

TAXONOMIC NOTES ON THE MITROMORPHA
GROUP OF THE FAMILY TURRIDAE
(MOLLUSCA : GASTROPODA : BORSONIINAE)

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Abstract. The genus *Mitromorpha* Carpenter is divided in the subgenera *Lovellona* Iredale, *Mitrolumna* Bucquoy, Dautzenberg & Bouge, and *Anarithma* Iredale. Some Indo-Pacific species of the *Anarithma* group are elucidated on the basis of their type specimens.

Early authors usually assigned species of the *Mitromorpha* — *Mitrolumna* group to either the Columbelloidea or Mitridae, and the majority of *Anarithma* species were described in the genus *Columbella* on the basis of the "V"-shaped groove on the columella which closely resembles the "split tooth" of some species of Columbelloidea. Thiele (1924) was the first author who examined the radula of *Mitra lachryma* Reeve, 1845 [= *Mitromorpha* (*Anarithma*) *metula* (Hinds, 1843)]. He excluded the species from the Mitridae and the Columbelloidea and relocated it in the subfamily Mangeliinae, family Turridae. He also remarked on the close similarity of the radula of *Mitromorpha filosa* (Carpenter, 1864) to the radula of *Anarithma*. Thiele's paper appears to have been overlooked by subsequent authors and Powell (1966) continued the placement of *Anarithma* in the Columbelloidea. Orr (1959), who examined the radula of *Lovellona atramentosa* (Reeve, 1849), found it to be closely similar to *Mitromorpha filosa* (Carpenter), and re-located *Lovellona* Iredale, in the Turridae.

Two recently published papers (Kilburn 1986 and Drivas & Jay 1986) deal with some species of the *Mitromorpha* group from South Africa and Reunion Island.

Family TURRIDAE

Subfamily **Borsoniinae** Bellardi, 1875

(Synonyms: Diptychomitridae Bellardi, 1889 (*nomen oblitum*); Mitromorphinae Casey, 1904 [May]; Mitrolumninae Sacco, 1904 [August]).

The assignment of the *Mitromorpha* — *Mitrolumna* group of species to the Borsoniinae by Powell (1966) and Kilburn (1986) appears to be an appropriate placement and a suppression of the forgotten family group Diptychomitridae Bellardi, would thus become unnecessary.

Genus **Mitromorpha** Carpenter, 1865

Mitromorpha Carpenter, 1865, Ann.Mag.Nat.Hist. (3) 15:182. Type species of *M. M.filosa* Carpenter = *Daphnella filosa* Carpenter, 1864 (non *Columbella filosa* Dujardin, 1837 = *Mitromorpha*) = *Mitromorpha carpenteri* Glibèrt, 1954. Recent, Eastern Pacific.

Shell small, biconic, usually with a short spire and longer, narrow aperture, columella edentulous in adult specimens, anal sinus weak to moderately prominent, siphonal canal unnotched, protoconch paucispiral and with 1½-2 dome-shaped embryonic whorls. Operculum lacking. Radula with a simple barbless shaft with a constriction a short distance behind the tip, base expanded.

I follow Emerson & Radwin (1969) and Keen (1971) in considering the presence or absence of columellar folds in this turrid group to be of diagnostic importance. Species without folds on the columella are edentulous in the juvenile as well as adult stage, but in the *Mitrolumna* group, species which always have a biplicate columella in the adult stage, will have an edentulous columella only in the juvenile or immature stage.

Subgenus **Lovellona** Iredale, 1917

Lovellona Iredale, 1917, Proc.Malac.Soc.Lond. 12(6):329. Type species by OD *Conus atramentosus* Reeve, 1849. Recent, Indo-Pacific.

Shell small, coniform, with a short spire and long aperture, columella edentulous, anal sinus absent, protoconch conical and with 2½-2¾ smooth whorls. Operculum absent, radula as in *Mitromorpha*.

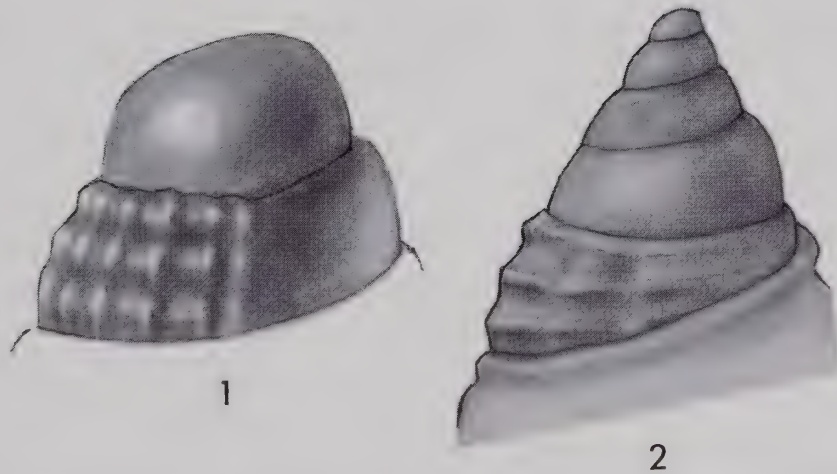
This weak subgenus which appears to be monotypic, differs only slightly in shape from *Mitromorpha* and the protoconch is conical multispiral rather than domed paucispiral as in *Mitromorpha*. Kay (1979) described the protoconch of *M. (L.) atramentosa* as "paucispiral, consisting of 1½ smooth, white whorls". Kilburn (1986) gave an SEM photograph of the protoconch of *M. (L.) atramentosa* and described the protoconch as consisting of 2½ embryonic whorls. Specimens which I examined had a conical protoconch of 2½-2¾ smooth embryonic whorls.

The Hawaiian *Lovellona peaseana* Finlay, 1927 (Fig. 1), belongs to *Mitromorpha s.str.* I have not seen the type specimen of *Conus micarius* Hedley, 1912, but specimens seen in collections with this name were worn *M. (L.) atramentosa* (Reeve).

Subgenus **Mitrolumna** Bucquoy, Dautzenberg and Dollfus, 1883

Mitrolumna Bucquoy, Dautzenberg & Dollfus, 1883, Moll.mar.Roussilon 1(3):115, 121. Type specimens by OD *Mitra olivoidea* Cantraine, 1835. Recent, Mediterranean.

Similar to *Mitromorpha* in shell and radular features but the columella of adult specimens of *Mitrolumna* has 2 folds and the protoconch is either paucispiral or multispiral and contains from 1½-3¼ embryonic whorls.



Figs. 1,2. Protoconchs. 1. *Mitromorpha (Mitromorpha) peaseana* Finlay, Hawaiian Is.
2. *M. (Anarithma) metula* (Hinds). Hawaiian Is.

Kilburn's (1986) diagnosis of the protoconch of species of the *Mitrolumna* group was "1½-2 embryonic whorls". However, the protoconch of *M. (M.) olivoidea* (Cantraine) has from 2-2¼ embryonic whorls and the same number can be found in *M. (M.) alba* (Petterd). Drivas & Jay (1986) described *M. (M.) kilburni* as having 2½ embryonic whorls and *M. (M.) keenae* (Emerson & Radwin 1969), which is an undisputed *Mitrolumna*, has been described as having ¾ smooth, glassy, translucent-white embryonic whorls (Emerson & Radwin 1969). This is clearly an overlap in the number of embryonic whorls between the *Mitrolumna* group (1½-3¼) and the *Anarithma* group (2¾-4½) of species. Paucispiral and multispiral protoconchs may be found in *Vexillum s.str.* Röding, 1778, *Pusia* Swainson, 1840, *Nassarius* Dumèril, 1806, and the buccinid *Cantharus (Prodotia)* group, and a generic placement on features of protoconch characters would result in nomenclatorial chaos. For a list of synonyms of the genus-group *Mitrolumna* see Kilburn (1986).

Subgenus *Anarithma* Iredale, 1916

Anarithma Iredale, 1916, Proc.Malac.Soc.Lond. 12(1):27. Type species by M *Clavatula metula* Hinds, 1843. Recent, Indo-Pacific.

Similar to both *Mitromorpha* and *Mitrolumna* in shell and radular features but differs from both in the convex columella with a "V"-shaped notch which resembles the columbellid notch in some Collumbellidae, siphonal canal notched. Operculum absent. Protoconch conical, consisting of 2¾-4½ smooth embryonic whorls (Fig. 2).

In addition to the species mentioned in more detail below, *Columbella fischeri* Hervier, 1899, also belongs to *Anarithma*. *Columbella (Conidea) perplexa* Schepman, 1911, from the Moluccas, Indonesia is a synonym of *M. (A.) fischeri* and the species should be assigned to *Anarithma* rather than *Lovellona* as suggested by van Benthem-Jutting (1940). Hervier (1899) clearly mentions the "split-tooth" feature of the columella, a character which was not developed in the 3 immature examples of

C.perplexa Schepman. The outer lip in *Anarithma* is usually distinctly denticulate in adult specimens of some species, with the posterior pair of denticles larger than the rest.

Iredale (1916) did not originally designate a type for his new genus *Anarithma* in accordance with Art.67c and 68b of the Code of ICZN (1985). Iredale (1916) listed his new genus as “*Anarithma nov. gen.*” (and not *gen.n., sp.n.*), but mentioned that *Anarithma* is “proposed for the shell commonly known as *Columbella lachryma* Gaskoin”. Since an original type designation must be rigidly construed according to the Code of ICZN, Iredale’s type selection is only a designation by indication, i.e. by monotypy (Art.68d of ICZN). In introducing his new genus *Zafrona* on the other hand, Iredale (1916) explicitly named *Colombella isomella* Duclos as the “type”.

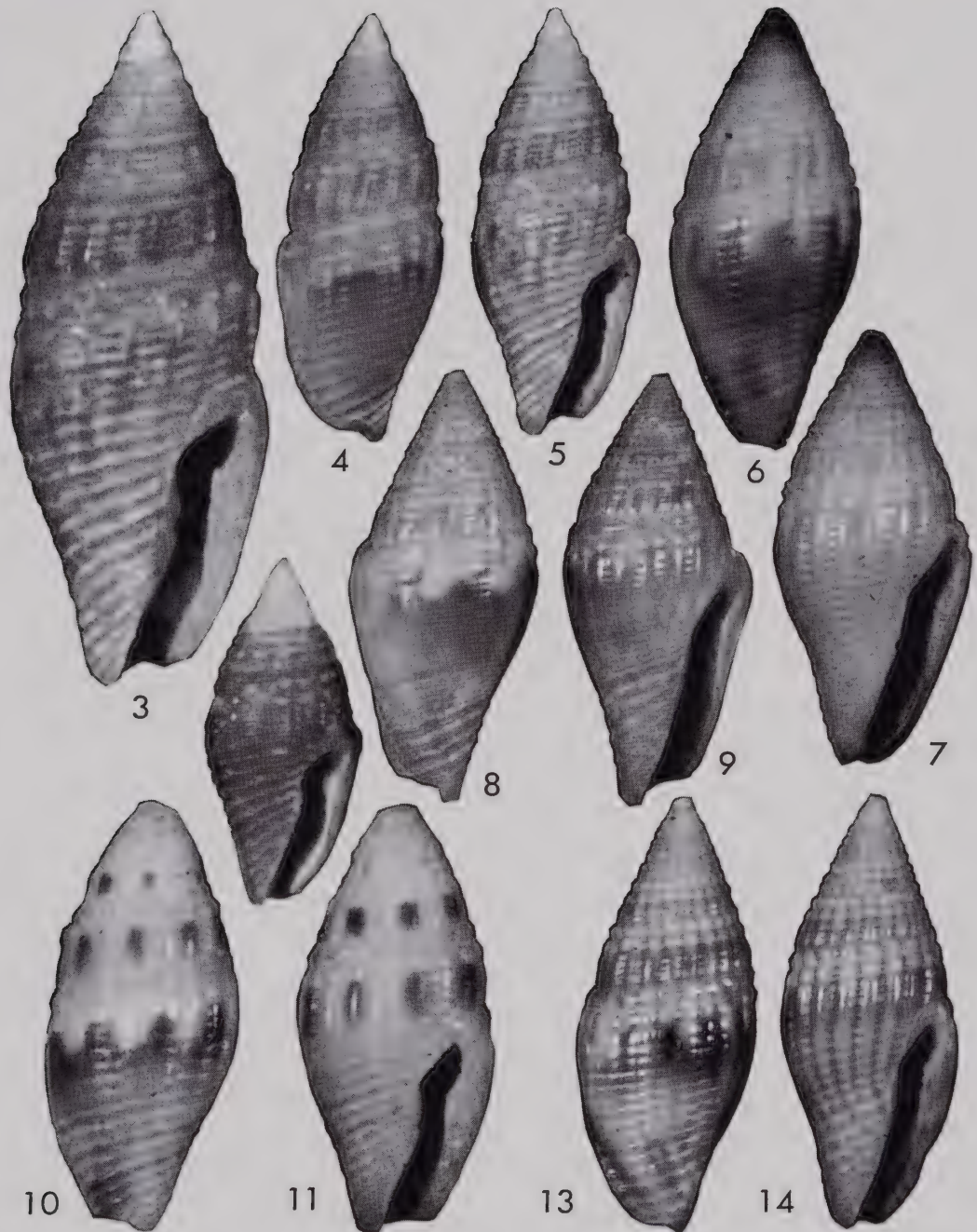
Mitromorpha (*Anarithma*) metula (Hinds, 1843) (Figs. 2-14)

1843. *Clavatula metula* Hinds, Proc.Zool.Soc.Lond. Pt.11:44; 1844 Hinds, Zool.voy. H.M.S.“Sulphur” 2(1):23, pl.7,fig.12.
 1845. *Mitra lachryma* Reeve, Conch.Icon, 2:pl.32,fig.258.
 1848. *Colombella pamila* Chenu, Illust.Conchyl. pl.22,figs.11,12 (fide Iredale, 1916).
 1860. *Cythara garrettii* Pease, Proc.Zool.Soc.Lond. p.147; 1965 Kay, Bull.Brit.Mus.(Nat. Hist.),Suppl.1:32,pl.10,fig.11.
 1871. *Columbella (Anachis) pusiola* Dunker, Malak.Blätter 18:157 (fide Iredale, 1916).
 1871. *Columbella (Anachis) nana* Dunker, Malak.Blätter 18:157 (fide Thiele, 1924).
 1896. *Columbella (Seminella) pacei* Melvill & Standen, J.Conch.8:275, pl.9,fig.5 (non E.A. Smith, 1895).
 1897. *Columbella (Seminella) stepheni* Melvill & Standen, J. Conch. 8:407 (nom.subst. pro *Columbella (Seminella) pacei* Melvill & Standen, 1896).
 1899. *Columbella lachryma* var. *producta* Hervier, J.Conchyl.47(4):381
 1899. *Columbella lachryma* var. *abbreviata* Hervier, *ibid.* 47(4):381 (non Doderlein, 1862; nec Bell, 1871).
 1899. *Columbella lachryma* var. *nitescens* Hervier, *ibid.* 47(4):382.
 1899. *Columbella sublachryma* Hervier, *ibid.* 47(4):382,pl.14,fig.1.
 1899. *Columbella sublachryma* var. *sphaerica* Hervier, *ibid.*47(4):384.
 1899. *Columbella stepheni* var. *inornata* Hervier, *ibid.* 47(4):386.
 1964. *Columbella dibolos* Bernard, Ann.Natal Mus. 16:17, fig.1f (fide Kilburn, 1986).
 1979. *Mitrolumna iki* Kay, Hawaiian mar.shells 64(4):349, fig.115D.
 1986.? *Anarithma maesi* Drivas & Jay, La Conchiglia 18(208-209):9, textfig.

TYPE LOCALITY. None (*metula; lachryma* and *pamila*); Hawaiian Is (*garrettii*); Fiji Is (*pusiola* and *nana*); Lifu, Loyalty Is (*pacei; stepheni; producta; abbreviata; nitescens; sublachryma; sphaerica* and *inornata*); Umdloti, Natal, 40 fms. [73 m] (*dibolos*); Kepuhi Pt., Oahu, Hawaiian Is, 60 m (*iki*); Reunion I (*maesi*).

DISTRIBUTION. From S.E. Africa to the Hawaiian Is and the Tuamotu Archipelago.

Type specimens. The holotype of *Clavatula metula* Hinds (*ex-Lombe-Taylor* collection) is in the B.M.(N.H.) No. 1879.2.26.81., length 4.5 mm, width 1.6 mm. The shell has 4½ whorls of teleoconch and a conical protoconch of 4 smooth, white embryonic whorls, sutures with a sutural girdle followed by a concave trough and slanting axial ribs which are nodulose on the posterior end, ribs bisected by spiral



Figs. 3-14. *Mitromorpha (Anarithma) metula* (Hinds). 3-5. Holotype B.M.(N.H.) No. 18792.26.81.; 4.5 mm. 6,7. Lectotype of *Mitra lachryma* Reeve, B.M.(N.H.) No.1962780; 7.8 mm. 10,11. Lectotype of *Columbella (Seminella) stepheni* Melvill & Standen, Manchester Univ. Mus. No.EE-B778; 4.0 mm. 12. Paratype of *Mitrolumna iki* Kay, B.M.(N.H.) No.1982265; 3.2 mm. 13,14. Specimen from Faone, Tahiti; 7.3 mm.

cords. The anal sinus is distinct, the columella convex and with a "V"-shaped groove. The colouring is straw, with a large brown blotch on the dorsal side of the body whorl (Figs. 3-5).

Three syntypes of *Mitra lachryma* Reeve, are in the B.M.(N.H.) No. 1980107. The illustrated syntype, length 6.8 mm, width 3.1 mm, is here designated as the lectotype. The lectotype has 6 whorls and a worn protoconch, c. 20 axial ribs and 3-4 spiral striae on the penultimate and 11 axial ribs and 7 grooves + 13 spiral threads on body whorl, columella "V"-grooved, dorsal side of body whorl with a spreading brown blotch (Figs. 6,7).

The lectotype of *Cythara garrettii* Pease, is in the B.M.(N.H.) No. 1962780, length 7.8 mm, width 3.4 mm. The lectotype has $6\frac{1}{4}$ whorls and a broken protoconch, a "V"-grooved columella and a brown blotch on the dorsal side of the body whorl (Figs. 8,9).

The illustrated syntype of *Columbella (Seminella) stepheni* Melvill & Standen (and at the same time the syntype of *C. (S.) pacei* Melvill & Standen) is in the Manchester University Museum No. EE B778, length 4.0 mm, width 1.8 mm. This worn syntype, which is here designated as the lectotype, has $5\frac{1}{2}$ whorls and a worn protoconch, 16 axial ribs and 4 spiral striae on the penultimate and 9 axial ribs and 18 spiral striae on the body whorl (Figs. 10,11).

The two very worn syntypes of *Columbella dibolos* Barnard, are in the South African Museum No. A29636 according to Kilburn (1986).

The holotype of *Mitrolumna iki* Kay, is in the Bernice P. Bishop Museum, Honolulu, No. 96824, length 3.5 mm, width 1.5 mm. However, since the holotype was unavailable for examination, I examined 2 paratypes in the B.M.(N.H.) No. 1982265 from the type locality, length of illustrated paratype 3.2 mm (Fig. 12). Paratypes had $3\frac{1}{4}$ whorls of the teleoconch and $4-4\frac{1}{4}$ milky-white smooth embryonic whorls, axial ribs which are becoming obsolete towards the outer lip on the body whorl, 3 spiral cords on the penultimate and 8 on the body whorl followed by 7 oblique cords on the siphonal fasciole, columella "V"-grooved, outer lip with blunt denticles posteriorly; orange-brown in colour, some nodules at body whorl suture white.

Kilburn (1986) and Drivas & Jay (1986) discussed *Mitromorpha (Anarithma) metula* (Hinds) from South Africa and Reunion Island. The authors illustrated various colour and sculptural variants and remarked on the high variability of the species. My own examination of about 60 specimens from localities ranging from New Caledonia to the Hawaiian Islands and French Polynesia, confirms the author's findings. Drivas & Jay's (1986) illustration of the typical *metula* form is actually the form *stepheni*, their *iki* form is typical *metula* and their *stepheni* form is the form *lachryma*. The small form of *metula* illustrated by Kilburn (1986, figs.158-160) also occurs on Mururoa Atoll, Tuamotu Archipelago (*leg.* C.Beslu).

Drivas & Jay (1986) gave the number of embryonic whorls in *metula* as $3\frac{1}{2}-4\frac{1}{2}$. In the 60 specimens of *metula* examined from Pacific localities the size of specimens ranged from 3.0-8.0 mm and the number of embryonic whorls of the protoconch

ranged from 3½-4¼ whorls, which is approximately the same range as reported by Drivas & Jay (1986) from Reunion I.

Drivas & Jay (1986) synonymised *Mitrolumna iki* Kay, 1979, from the Hawaiian Is, with *Mitromorpha (Anarithma) metula* (Hinds). Having compared the 2 paratypes of *iki* with smaller examples of *metula*, I was unable to find any constant differentiating characters between the two species and I agree with the conclusion reached by Drivas & Jay (1986) as to their synonymy.

Thiele (1924) compared specimens of *Columbella nana* Dunker, from the Dunker collection in the Zoological Museum, Humboldt University, Berlin, and pronounced these to be very similar if not identical with *lachryma* Reeve (= *metula* Hinds). Kilburn (1986, figs. 151,152) illustrates the holotype of *Clavatula metula* Hinds, and his illustration shows the protoconch to be partly missing. When I examined the holotype of *Clavatula metula* in 1980, it had a complete protoconch of 4 embryonic whorls (Figs. 3-5).

M. (A.) metula is a very variable species with a much wider range of distribution than the one indicated by Kilburn (1986). It appears to be more common in French Polynesia than other parts of the Pacific.

Mitromorpha (Anarithma) alphonsiana (Hervier, 1899) (Figs. 15-20)

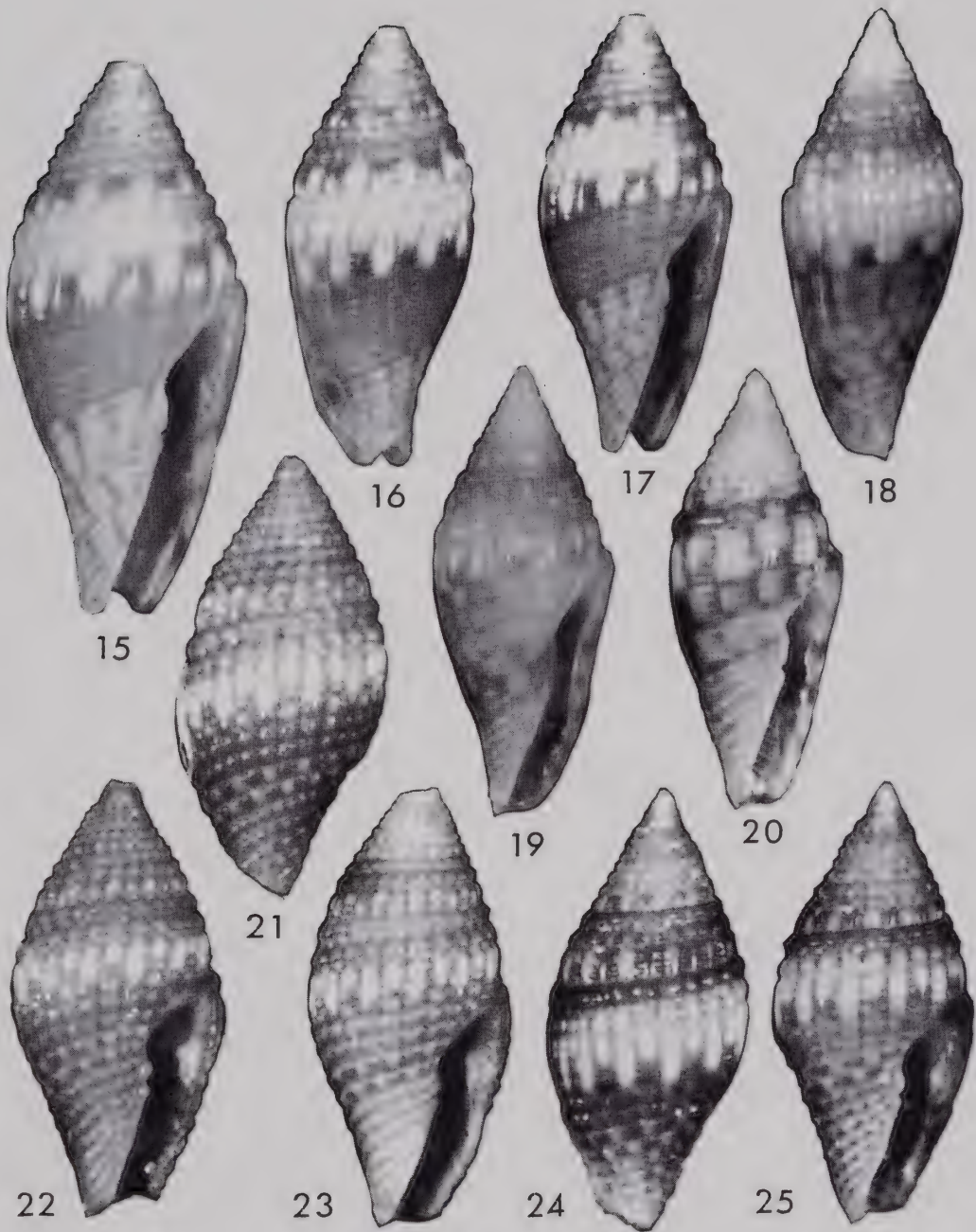
1899. *Columbella alphonsiana* Hervier, J. Conchyl. 47(4):387, pl.14, figs.2,2a.

TYPE LOCALITY. Lifu, Loyalty Islands.

DISTRIBUTION. From New Caledonia to the Tuamoto Archipelago (and the Hawaiian Is ?).

Type specimens. The syntype illustrated by Hervier (1899), which is in the Museum National d'Histoire Naturelle, Paris (no number), length 5.2 mm, width 2.2 mm, is here designated as the lectotype. The lectotype has 4½ whorls of the teleoconch plus a partially preserved protoconch, 18 axial ribs on the body whorl and 17 ribs, 2 rows of nodules and 11 short spiral grooves plus 10 oblique cords on the body whorl, columella with a "V"-shaped groove, aperture long and narrow, outer lip slightly thickened posteriorly, siphonal notch prominent. The base colour is white, 2 sutural rows mauve in colour, body whorl with a broad mauve band which is bordered posteriorly by brown quadrate spots, base of shell with wavy axial brown lines (Figs. 15-17).

Kay (1979) reports the "holotype" of *M. (A.) alphonsiana* as being worn and smooth. Hervier (1899) examined 25 specimens from Lifu but he did not actually select a holotype for the species. The syntype described and illustrated by Hervier (1899) has been deposited in the Museum National d'Histoire Naturelle, Paris, and is carried on the register as a "paratype" (should be "syntype") [see Fischer-Piette 1950]. This specimen, which is here selected as the lectotype, is not worn smooth as stated by Kay (1979), but apart from a broken protoconch is in a good state of preservation with a good sculpture and colour.



Figs. 15-25. 15-20. *Mitromorpha (Anarithma) alphonsiana* (Hervier). 15-17. Lectotype Mus.Nat.d'Hist.Nat.Paris; 5.2 mm. 18-20. Specimens from Mururoa Atoll, Tuamotus. 18,19. 6.4 mm. 20. 4.3 mm. 21-25. (*M. (A.) salisburyi* (Cernohorsky). 21,22. Holotype AIM No. TM-1349; 4.0 mm. 23. Paratype; 4.2 mm. 24,25. Specimen from Mururoa Atoll, Tuamotus; 4.4 mm.

I have examined numerous specimens of *M. (A.) alphonsiana* from Anaa I and Mururoa Atoll, Tuamotus, and the species can be distinguished at a glance from *metula* on the basis of its constant violet-mauve banding and bordering brown quadrate spots. Hervier (1899) described the protoconch as having 2-3 smooth embryonic whorls, and the protoconch is actually conical, multispiral, and consists of 2¾-3 smooth embryonic whorls.

The specimen illustrated by Drivas & Jay (1986) as *alphonsiana* does not appear to be that species. For further discussion see below under *M. (A.) salisburyi* Cernohorsky.

Mitromorpha (Anarithma) salisburyi (Cernohorsky, 1978) (Figs. 21-25)

1978. *Mitrolumna salisburyi* Cernohorsky, Nautilus 92(2):66, figs.10-12; 1978 Cernohorsky, Tropical Pacific mar.shells p.163, pl.58,fig.6.

TYPE LOCALITY. Maile Pt., Oahu, Hawaiian Is, 32 fathoms (59 m).

DISTRIBUTION. From the Hawaiian Is to the Tuamotu Archipelago.

Type specimen. The holotype is in the Auckland Institute and Museum No. TM-1349, length 4.0 mm, width 2.0 mm (Figs. 21,22).

Kay (1979) considered *M. (A.) salisburyi* to be a synonym of *M. (A.) alphonsiana*. Since these two species differ from each other quite appreciably, it is open to speculation of Dr Kay examined the correct type specimen of *alphonsiana* (her description is "worn and smooth" which the lectotype is not) or if *alphonsiana* really does occur in the Hawaiian Islands.

Since the original description of *M. (A.) salisburyi* more specimens have become available from Anaa I and Mururoa Atoll, Tuamotus, where the species is sympatric with *M. (A.) alphonsiana* without any intergrading specimens having been found. The two species differ as follows:

M. (A.) salisburyi is ovate-biconic, with the aperture being about the same height as the spire, the protoconch consists of 3-3½ glassy, golden-brown embryonic whorls, the sculpture is decidedly more nodulose, the fused posterior denticles on the posterior of the outer lip are prominent, the "V"-shaped groove is deeper and the siphonal notch is shallower and almost spout-shaped. The base colour is orange-brown, sutural nodules are rosy-mauve, on the dorsal side the subsutural white axial riblets alternate between long and short, there are 2 narrow rosy-mauve bands on the body whorl and the spiral cords towards the base have small reddish-brown spots.

M. (A.) alphonsiana has a more slender shell with a longer, narrower aperture and shorter spire, a protoconch of 2¾-3 milky-white or glassy-white embryonic whorls, the sculpture is more discreet and not nodulose, the outer lip is slightly constricted centrally, the fused posterior denticles and swelling on the outer lip are less prominent, the "V"-shaped groove is more shallow and the siphonal notch is more prominent. The base colour is white, penultimate and antepenultimate sutural row of

nodules mauve-violet with remaining spire whorls white, body whorl with a broad mauve coloured central band with quadrate brown spots adjoining posterior edge of band, lower half of body whorl with interlacing brown axial lines.

Mitromorpha (Anarithma) dorcas (Kuroda & Oyama, 1971) (Fig. 26)

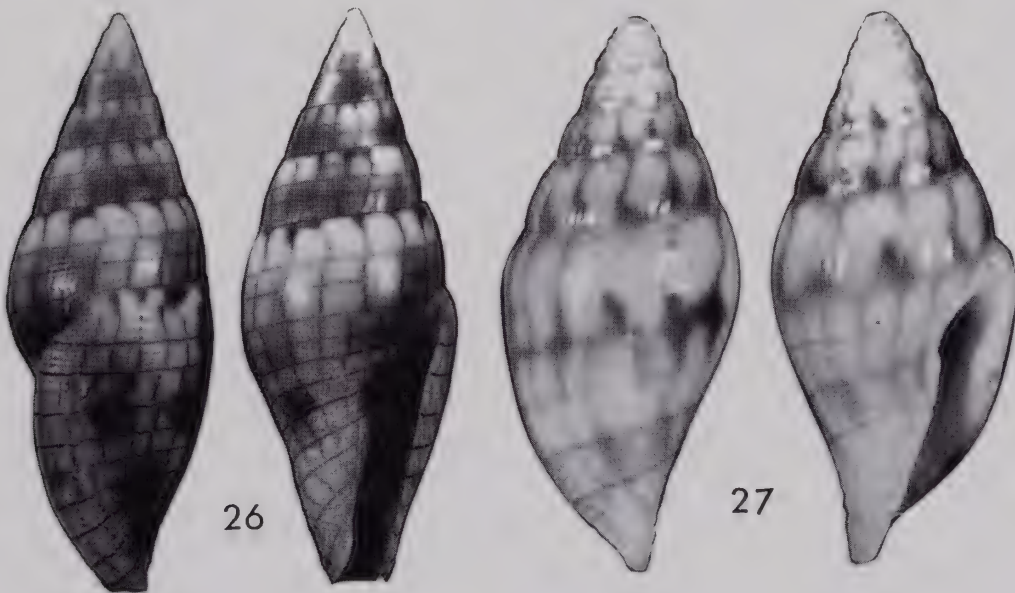
1971. *Anarithma dorcas* Kuroda & Oyama, Sea shells Sagami Bay, p.226, pl.55,fig.7; pl.111,fig.9; 1975 Okutani, Venus:Jap. J.Malac. 33(4):194, pl.10,fig.31; 1986 Springsteen & Leobrera, Shells Philippines p.274, pl.78,fig.4.
1980. *Mitrella celinae* Kosuge, Bull.Inst.Malac.Tokyo 1(3):46,pl.9,figs.10,11.

TYPE LOCALITY. Sagami Bay, Japan (*dorcas*); South China Sea (*celinae*).

DISTRIBUTION. To date known only from Japan and the Philippine Islands.

Shell elongate-biconic, teleoconch with 7 whorls and protoconch with 2-2¼ smooth white embryonic whorls, 2-3 post-embryonic whorls clathrate, later whorls with 2-4 flattish, low spiral cords at posterior of suture, body whorl with finely punctate spiral grooves, aperture with up to 15 lirae in mature specimens, columella with a "V"-shaped groove, siphonal notch distinct. Base colour whitish to pale fawn, ornamented with dark brown spots at sutures and reddish-brown spiral lines and bisecting axial lines and nebulous brown zones.

As has been remarked by Kilburn (1986) this species is rather atypical for the genus *Anarithma* not only in general shape but also in size (up to 25.0 mm) and lack of axial sculpture. A specimen from Mururoa Atoll, Tuamotus (*leg. C.Beslu*) closely



Figs. 26,27. 26. *Mitromorpha (Anarithma) dorcas* (Kuroda & Oyama). Panlao, Bohol, Philippines; 16.3 mm. 27. *M. (A.) spec.* Mururoa Atoll, Tuamotus; 7.1 mm.

resembles *M. (A.) dorcas* in the lack of axial sculpture, strong cords on early whorls, brown lines with darker spots, but the specimen is only 7.1 mm in length (Fig. 27).

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