed type species *Clavilithes parisiensis*.

A (possibly incomplete) list of species which are to be placed in *Clavellofus* is as follows:

britannicus (*Clavilithes*) Wrigley, 1927, p. 226, fig. 15, Eocene of England;
carinatus (*Clavilithes*) Doncieux, 1908, p. 62, pl. 3, fig. 9a-c, Eocene of France;
chamberlaini (*Clavilithes*) Johnson & Grabau, 1902, p. 602, Eocene of Texas;

clavellatus (*Fusus*) Lamarck, 1803, p. 317, pl. 5, fig. 8a-e (based *in parte* on *Fusus deformis* (Solander *in* Brander, 1766), pl. 22, figs 37, 38 (*non* pl. 8, fig. 93)), placed in *Clavella* (a synonym of *Clavilithes*) by Pezant, 1908, p. 173, Eocene of France;
conjunctoides (*Clavilithes*) Grabau, 1904, p. 122, pl. 8, fig. 19, Eocene of England;
conjunctus (*Fusus*) Deshayes, 1834, pl. 70, figs 16, 17; 1835a, p. 527, placed in *Clavella* (a synonym of *Clavilithes*) by de Gregorio (1880, p. 92), placed in synonymy with *Clavilithes clavellatus* (Lamarck, 1803) by Le Renard (1992, p. 8), Eocene of western Europe;
custugensis (*Clavilithes*) Cossmann, 1923, p. 118, based on species misidentified as *Clavilithes rugosus* (Lamarck, 1803) by Doncieux (1908, p. 66), Eocene of France;
cylindricus (*Clavilithes*) Wrigley, 1927, p. 230, fig. 22, Eocene of England;
dameriacensis (*Fusus*) Deshayes, 1864, atlas 2, pl. 85, figs 23, 24; 1865, p. 256, placed in *Clavilithes* by Cossmann (1889, p. 174), and in *Clavilithes* (*Rhopalithes*) by Cossmann & Pissarro (1911, pl. 41, fig. 198-8), removed from this subgenus and placed in *Clavilithes* (*s. str.*) by Glibert (1963, p. 137), Eocene of France;
deformis (*Murex*) Solander *in* Brander, 1766, p. 22, pl. 2, figs 37, 38, pl. 8, fig. 93 (species represented by pl. 2, figs 37, 38 renamed *Fusus clavellatus* Lamarck, 1803), placed in *Clavilithes* by Cossmann (1889, p. 173), Eocene of England;
egregius (*Fusus*) Beyrich, 1856, p. 78, pl. 22, figs 1-5, placed in *Clavella* (a synonym of *Clavilithes*) by von Koenen (1865, p. 479), as a variety of *Fusus* (*Clavella*) *longaevus* (Solander *in* Brander, 1766), Cenozoic of Europe;
elongatus (*Clavilithes*) Wrigley, 1927, p. 229, figs 16, 17 (*ex* Newton, 1891), Eocene of England;
fennemai (*Fusus* (*Clavella*)) Martin *in* Martin & Icke, 1906, p. 307, pl. 45, fig. 729, placed in *Clavilithes* (*Clavilithes*) by Beets (1986, p. 35), Miocene of Java;
hantoniensis (*Clavilithes*) Wrigley, 1927, p. 226, fig. 10, Eocene of England;
hexacolpus (*Clavella*) Cossmann & Pissarro, 1901, p. 50, pl. 11, fig. 15 (*Clavella* is a synonym of *Clavilithes*), Eocene of France;
kennedyanus (*Clavilithes*) Harris, 1895, p. 73, pl. 7, fig. 8, Eocene of Texas;
longaevus (*Murex*) Solander *in* Brander, 1766, p. 22, pl. 2, fig. 40, pl. 6, fig. 73, pl. 8, fig. 93, placed in *Clavella* (a synonym of *Clavilithes*) by de Gregorio (1880, p. 91) [species illustrated in pl. 8, fig. 93 renamed *Clavilithes solanderi* Grabau, 1904], Eocene of Europe and Egypt;
macrospira (*Clavilithes*) Cossmann, 1889, p. 173, pl. 6, fig. 7, placed in synonymy with *Clavilithes pinus* (Perry, 1811) by Le Renard (1992, p. 8), Eocene of France;
macrospiratus (*Clavellofus*) Grabau, 1904, p. 102, pl. 1, figs 21, 24-25, 27-28, placed in *Clavilithes* (*s. str.*) by Le Renard & Pacaud (1995, p. 117), Eocene of France;
maximus (*Fusus*) Deshayes, 1835, p. 526, pl. 71, figs 11, 12, placed in *Clavilithes* by Cossmann (1889, p. 177), Eocene of France;
nilotica (*Clavilithes*) Abbass, 1967, p. 92, pl. 18, figs 3-5, Eocene of Egypt;
nilotica (*Clavilithes*) var. *depressa* Abbass, 1967, p. 92, pl. 18, figs 6-8; Eocene of Egypt;

- nilotica* (*Clavilithes*) var. *saghaensis* Abbass, 1967, p. 92, pl. 18, figs 1, 2, Eocene of Egypt;
- parisiensis* (*Fusus* (*Cyrtulus*)) Mayer-Eymar, 1876, p. 89, based on species misidentified as *Fusus longaevus* (Solander in Brander, 1766) by Lamarck (1803, p. 317, pl. 5, figs 9, 14), placed in *Clavilithes* by Grabau (1904, p. 110), Eocene of France;
- parvetorbis* (*Clavilithes*) Garvie, 1996, p. 78, pl. 17, figs 1, 2, Eocene of Texas;
- ponderosa* (*Clavilithes*) Swainson, 1840, p. 304; Lamarck, 1816, pl. 425, fig. 4, Eocene of England and France;
- scalaris* (*Fusus*) Lamarck, 1816, p. 6, pl. 425, fig. 7, placed in *Clavilithes* by Grabau (1904, p. 117), Eocene of Europe;
- solanderi* (*Clavilithes*) Grabau, 1904, p. 123, pl. 14, figs 5, 6, pl. 15, figs 1, 2, based on *Murex longaevus* Solander in Brander, 1766, pl. 8, fig. 93 only, placed as a 'race' of *Clavilithes longaevus* by Cossmann & Pissarro (1913, pl. 65, fig. 198-1), and as a subspecies of *Clavilithes houdasi* Cossmann, 1907 by Dolin *et al.* (1980, p. 31), Eocene of western Europe and Egypt;
- spiratus* (*Clavellofus*) Grabau, 1904, p. 99, pl. 1, figs 17, 20, 26, pl. 18, fig. 4, type species of *Clavellofus* Grabau, 1904, Eocene of France;
- subscalaris* (*Clavilithes*) Grabau, 1904, p. 114, pl. 10, fig. 1, pl. 12, figs 1-3, 7-12, placed as a variety of *Clavilithes parisiensis* (Mayer-Eymar, 1876) by Cossmann (1907, p. 264), and as a subspecies of that taxon by Glibert (1963, p. 139), Eocene of France;
- tuberculatus* (*Clavellofus*) Grabau, 1904, p. 101, pl. 1, figs 18, 19, 22, Eocene of France;
- tuberculosis* (*Fusus*) Deshayes, 1834, pl. 75, figs 14, 15; 1835, p. 522, placed in *Clavella* (a synonym of *Clavilithes*) by de Gregorio (1880, p. 91), Eocene of France.

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