Boll. Malacologico | Milano | **17** | (5-6) | 61-88 | maggio-giugno 1981

Jacobus J. van Aartsen °

EUROPEAN PYRAMIDELLIDAE: II. *TURBONILLA*

Introduction

As in the Chrysallidae I have followed the book by NORDSIECK (1972) as far as is appropriate. However, I have omitted the species described by DAUTZENBERG and FISCHER (or HAMONVILLE) which were dredged near the Azores and which according to Nordsieck have been found on the Atlantic coast of France. In this matter I do not have a definite opinion except to say that I myself did not encounter such species and moreover would be very hesitant to identify them with species from deep waters near the Azores.

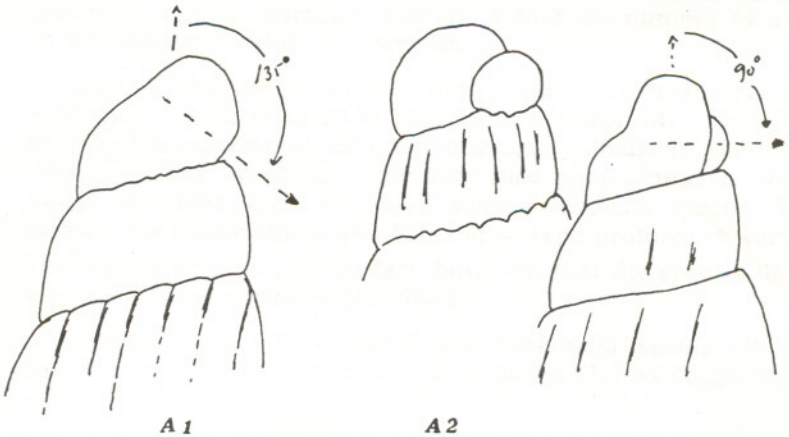
In determining species of *Turbonilla* I find a number of characteristics of systematic value. These are (see fig. A and B):

1) The form of the embryonic whorls which may be helicoid or planorbid. The planorbid type is such that all the embryonic whorls lie roughly in one plane and so form a miniature *Planorbis*, whereas in the helicoid type the embryonic whorls form a miniature *Helix*. Intermediate forms may be found in certain species, but the character is highly specific within one species.

2) The angle between the axis of the embryonic whorls and the axis of the adult whorls (= shell axis). This angle usually is equal to either 90° or about 135°. This angle is also highly characteristic and rather constant within one species. Planorbid embryonic whorls are mostly associated with an angle of 135°.

3) The height/diameter-ratio of the lower whorls. Some slight variation may occur within one species. This ratio for the majority of species is somewhere between 0.50 and 0.60. A group of very slender species has this ratio about 0.66.

° Adm. Helfrichlaan 33, Dieren, Holland.



A 1 A 2

4) The ratio of diameter (D) of the shell to the total height (H). This ratio is expressed as D/2H and varies somewhat within one species. Because the top of the shell is not a mathematical point the ratio D/2H depends on age decreasing asymptotically. It is therefore important that only more or less adult specimens should be measured.

5) The relative height of the last whorl. This parameter is defined as h : H, where H is the total height of the shell and h is the height of the last whorl to be measured as shown in figure B. This parameter divides the Turbonilla - species into two groups viz. one group where h : H $\geqslant$ 0.40 and the other group where h : H $<$ 0.40.

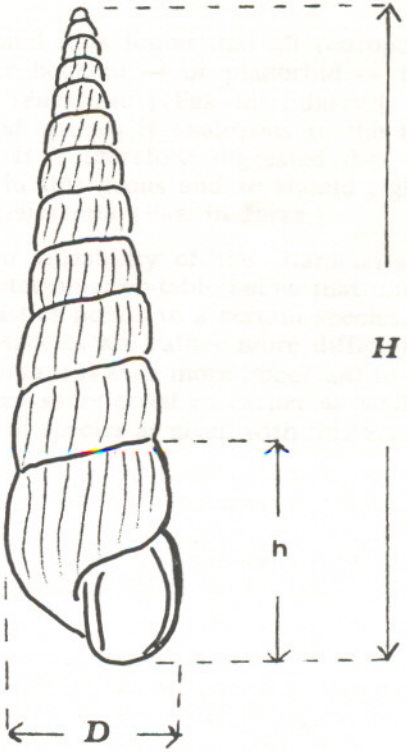


fig. B

I do not find the abrupt closure of the interspaces between the axial ribs a good character. Nor did I find the number of axial ribs to be constant within one species.

Rather recently RODRIGUEZ BABIO and THIRIOT-QUIÉVRIEUX have published a number of SEM (Scanning Electron Microscopy) photographs of a number of different microgastropods. In their 1975 publication there are given some very nice photographs of the protoconchs and first adult whorls of some *Turbonilla* species. These illustrate the planorbid — and helicoid — type protoconch very nicely. One should be aware of the fact, however, that the species illustrated are not always correctly identified:

Planche 2, fig. D, E and F are *Turbonilla pusilla* (PHIL.) and not *T. elegantissima* (MONTAGU) = *T. lactea* (L.) as suggested by the authors.

Planche 2, fig. G, H and I are not *T. innovata* MTRS. but *Chrysallida terebellum* (PHIL.).

The illustrations of a planorbid-type protoconch (planche 2, fig. A, B and C) are correctly identified as *T. crenata* (BROWN) = *T. rufa* (PHIL.).

With these corrections in mind it is found that all (european) *Turbonilla* species possess either helicoid — or planorbid — type protoconchs except *T. (Tragula) fenestrata* [(FBS. ms.) JEFFR.]. The protoconch of the last mentioned species is analogous to the type found in the genus *Chrysallida*. It is therefore suggested that this species should be better placed in this genus and so should rightly be called *Chrysallida (Tragula) fenestrata* (FBS. in JEFFR.).

As there is always a certain variability of the characteristics mentioned one will find in the determination-table below that only a certain combination of characteristics points to a certain species. As in my experience the *Turbonilla*-species are rather more difficult to identify than are those of *Chrysallida* it is even more important to use the descriptions in the standardworks referred to earlier as well as to compare carefully with figures of species as given with this article.

In an interesting study by WHARTON (1976) the author shows the wide variability range of a number of shell features in the genus *Turbonilla*. I agree entirely with his remarks and especially when he points out « Shell characteristics alone are generally unacceptable for a clear understanding of specific differences between species of the subgenus *Turbonilla* s.s. ».

It should therefore be understood that the species mentioned in the following table are more strictly to be considered as « species » in collectors-terms rather than species in the strict biological sense. Although I am convinced that most of them will prove to be that too, it will ask much research in order to be sure.

Before giving the determination-table it should be mentioned that apart from the species of the Azores the following are also not treated in this table:

T. sigmoidea (JEFFR.) — This is a species of Chrysallidae (see VAN AARTSEN, 1977).

T. interrupta (TOTTEN) — A species very similar to *T. rufa* (PHILIPPI). I did never see a specimen of European origin which was identical to this U.S.A.-species and so I prefer to treat *T. interrupta* (TOTTEN) as an exotic species.

T. formosa (JEFFR.) — JEFFREYS (1867 : 164) himself states that the only specimen known was of doubtful origin and that some other specimens he had referred to this species turned out to be *T. rufa* var. *fulvocincta* (THOMPSON). As far as I know nobody has ever mentioned the species after JEFFREYS did except for NORDSIECK in his recent work (1972 : 130), based on material from Ibiza! To me the last mentioned shells are to be considered as forms of the variable *T. rufa* (PHIL.).

T. marioni (DE FOLIN) — According to MONTEROSATO (1890 : 157) this species is identical to *Graphis albida* (KANM.) = *Gr. unica* (MONT.). Although I did not see the original material it seems very likely that MONTEROSATO was right. Prof. C. GOUGEROT, Paris (in lit.) writes me that he has seen the material in the DE FOLIN-collection in Paris and fully agrees with the conclusions of MONTEROSATO. According to MONTEROSATO (1890 : 191) the *T. minuscula* DE FOLIN is also identical with *Graphis albida* (KANM.).

1.a. Spiral sculpture present. Sometimes this spiral sculpture can consist of numerous very fine spiral striae only.	2
b. Spiral sculpture absent.	10
2.a. Spiral sculpture on normal whorls consisting of a few (1 or 2) spiral ribs only.	3
b. Spiral sculpture different.	5
3.a. Spiral sculpture consisting of two spiral ribs at the lower half of the whorl. Whorls for the most part perfectly flat with a greater slope than the side of the shell, sloping in at the place of the spiral ribs.	*fenestrata* [(FBS. ms.) JEFFR.] is *Chrysallida* (fig. 1)
b. Spiral sculpture consisting of one or two spiral ribs. These ribs may be seen mainly between the longitudinal ribs. Whorls rather flat following the contour lines of the shell.	4
4.a. The spiral rib (s) form knots at the intersection with the axial ribs. In somewhat worn specimens the spiral(s) can only be seen between the axial ribs! Colour deep rose.	*rosea* (MTRS.) (fig. 2)
b. The spiral ribs do not form knots. Colour white with a red band over the middle of the whorls.	*rosea* (MTRS.) *var. amoena* (MTRS.)

5.a. Spiral sculpture consisting of granular spiral striae. — *multilirata* (MTRS.) (see note on page 75)

b. Spiral sculpture consisting of numerous very fine spiral striae, covering ribs and interstices alike. — 6

c. Spiral sculpture consisting of incised lines. — 7

6.a. Shell of nearly equal breadth throughout. Very small and slender. H3.00 D0.70 (7 whorls). — *fulgidula* (JEFFR.) (fig. 3)

b. Whorls compressed in the middle. Axial ribs rather irregularly disposed over the shell, sometimes only present on the top-whorls. H3.8 D0.9 (8 whorls). — *semicostata* (JEFFR.) (fig. 6)

c. Whorls also compressed in the middle. With regular axial ribs. Sometimes the top-whorls are smooth. A clear tooth is present. H7.0 D1.72 (11 whorls). — *atlantica* (Loc.) p.p. (fig. 34)

7.a. Several axial ribs are developed into varices, all be it sometimes not very pronounced. — 8

b. No varices are generally present. — 9

8.a. Shell of clearly conical form with 9 to 10 more or less convex whorls. H10.0 D3.0 (10 whorls). — *striatula* (L.) (fig. 4)

b. Shell more slender. Spiral lines much less clearly defined. H10.0 D2.4 (10 whorls). — *mirifica* PALL. (fig. 5)

9.a. Axial ribs forming thin and narrow, more or less vertical lamellae. Whorls with a shoulder at the upper part. H6.0 D2.0 (8 whorls). *scalaris* (PHIL.) (fig. 7)

b. Shell with very similar sculpture but whorls convex, not shouldered and there are more axial lamellae. H5.5 D2.0 (7 whorls). *rufescens* (FORBES) (fig. 8)

c. Whorls not shouldered nor convex but rather flat. Form of the shell varying from regularly conical to subcylindrical. Colour bands (usually) present. Height up to 10 mm. *rufa* (PHIL.) (fig. 10)
= *crenata* (BROWN)

10.a. A peculiar kind of axial striae, covering ribs and interstices alike, is present. These striae (sometimes developed into thin lamellae) are not just growthlines! They are sometimes barely detectable! ! 11

b. Only axial ribs present. No spiral nor other axial sculpture can be detected. 14

11.a. Shell forming a subcylindrical cone. Axial ribs very close to each other and nearly vertical. *compressa* (JEFFR.) (fig. 9)

b. Shell regularly conical. 12

12.a. Shell with irregular axial ribs. These ribs vanish already above the periphery and may be wanting on the last whorl. H7.0 D2.00 (8 whorls). *paucistriata* (JEFFR.) (fig. 11)

b. Shell with numerous but clearly-defined regular ribs. 13

13.a. Shell somewhat coeloconoid. About 24 ribs which are broad and straight, nearly vertical. Whorls relatively low. H24.0 D5.5 (16 whorls). *speciosa* H. ADS. p.p. (fig. 12)

b. Shell somewhat cyrtoconoid. About 16 ribs which are curved at the upper suture and lateron becoming obsolete. H12.0 D3.25 (12 whorls). *magnifica* (SEG.) (fig. 13)

14.a. Some of the axial ribs are developed into varices. The ribs are straight and nearly vertical. *rectogallica* SACCO (fig. 35) = *pusilla* B.D.D. non PHIL.

b. No (regular) varices present. 15

15.a. Shell relatively long, reaching 9 to 10 mm in height at about 10-12 whorls. Also relatively solid. 16

b. Shell not much more than 6 mm and usually less. 17

16.a. Embryonic whorls somewhat helicoid with axis at right angles to the axis of the shell. The height/diameter ratio of the lower whorls reaching about 0.45. *speciosa* H. ADS. p.p. (fig. 12)

b. Embryonic whorls somewhat more planorbid but the axis makes an angle of about 135° with the axis of the shell. The height/diameter ratio of the lower whorls reaching about 0.55 to 0.60. *lactea* (L.) *s.l.* (fig. 14-31)

17.a. Shell small. Height 2.5 to 3 mm only, with a more or less subcylindrical outline. Diameter usually between 0.6 and 0.85 mm. 33

b. Shells somewhat bigger and more conical or, if subcylindrical, of 1 mm or more in diameter. 18

18.a. The height/diameter ratio of the lower whorls reaching about two-thirds. Shells relatively slender.	19	
b. The height/diameter ratio of the lower whorls about 0.50 or slightly more: reaching 0.6 at most.	22	
19.a. The first 3 to 5 regular whorls without axial ribs. There is also a clear transparent band below the upper suture.	20	
b. Axial ribs on all the regular whorls.	21	
20.a. The axial ribs somewhat irregular. A small but clearly-defined tooth on the columella and sometimes some small teeth at the inside of the outer lip. Whorls concave.		*atlantica* (Loc.) p.p. (fig. 34)
b. At 10 whorls about 4.5 mm in height. Axial ribs projecting above the upper suture so as to make the sutural line wavy in appearance.		*delicata* (Mtrs.) (fig. 15) = *gracilis* (Phil.) non Brocchi
c. At 10 whorls 6 to 6.5 mm in height. Axial ribs rather broad and very near to each other. Ribs do not project above the suture.		*acuta* (Don.) Smith (fig. 16)
21.a. Ribs vertical. Shell decidedly conical (D/2H $\sim$ 0.165). Relative height of the last whorl more than 0.40.		*verticalis* (Marsh.) (see note on page 75)
b. Ribs also about vertical but shell more slender (D/2H $\sim$ 0.125). A small but clear tooth on the columella. Whorls concave. Relative height of the last whorl about 0.35.		*atlantica* (Loc.) p.p. (fig. 34)
c. Ribs oblique and opisthocline, running about parallel to the left-hand-side contour of the shell. Shell rather slender (D/2H $\sim$ 0.120). No tooth on the columella. Whorls flat to slightly convex.		*tenuis* Pall. (fig. 18)

22.a. Relative height of the last whorl equal to 0.40 or more. 23

b. Relative height of the last whorl decidedly less than 0.40. 26

23.a. Whorls more or less convex, apical whorls planorbid with an axis making an angle of 135° with the shell axis. 24

b. Whorls flat and sometimes shouldered. 25

24.a. Shells with D/2H ~ 0.200, axial ribs strong, opisthocline, 14-16 in number. Whorls relatively low. *obliquata* (PHIL.) (fig. 17)

b. Shells somewhat more slender (D/2H~0.180). Axial ribs not so strong, 18-20 in number. Whorls somewhat higher. Young specimens! *lactea* (L.) *s.l.* (fig. 14)

25.a. Whorls shouldered at the upper suture. Relative height of the last whorl about 0.42. Shells of 3.5 mm (8 whorls). *pseudogradata* NORDS. (fig. 19) = *gradata* MTRS. non B.D.D.

b. Whorls flat, not shouldered. Relative height of the last whorl 0.45. Shells of 4.5-5 mm (8 whorls). *sinuosa* (JEFFR.) (fig. 20) = *grossa* (MARSH.)

26.a. Whorls shouldered at the upper suture. 27

b. Whorls not shouldered. 28

27.a. Shell subcylindrical with obtuse top. Ribs almost straight and vertical. *gradata* B.D.D. (fig. 21)

b. Shells conical-cyrtoconoid with relatively pointed top. Ribs almost straight but opisthocline, running about parallel with the lefthand-side contour of the shell. *hamata* NORDS. (fig. 22)

28.a. Whorls rather convex.	29
b. Whorls only very slightly convex or flat.	30
29.a. Shells about 3.2 mm in height. The interstices between the axial ribs much wider than the breadth of the ribs.	*jansseni* n. nov. (fig. 23) = *acuticostata* (JEFFR.)
b. Shells about 7 mm in height. The interstices between the axial ribs of the same breadth as the ribs themselves.	*syrtensis* n. nov. (fig. 36) = *pallary* NORDS. non DAUTZ. = *stricta* PALL. non VERRILL, nec CLESSIN pro parte
30.a. Form of the shell regularly conical but slender. Axial ribs inclined opisthocline, especially on the top whorls.	*acutissima* MTRS. (fig. 24)
b. Form of the shell more or less cyrtoconoid, especially near the top.	31
31.a. Embryonic whorls helicoid, their axis making an angle of about 90° with the shell axis. Axial ribs straight and more or less oblique (opisthocline).	*pusilla* (PHIL.) (fig. 25)
b. Embryonic whorls more planorbid, their axis making an angle of about 135° with the shell axis. Axial ribs curved (inverted C-shaped).	32
32.a. Ribs as broad or broader than the interspaces. Axial ribs on lower whorls strongly curved, interspaces deeply excavated.	*innovata* MTRS. (fig. 26) = *pusilla* JEFFR. non PHIL.
b. Ribs (much) narrower than the interspaces. The interspaces are much less deeply excavated and the ribs are less curved.	*pallaryi* DAUTZ. (fig. 27) = *pseudostricta* NORDS.

33.a. Shells of subcylindrical outline throughout. Diameter 0.7-0.8 mm. 34

b. Shells subcylindrical at the lower whorls but clearly cyrtoconoid near the top. Diameter of lower whorls 0.8-0.185 mm. 35

34.a. Embryonic whorls planorbid with axis at about 135° with the shell axis. Whorls somewhat convex. *attenuata* (JEFFR.) (fig. 28)

b. Embryonic whorls helicoid with axis at about 90° with the shell axis. Whorls flat with nearly vertical axial ribs. cf. *micans* (MTRS.) NORDS. (fig. 29)

35.a. Embryonic whorls with axis at about 135° with the shell axis. Whorls flat. Axial ribs on the lower whorls curved (inverted C-shaped) with deeply excavated interstices. *innovata* MTRS. *nana* (MARSH.) (fig. 30)

b. Embryonic whorls with axis at about 90° with the shell axis. Whorls flat. Axial ribs nearly straight and more or less oblique (opisthocline). *pusilla* (PHIL.) *minuscula* (MARSH.) (fig. 32)

Remarks and notes:

Turbonilla acuta (DONOVAN, 1804) SMITH, 1974

Much confusion about this name exists in the literature. JEFFREYS (1867: 167) considers *T. acuta* to be a synonym of *T. lactea* (L.). This same view was held by BUCQUOY, DAUTZENBERG and DOLLFUS (1883) as well as by PRIOLO (1961). LOCARD (1892), HIDALGO (1917) and MONTEROSATO do not mention *T. acuta* (DON.). MARSHALL who has given many valuable contributions to the knowledge of the British mollusca also does not mention the name. More recently the name is mentioned by WINCKWORTH (1932) in his well known list of British marine mollusca, referring to it the *T. gracilis* in FORBES & HANLEY as well as the figure on Plate XVI fig. 3 s.n. *T. pusilla* in Sowerby's Index (1887). According to MARSHALL (1900 : 334) however, this same figure is to be referred to *T. pusilla* (PHIL.) although Marshall suggests that the figure is not a very good one. Unfortunately Winckworth does not give any particulars why he considers *T. acuta* (DON.) a species which can be clearly recognized after more than a hundred years.

In more recent times Mrs. MCMILLAN (1968 : 62) used the name *T. acuta* for a shell with the following description: « Smaller than the last [= *T. lactea* (L.) s.n. *T. elegantissima* (MONT.)], this subcylindrical shell has only 9 whorls with oblique ribs and no tooth. Not uncommon, but perhaps often confused with *elegantissima* ». No figure is given. Miss Sh. SMITH, in her recent key (1974) apparently follows this view but adds as a reference part of the shells called *T. delicata* (MTRS.) by NORDSIECK (1972 : 125 spec. no. 3.030). The characteristic of this species should be that the first 3 to 4 regularly whorls do not show axial ribs. Although from all this it is not clear whether WINCKWORTH, MCMILLAN and SMITH all meant to describe the same species it seems that at least the last two authors agree in that they mean a species which is

1) smaller than *T. lactea* (L.), and has
2) only 9 whorls. Furthermore the whorls are
3) higher in proportion than in *T. lactea* and the shell is
4) more aciculate (« subcylindrical »). It may be that the topwhorls are frequently smooth.

A Turbonilla-species which fulfils all these requirements and having a helicoid protoconch with axis at 90° to the shell axis, I have therefore provisionally named *T. acuta* (DON.) SMITH. This species occurs at the Atlantic coast in the Southwest of France and the North of Spain and in the Mediterranean on the Algerian coast. It may be identical with *Turbonilla subulina* (MTRS.) PALLARY, 1920 from the Atlantic coast of Morocco, but I have not yet been able to check this.

Turbonilla pallaryi DAUTZENBERG, 1910

According to NORDSIECK (1972 : 124) there are two species which have been mixed in the description of PALLARY (1904 : 236) of a new species *Turbonilla stricta*. One of these two species is about 7 mm long and has rather convex whorls. This has been called *pallaryi* NORDSIECK, 1972 because of preoccupation of the name *stricta* by VERRILL. However, the other, smaller species (about 4.5 mm and only slightly convex whorls) which was called *pseudostricta* by NORDSIECK, 1972 had already been called *pallaryi* by DAUTZENBERG (1910 : 95) because of preoccupation of the name *stricta* by CLESSIN (1902). This same species is figured by PALLARY (1920 : Planche - fig. 10).

It follows that the species *Turbonilla pallaryi* NORDSIECK, 1972 non DAUTZENBERG, 1910 is in need of a new name for which I propose *Turbonilla syrtensis* nom. nov.

The smaller of the two species should be called *Turbonilla pallaryi* DAUTZENBERG, 1910 = *Turbonilla pseudostricta* NORDSIECK, 1972.

Turbonilla rosea (MONTEROSATO, 1877)

This species was first identified as *Turbonilla internodula* (WOOD), a pliocene fossil species from the English Crag. However, MONTEROSATO was not quite sure about the identity and suggested the name *rosea* in case the recent, Algerian species should be found to differ from the fossil *T. internodula* (WOOD). The name *rosea* is a very appropriate one because the species is usually intensely coloured rose. This also explains that the name *rosea* was again imposed on this species by v. MALTZAN in 1885 apparently unaware of the fact that MONTEROSATO suggested this name already in 1877. It should be noted, however, that also white specimens do occur albeit rather rare.

Turbonilla fulgidula (JEFFREYS, 1884)

Originally described with dimensions 1.85 mm long and 0.75 mm broad. Specimens in my own collection which have been compared with those in the Jeffreys' collection (Smithsonian Inst. Washington, number 132732 from Porc. Exp. 1870 Sta. 13) show that the species can become about 3 mm long *at the same breadth* of 0.7 - 0.8 mm. Accordingly full-grown specimens are much more cylindrical than the original figure by JEFFREYS (1884 : Plate 27 fig. 3) would suggest.

Turbonilla mirifica PALLARY, 1904

Specimens from Sfax of the species *T. mirifica* PALLARY have convinced me that this is a species closely allied to *T. striatula* (L.). It has the same type of ribs, it does have an occasional varix, there is a weak spiral sculpture present and some specimens show teeth on the inside of the outer lip, just as can be seen in *T. striatula* (L.). Also PALLARY (1904 : 238) himself compares his new species with *T. striatula* (L.). In view of this evidence I cannot agree with NORDSIECK (1972 : 123) that *T. mirifica* PALLARY, 1904 should be equal to *T. acuticostata* (JEFFREYS, 1884). The original description by Jeffreys, to me at least, does not suggest a close relationship between *T. acuticostata* (JEFFR.) and *T. striatula* (L.), which is also mentioned by JEFFREYS in the same work. Specimens from the Jeffreys' Collection (Reg. n.° 132708, Porc. Exp., 1870, Razel Amoush and Reg. n.° 132709, Cape Breton, France) confirm that the two species are very different indeed!

Turbonilla cf. *micans* (MONTEROSATO, 1875) NORDSIECK, 1972

The species described and figured under this name by NORDSIECK (1972 : 127 Plate P V fig. 30) certainly is a good species allied to *T. pusilla minuscula* MARSHALL, 1891 but it is certainly not equal to *T. attenuata* (JEFFREYS, 1884), specimens of which I have studied from the Jeffreys' collection in Washington (USA). In *attenuata* (JEFFR.) (from the Jeffreys' Collection, Washington Reg. n.° 132711, Porc. Exp. Sta. 55), the whorls are somewhat more convex and the embryonic whorls have their axis at 135° to the shell-axis whereas in *T. micans* (MTRS.) NORDSIECK the whorls are very nearly flat and the embryonic whorls (helicoid) have their axis at 90° to the shell-axis. Although MONTEROSATO (1884 : 92) himself declared the shell described as *Od. attenuata* by JEFFREYS to be the same as his *T. micans*, it seems to me he may have been mistaken and the species discussed here is given under the name *T. cf. micans* (MTRS.) NORDSIECK, 1972.

Turbonilla rufa (PHILIPPI, 1836)

Several forms have been described with essentially the same type of spiral sculpture consisting of spirally incised lines. The differences between these forms viz. more or less slender, uniformly coloured or banded and more or less axial ribs, in my opinion are not enough to warrant different species. I therefore regard *fulvocincta* (THOMPSON), *crenata* (BROWN), *fasciata* (REQ.), *spectabilis* (MTRS.) and *exigua* (MTRS.) all to be varieties of one and the same species: *Turbonilla rufa* (PHILIPPI, 1836).

The only species which may be different is *T. densecostata* (PHILIPPI, 1844). It is not easy to find out what PHILIPPI really meant by this name. It seems certain, however, that MONTEROSATO, B.D.D. as well as PRIOLO all applied this name to what in my opinion is a small and slender form of *T. rufa*. Therefore, it seems advisable to follow this opinion and not to consider *T. densecostata* (PHILIPPI) a separate species until further evidence is brought forward. *Turbonilla formosa* (JEFFR.) sensu NORDSIECK, 1972 may be placed in the same category.

Turbonilla multilirata (MONTEROSATO, 1875) and *T. verticalis* (MARSHALL, 1900)

These two species I do not know and so I have been obliged to use what is known about them in the literature. The English Journal of Conchology, vol. 13 (1912) contains a plate (number 5) on which both species are given as photographs but these are not very good ones.

Turbonilla lactea (L., 1766) and *T. campanellae* (PH., 1836)

I consider *T. lactea* identical with *T. elegantissima* (MONT.) and in view of priority use the name given by LINNAEUS.

As far as I can make out *T. campanellae* (PHIL.), is somewhat more slender than the Atlantic specimens of *lactea* and occurs mostly in the

Mediterranean. However, there are (young) specimens of what I consider to be the real *T. lactea* found in the Mediterranean also. On the other hand certain specimens of the Atlantic coast of France cannot be distinguished from the usual Mediterranean form *campanellae*. Furthermore, both forms vary in their relative slenderness, the form and the number of ribs but retain the same protoconch. Therefore, I consider *T. campanellae* a form of *T. lactea* and not a species in its own right. See also fig. 31 and fig. 14.

Turbonilla robusta

The Jeffreys' collection in Washington (USNM) does contain a sample numbered 132750 with the name *Odostomia robusta*. The label does not give any author and further states « Cape Breton/France - de Folin ». Two specimens are present, one of which is figured here (fig. 33). Both specimens belong to the same species, but I have not been able to trace any *Od. robusta*. The specimens quite clearly show distinct spiral lirations, just as mentioned for *T. multilirata* (MTRS.). It thus seems possible that these specimens really should be called by the latter name.

Turbonilla hamata NORDSIECK, 1972

Although I have separated this species from *T. delicata* (MTRS.) it is with some hesitation and I would not be too surprised did it turn out to be a form of *T. delicata* MTRS. after all.

Turbonilla acutissima MONTEROSATO, 1884

Also here there is a severe doubt as to this species claim to independence. It may very well be a form of the very variable *T. pusilla* (PHIL.) although for collectors purposes I have preferred to treat *T. acutissima* MTRS. as a separate species.

Turbonilla acuticostata (JEFFREYS, 1884)

As it has now been demonstrated that *Odostomia acuticostata* JEFFREYS, 1884 is not the same species as *Turbonilla mirifica* PALLARY, as supposed by NORDSIECK (1972 : 123), this species is in need of a new name, because there exists already a *Turbonilla acuticostata*, an oligocene fossil described by O. SPEYER (1870 : 197 and Taf. 26, fig. 6). As both species are real *Turbonilla*, I propose the new name *Turbonilla jansseni* for the species *Turbonilla acuticostata* (JEFFR., 1884), non O. SPEYER, 1870. The species is named after my friend Arie W. Janssen of the Rijksmuseum van Geologie en Mineralogie / Leiden.

The fossil *T. acuticostata* O. SPEYER is also discussed and figured in the recent work of R. JANSSEN (1978 : 340 and Taf. 18a, fig. 94).

In conclusion I must stress again that the identification of *Turbonilla* species on the basis of a key only, as the one published here, is rather dangerous. One should consult the relevant literature and compare carefully with the figures published. Also it should be realized that some species are much more variable than others. Within the genus *Turbonilla* the most variable species (and most generally encountered) undoubtedly is *T. pusilla* (PHIL.). This species more or less plays the same role in *Turbonilla* as the species *obtusa* (BROWN) [= *interstincta* (MONTAGU)] among *Chrysallida*.

Appendix

Most specimens figured are from my own collection. A number of species however is rather rare and so I borrowed specimens from the Jeffrey's collection (Washington) and from the British Museum (London). In view of the recent publication by WARÈN (1980) it seems worthwile to mention the sample-numbers of those species which have here been photographed:

T. acuticostata (JEFFR.) = *T. jansseni* n. nov.	USNM n. 132708
T. attenuata (JEFFR.)	USNM n. 132711
T. compressa (JEFFR.)	USNM n. 133047
T. magnifica (SEGUENZA)	USNM n. 132337
T. paucistriata (JEFFR.)	USNM n. 132210
T. semicostata (JEFFR.)	USNM n. 132752
T. speciosa (H. ADAMS)	USNM n. 132756
T. robusta (no author mentioned)	USNM n. 132750
T. acutissima (MTRS.) (fide MTRS, Alger, M. Joly)	BMNH. 1911.10.26.28493-502
T. rufescens (FORBES)	BMNH. 1911.10.26.29041-042

Acknowledgement

The work described above could not have been done without the invaluable help of a number of people. Many thanks are due to Dr. J. Rosewater and Dr. H.A. Rehder (USNM - Washington), Miss K. Way (BMNH - London) and Dr. J.v. Goethem (MHN - Brussels) for loan of specimens from the musea mentioned as well as to Ir.A. Verduin (RMNH - Leiden) and Dr. G. Barletta for taking the photographs published with this paper. Special thanks are due to Dr. F. Ghisotti for his help and encouragement in this work.

INDEX AND SYNONYMS

(A = European Atlantic species - M = Mediterranean species)

A M	*multilirata* (Mtrs., 1875)	: (see on page 75)
A M	*nana* (Marshall, 1894)	: fig. 30 form of *innovata* Mtrs.
M	*obliquata* (Philippi, 1844)	: fig. 17
M	*pallaryi* Dtz., 1910	: fig. 27 (see on page 73)
M	*pallaryi* Nordsieck, 1972	: *syrtensis* n. nov. (see on page 73)
A M	*paucistriata* (Jeffr., 1884)	: fig. 11
M	*pseudogradata* Nords., 1972	: fig. 19
M	*pseudostricta* Nords., 1972	: *pallaryi* Dtz. (see on page 73)
M	*pusilla* B.D.D., 1883	: *rectogallica* Sacco
A M	*pusilla* (Jeffr., 1867)	: *innovata* Mtrs.
A M	*pusilla* (Philippi, 1844)	: fig. 25
M	*rectogallica* Sacco, 1890	: fig. 35
A	*robusta* (? Auct.)	: fig. 33 (see on page 76)
M	*rosea* (Mtrs., 1877)	: fig. 2 (see on page 74)
A M	*rufa* (Philippi, 1836)	: fig. 10 (see on page 75)
A	*rufescens* (Forbes, 1846)	: fig. 8
A M	*scalaris* (Philippi, 1836)	: fig. 7
A	*semicostata* (Jeffr., 1884)	: fig. 6
A M	*sigmoidea* (Jeffr., 1884)	: is *Chrysallida* (see on page 64)
A M	*sinuosa* (Jeffr., 1884)	: fig. 20
A	*speciosa* H. Adams, 1869	: fig. 12
M	*spectabilis* (Mtrs., 1884)	: form of *rufa* (Ph.) (see on page 75)
M	*striatula* (L., 1766)	: fig. 4
M	*stricta* Pallary, 1904	: *syrtensis* (p.p.) n. nov. (see on page 73)
A	*subulina* (Mtrs.) Pall., 1920	: ? *acuta* (Don.) Smith (see on page 73)
M	*syrtensis* n. nov.	: fig. 36 (see on page 73)
M	*tenuis* Pallary, 1904	: fig. 18
A	*verticalis* (Marshall, 1900)	: (see on page 75)

DESCRIPTION OF PLATES

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fig. 5 - *Turbonilla mirifica* PALLARY, 1904 x 15

fig. 6 - *Turbonilla semicostata* (JEFFREYS, 1884) x 30

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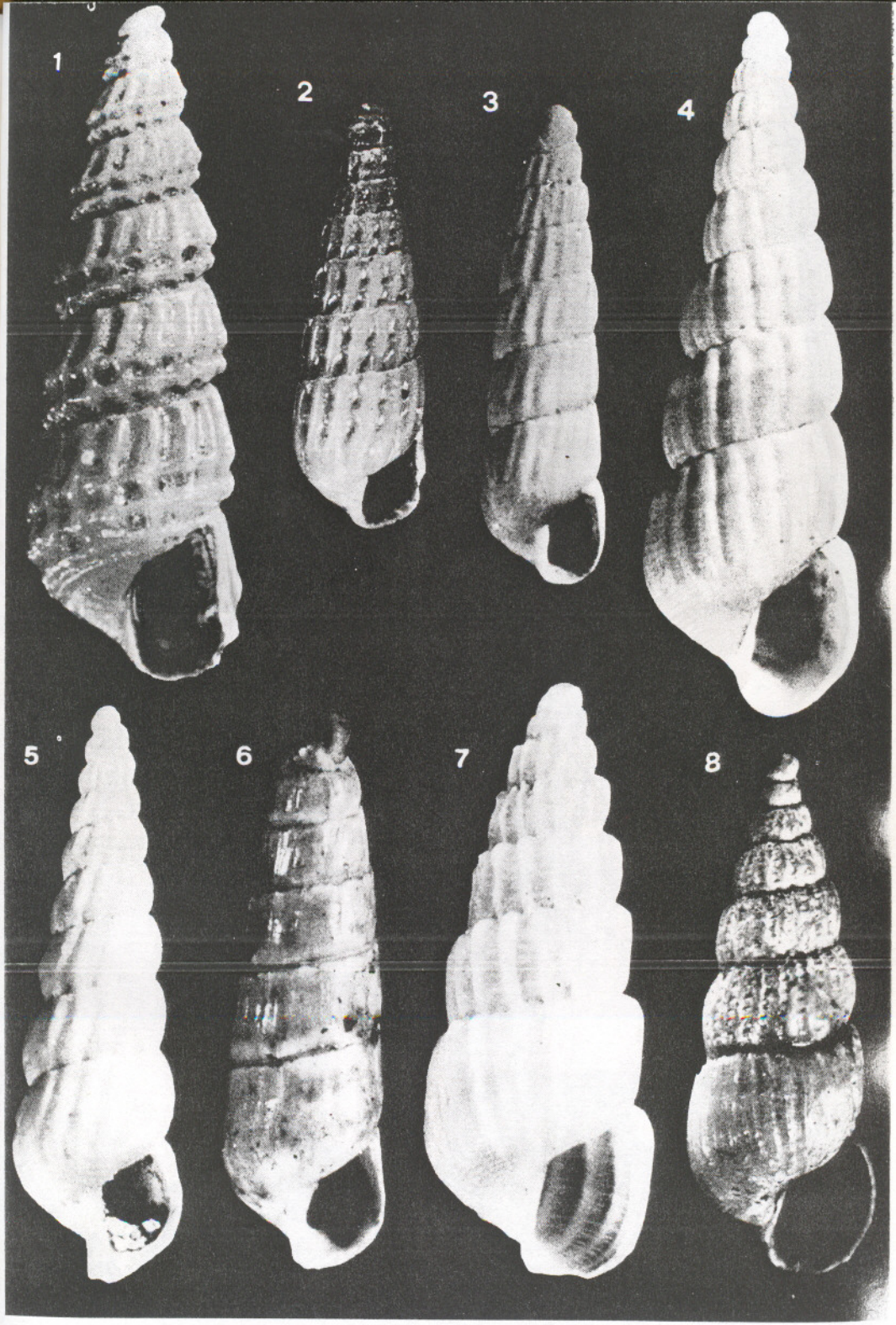
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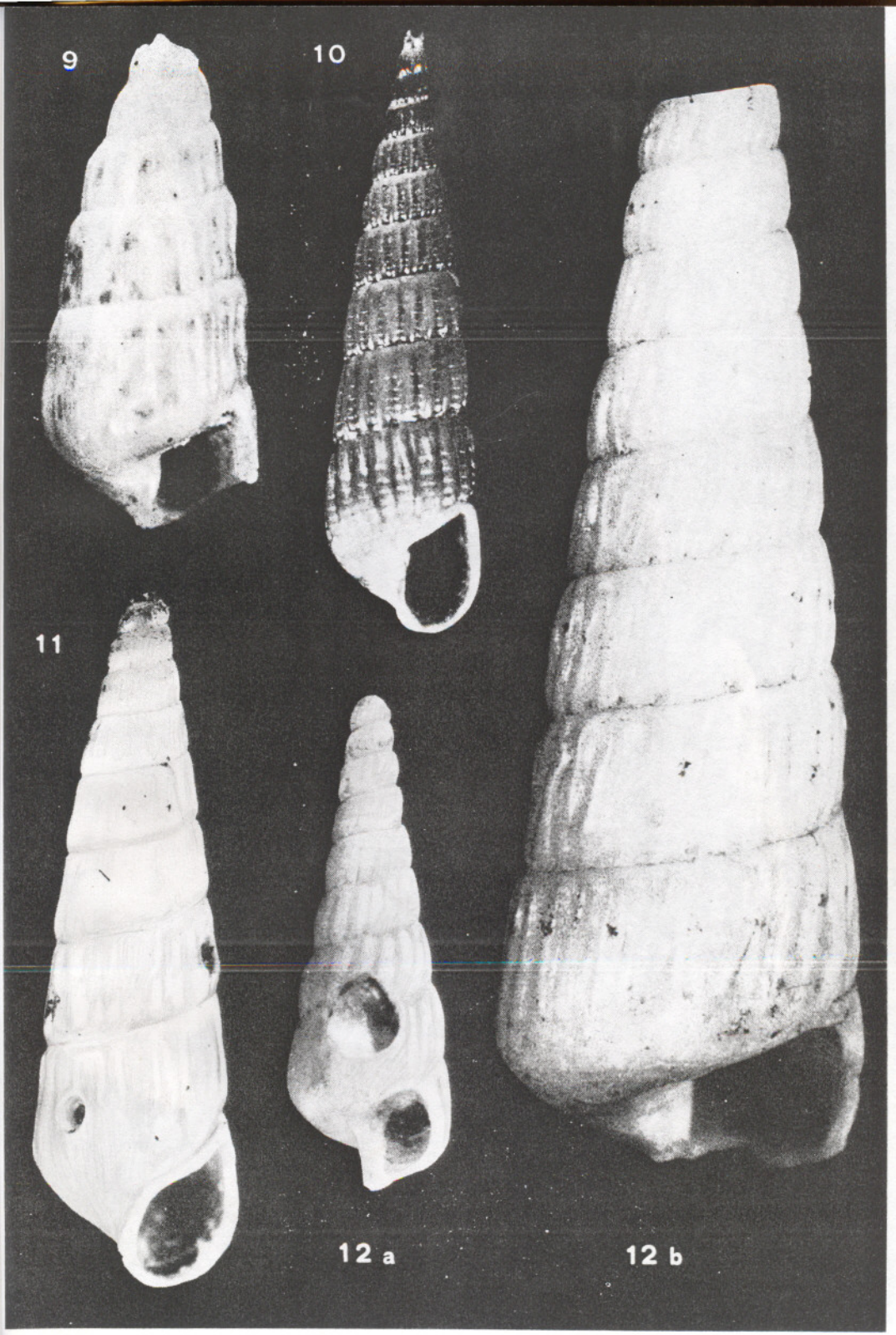

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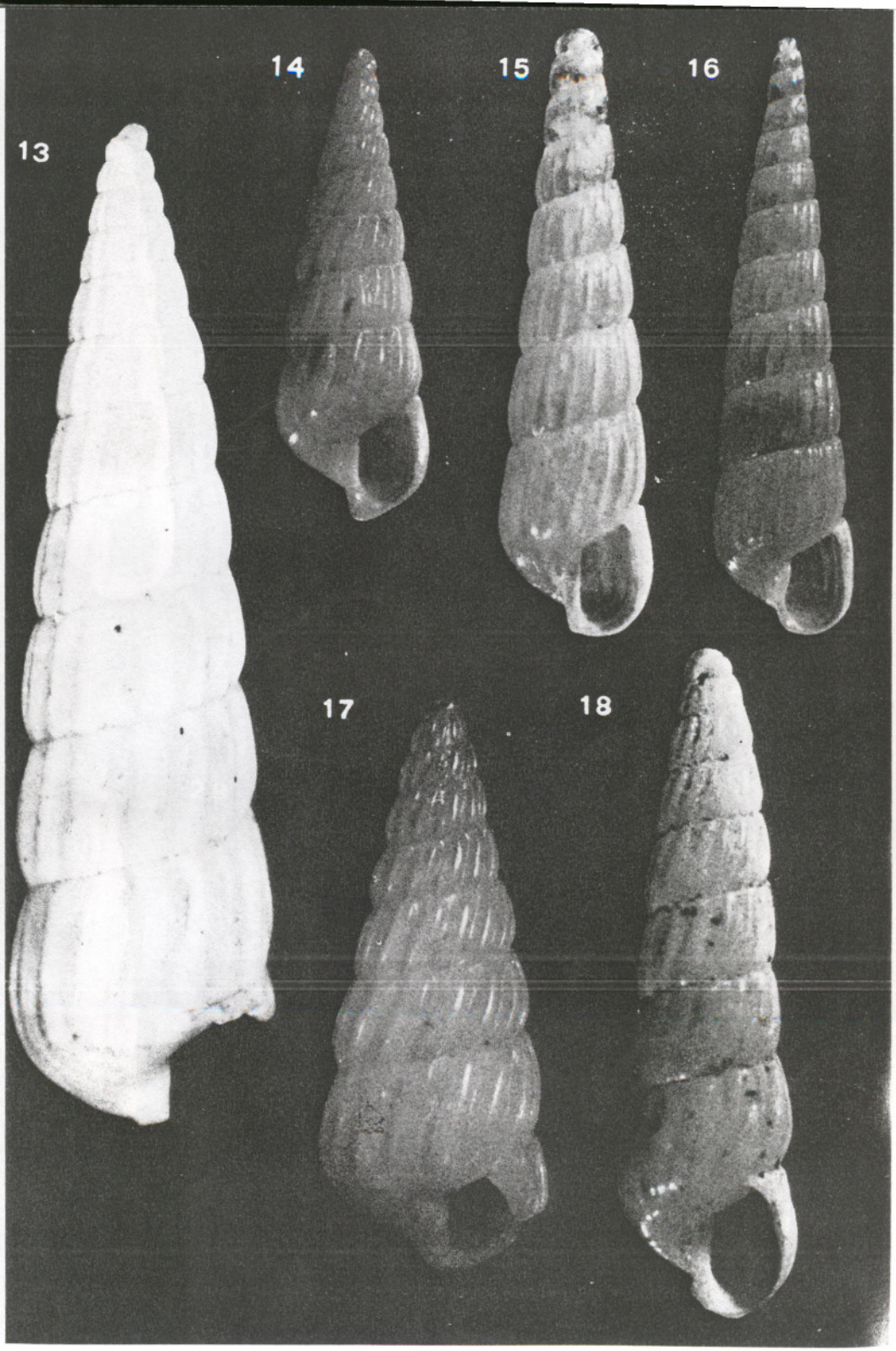

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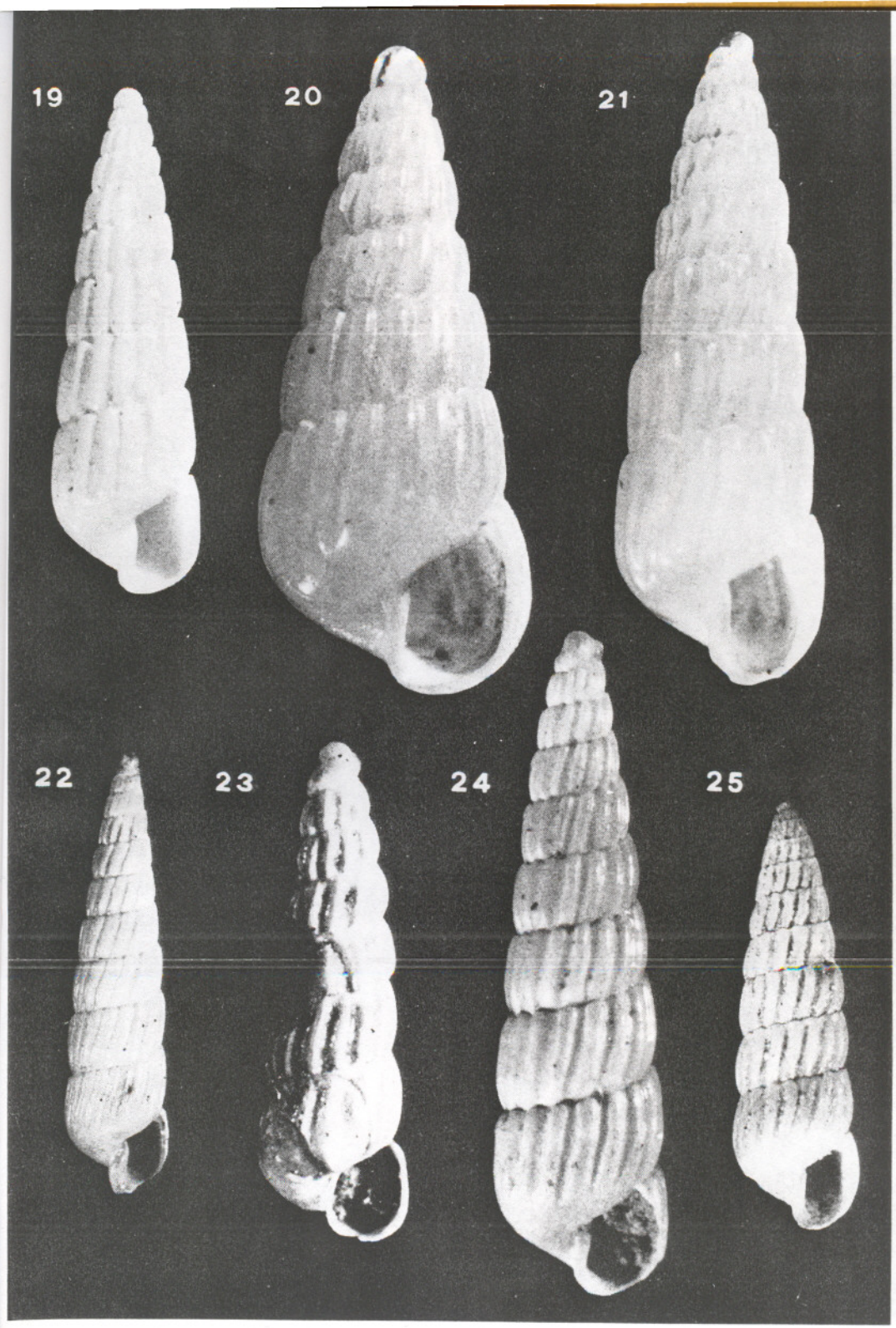
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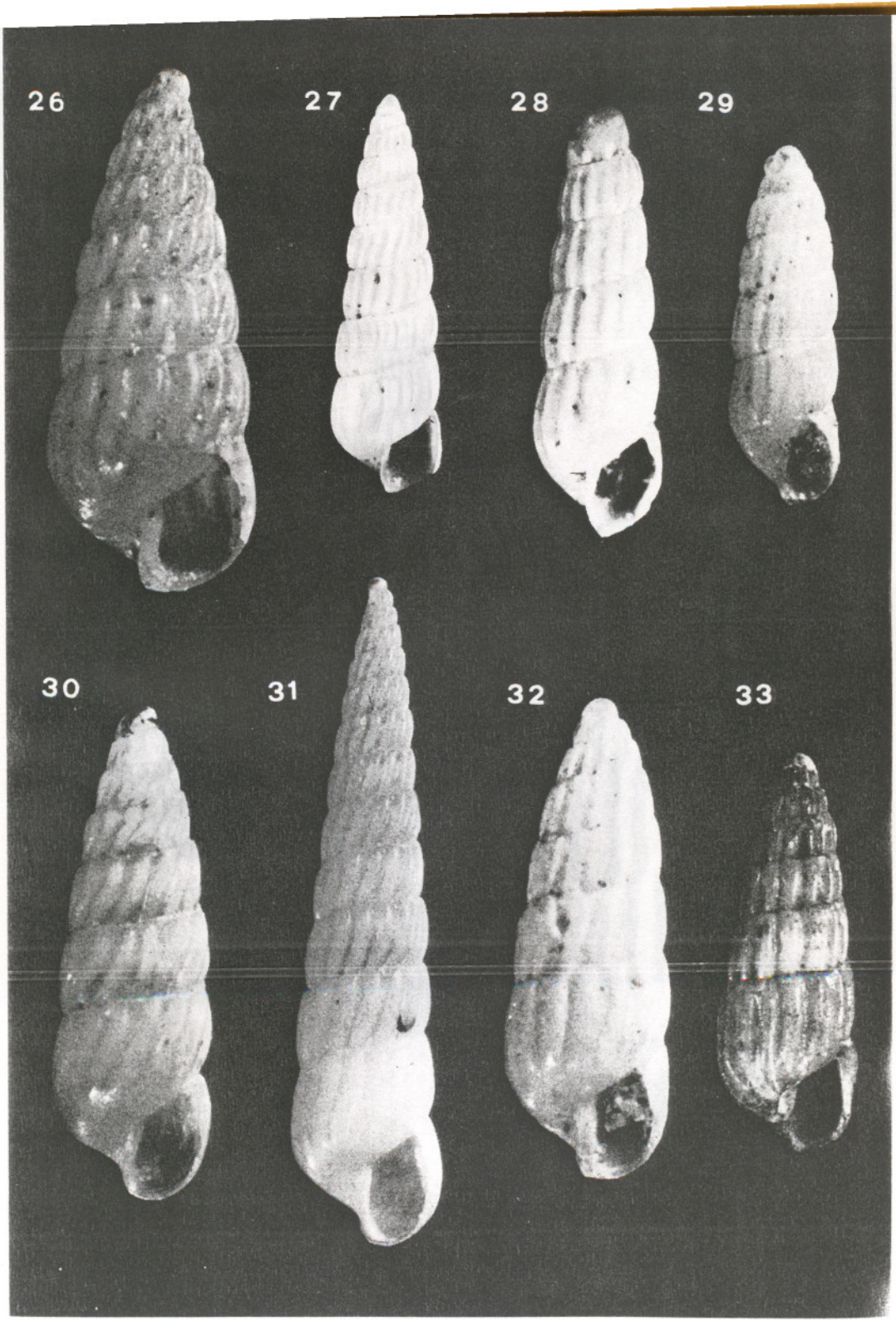

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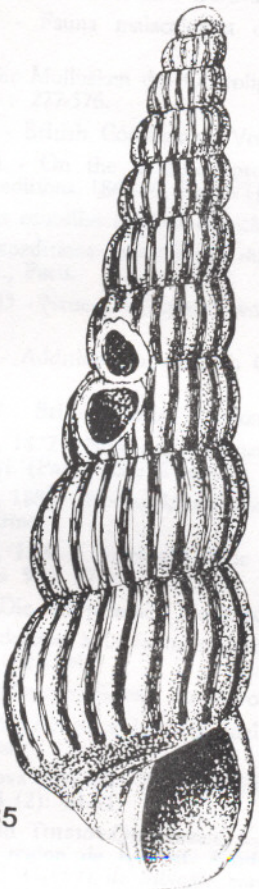

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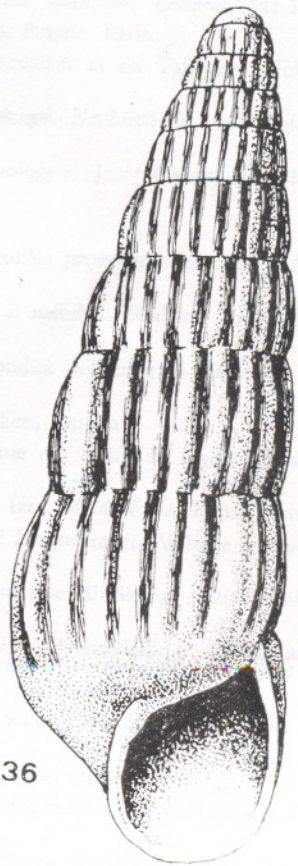

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