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An overview of the genus *Drupa* Röding, 1798 (Gastropoda: Muricidae)

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Abstract: As a new species has been described and many new data have become available since Emerson & Cernohorsky (1973) and *Drupa*-species are often confused, this article aims at helping both scientists and collectors to identify all members of the aforementioned genus in an easy way. For that purpose, all species are discussed and clearly illustrated. The genus and its subgenera are briefly discussed and remarks are added for the individual species.

The genus *Drupa*: Although Linnaeus (1758; within the genus *Murex*) was the first one to mention species that would later belong to the genus *Drupa*, the genus *Drupa* was only introduced by Röding in 1798 to accommodate 3 new taxa: *Drupa morum*, *Drupa grossularia* and *Drupa rubusidaeus* and Linnaeus's *Murex ricinus* within the family **Muricidae**. However, Linnaeus (1758; 1767) and Martyn (1784) had already dealt with the later *Drupa morum*, yet their names were rejected (partim or non binominal). Montfort (1810; genus *Sistrum*) and Lamarck (1816; genus *Ricinula*) also proposed genus names for *Drupa* species previously assigned to *Murex*, yet these are clearly junior synonyms of Röding's *Drupa*. In the course of the 19th and 20th century, a total of 8 species and subspecies were added, leaving us with a total of 12 valid taxa within the genus.

These 12 taxa are divided into 3 subgenera, which were originally introduced as valid genera (see Tröndle & Houart, 1992 and Emerson & Cernohorsky, 1973): *Drupa* s.s. (6 taxa), *Ricinella* Schumacher, 1817 (2 taxa) and *Drupina* Dall, 1923 (4 taxa).

General remarks: *Drupa* species are typical inhabitants of the intertidal zone and as a consequence only occur in shallow water.

Alphabetical overview per subgenus

Subgenus *Drupa s.s.*

Drupa s.s. can easily be recognized by the structure and position of the teeth in the inner lip: all species belonging to *Drupa s.s.* show two clusters of 2 to 4 teeth, which considerably narrow down the aperture and a columella with strong folds.

***Drupa (Drupa) denticulata* Houart & Vilvens, 1997**

Original reference: Apex 12(4): 125-131.

Type material: Holotype in Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels, Belgium.

Range: Restricted to northeastern Madagascar, Mauritius and la Réunion.

Distinctive features: Size up to 40mm in length. Last whorl with 5 spiral rows, of which the uppermost 2 or 3 are covered with distinct, rounded knobs. These knobs are not very distinct on the uppermost row, which marks the suture, but are very distinct on the second and third one, yet become much smaller or even almost disappear on the two lowest rows. In between these rows, 2-4 raised spiral cords are visible. Other whorls with only one row of knobs on the shoulder; further structure almost invisible as all specimens known hitherto have eroded apices. Top low, almost neglectable in comparison to total shell length. Parietal shield strongly developed, cut off from the ventral side of the shell by a strong ridge. Adapical half of columella smooth; abapical half with 4 strong folds and 1 or 2 lower folds. Inner lip with 2 strong abapical denticles and two clustered sets of 2-4 denticles (usually 3 for the abapical set and 4 for the adapical set) in the middle. These are often very close to each other, rendering the effect of one long row of denticles. They all narrow down the aperture by some 50%. Siphonal canal short, open. Base colour creamish or greyish with dark brown to black knobs. Aperture and columella purple with paler denticles (usually white). Edge of parietal shield clearly marked by a creamish band.

Remarks: This species can only be confused with *Drupa morum morum*, but can easily be distinguished by the position of the knobs, the strongly developed parietal shield with a clear edge and its more elongate overall shape.

***Drupa (Drupa) elegans* (Broderip & Sowerby, 1829)**

Original reference: Zoological Journal, London, vol. 4 p. 376.

Type material: Lectotype (selected out of three syntypes by Emerson and Cernohorsky (1973)) in the Natural History Museum, London, UK.

Range: from Wake Island (Pacific) to the Society Islands, the Tuamotu Islands and the Marquesas Islands.

Distinctive features: Size up to 25mm in length (smallest member of the genus). Body whorl with 5 slightly raised axial ribs with 7 or 8 strong, elongated knobs, gradually becoming larger towards the aperture and decreasing in size abapically. In between these ribs the axial sculpture consists of 3 or 4 spiral cords made of very small close-set scales. Spire rather low with flattened whorls wearing only one row of small knobs on the shoulder. Parietal shield strongly developed and marked by a strong rim. Columella with a strong parietal ridge and 3-5 folds in the abapical half. Inner lip with 2 strong abapical denticles and two clustered sets of 2-4 denticles (usually 2 for the abapical set and 3-4 for the adapical set) in the middle. These sets even further narrow down the already narrow aperture. Colour off-white except for a very distinct, continuous reddish brown line around the aperture. This line will distinguish the species at once from all other species within the genus.

Remarks: Emerson and Cernohorsky (1973) suggested that this species might prove to be a colour phase of *D. ricinus*. This would confirm Tryon (1880) and Hedley (1913) who only consider *D. elegans* a forma of *D. ricinus*. Yet, no publication nor further investigation has been done since then and as the radulae figured by Emerson and Cernohorsky differ, we continue to consider *D. elegans* a valid species, thus agreeing with Tröndle & Houart (1992) who also consider it a valid species. Originally described within the genus *Ricinula*.

***Drupa (Drupa) morum morum* Röding, 1798**

Original reference: Museum Boltenianum, pars secunda. p. 55.

Type material: In his original description, Röding (1798) refers to Martini. As no specimen this figure was based upon could be traced, Emerson and Cernohorsky (1973) designated Martini's figure (plate 101, figs. 972,973) lectotype. Two syntypes of *Ricinula horrida* Lamarck, 1816, a junior synonym of *D. morum morum*, are in the Museum of Natural History in Geneva. Emerson and Cernohorsky (1973) selected one of these as the lectotype of *Ricinula horrida*.

Range: Indo-Pacific: From Japan down to northern Australia and from the Red Sea and eastern Africa east to Easter Island and Clipperton Island, excluding the Marquesas Islands.

Distinctive features: Size up to 49mm in length. Last whorl with 4 or 5 rows of almost equally-sized heavy knobs. In between these rows of knobs 3-5 low yet distinct spiral cords are visible. Other whorls with only one row of knobs on the shoulder. Transition between whorls concave. Top rather low, almost negligible in comparison to the total shell length. Parietal shield covering entire ventral side. Apical half of columella smooth, abapical half with 3-5 very strong ridges extending into the aperture. Inner lip with 2 strong abapical denticles and two clustered sets of 2-4 denticles in the middle. The latter seriously narrow down the aperture. Siphonal canal very short, only visible ventrally. Colour off-white to light creamish with dark brown to blackish knobs, except for the ones on the outer lip which are in the base colour. Interspaces between knobs light brown. Aperture and columella purple with a light (white to off-white) band on the outside.

Remarks: Type species of the genus *Drupa*. In fact, *Ricinula horrida* Lamarck was designated type of the genus *Drupa*, yet this is a junior synonym of *D. morum* (see above).

***Drupa (Drupa) morum iodostoma* (Lesson, 1840)**

Original reference: Rev. Zool. Soc. Cuvierienne, vol. 3 p. 355

Type material: Emerson & Cernohorsky (1973) suppose that the type specimen is in the Muse National d'Histoire Naturelle, Paris. However, Tröndle & Houart (1992) state that "Contrairement à ce que Emerson & Cernohorsky (1973) écrivent, aucun matériel type n'a été localisé à Paris pour *D. morum iodostoma*". During a recent visit to the MNHN, the first author could not trace any type specimens of *D. morum iodostoma* either. The type material therefore seems to be untraceable and we can only refer to Lesson's original figure.

Range: Restricted to the Marquesas Islands.

Distinctive features: Size up to 47mm in length. Last whorl with 5 slightly raised ribs, with the one on the suture most pronounced. In between these ribs 3 lower, yet distinct spiral cords are visible. Other whorls with fine spiral cords, yet often eroded. Spire low with a protruding protoconch. Parietal shield only consisting of a very thin callus, leaving the spiral sculpture well-visible. Columella with a very strong parietal ridge and 3 or 4 strong ridges extending into the aperture on the abapical half. Inner lip with 2 strong abapical denticles and two clustered sets of denticles at about the

middle of the inner lip: 3 or 4 in the upper cluster and 2 or 3 in the lower cluster. These also seriously narrow down the aperture. Siphonal canal straight, half-open, slightly curved ventrally. Colour creamish with dark brown to black raised ribs and rusty to brownish red spiral cords. Aperture and columella pinkish purple with a white band on the outside. Denticles on the outer lip and ridges on the columella white to palish pink; parietal ridge again pinkish purple.

Remarks: This subspecies can only be confused with the nominate *D. morum morum*, but the lack of knobs on the dorsum, the dark dorsal bands and the pinkish purple aperture distinguish this subspecies at once.

Originally described within the genus *Purpura*.

***Drupa (Drupa) ricinus ricinus* (Linnaeus, 1758)**

Original reference: *Systema Naturae*, ed. 10 p. 750.

Type material: Probable type specimen in the Linnean Society, London, UK.

Range: Indo-Pacific: From Japan down to Australia and from Eastern Africa east to Polynesia. It has even been recorded as far east as the western coast of the USA.

Distinctive features: Size up to 35mm in length. Last whorl with 5 rows of thick knobs which become larger towards the outer lip. Knobs on outer lip very well-developed and about twice the size of the last but one knob. In between these rows of knobs, 4 or 5 very fine spiral cords are visible. Other whorls with only one row of small knobs on the shoulder. Top rather low, less than 10% of total shell length. Abapical half of columella with 2 very strong folds, the lower one looking like a real denticle. Further down the columella two smaller granules. Inner lip with two strong abapical denticles and two clustered sets of 2-4 denticles in the middle. The latter narrow the aperture by some 50%. Colour off-white, knobs dark brown except for the ones on the outer lip which are lighter. Interspaces between knobs creamish to light brown. Columella and aperture white. The outer lip is white or ornamented with a pattern of yellow blotches (see remarks).

Remarks: Some collectors distinguish colour variations within this species such as forma *albolabris* (Blainville, 1832) with a completely white aperture (see Fig. 10) and forma *arachnoides* (Lamarck, 1816) with orange spots on the thickened lip (see Fig. 11). Yet, these forms lie within the normal variability of the species and have no taxonomic value.

Originally described within the genus *Murex*.

Drupa (Drupa) ricinus lischkei Hidalgo, 1904

Original reference: Rev. R. Acad. Cienc. Madrid 1(2):74.

Type material: Lectotype and 4 paralectotypes designated by Templado et al (1993) in the Museo Nacional de Ciencias Naturales, Madrid, Spain.

Range: Restricted to the Red Sea.

Distinctive features: Size up to 40mm in length. Last whorl with 4 or 5 rows of strong knobs of unequal size; largest ones in the middle of the dorsum. Top low, less than 10% of total shell length. Columella with a thick and well-developed parietal shield. Abapical half of columella with 3 strong folds running into the aperture and two smaller granules. Inner lip with two strong abapical denticles and two clustered sets of 2-4 denticles in the middle, yet only weakly narrowing down the aperture (about 25%). Colour off-white, sometimes with brown axial spots. Knobs on last whorl white, those on the other whorls brown. Aperture and columella white, yet sometimes with a faint rusty orange on the columella and a silver overcast at the edge of the parietal shield. This subspecies can in fact easily be distinguished from the nominate species by its larger size, the size and colour of the knobs on the dorsum, the less developed denticles in the inner lip and the strong parietal shield.

Remarks: Veerbinnen & Dirx (2000) state that "*D. albolabris* (Blainville, 1832) is the first available name for specimens occurring in the Red Sea. Tryon 1880 (...) figures this species and mentions the Red Sea as locality". However, De Blainville's *Purpura albolabris* (1832) was described from Ceylon (Sri Lanka) and is in fact a synonym of *D. ricinus ricinus* (for a discussion of the use of the name *albolabris*, we refer to the remarks under *D. ricinus ricinus*). We therefore assume that the authors meant De Blainville's *Ricinula albolabris* (in Küster, 1862), yet the problem is that the type material consists of two species and that no holotype was indicated. Moreover, if there had been a holotype, the name *albolabris* would have been preoccupied, and therefore invalid. In 1973, Emerson & Cernohorsky described this subspecies as *D. ricinus hadari*, the name most collectors still use. Yet, the authors overlooked Hidalgo's publication (1904), which makes the name *hadari* a junior synonym of the name used here. Also see Templado et al. (1993).

Originally described within the genus *Ricinula*.

Subgenus *Drupina* Dall, 1923

The subgenus *Drupina* can most easily be recognized by the narrow aperture with single teeth not narrowing down the aperture, but above all by the two large processes on the adapical half of the outer lip.

Drupa (Drupina) grossularia Röding, 1798

Original reference: Museum Boltenianum, pars secunda: p. 55.

Type material: As the type material is no longer traceable, Emerson & Cernohorsky (1973) designated the specimen figured by Martini (1777: pl. 102, figs. 978, 979) lectotype. On top of that, two syntypes of *Ricinula digitata* Lamarck, 1816, a junior synonym, are in the Museum of Natural History, Geneva, Switzerland. Emerson & Cernohorsky (1973) selected the one that matches Lamarck's dimensions most lectotype.

Range: From Japan down to western Borneo, easternmost Sumatra to northwestern Australia and eastwards throughout the Pacific to Hawaii, the Marquesas Islands and the Pitcairn Islands. Verbinen & Dirx (2000) also report it from the Red Sea (Eilat); we could not find any data from the region in between this locality and the abovementioned range as only *D. lobata* seems to occur there. See *Drupa lobata*'s range for further discussion.

Distinctive features: Size up to 35mm in length. Last whorl with 5 strong spiral ribs, in between which 2-4 spiral cords ornamented with tiny scales are visible. The second and third spiral rib bear a number (usually 4-7) of low rounded nodules, gradually decreasing in size in the direction of the outer lip. However, the one closest to the outer lip is prolonged and forms a large process. Process of the second spiral rib half open, the one of the third spiral rib closed. Upper part of aperture showing a fold near the onset of the upper process. Spire low, less than 10% of total shell length, usually eroded. Abapical half of columella with 2-5 (usually 3) faint folds. Inner lip with 6 singular denticles, the uppermost one usually slightly deeper into the aperture. Colour a uniform off-white to dark creamish. Columella and aperture yellow to orange; denticles white.

This species can in fact easily be distinguished from all other members within the genus by its large processes on the upper half of the outer lip and the colour of the aperture.

Remarks: Type species of the subgenus *Drupina*. *Ricinula digitata* Lamarck, 1816 was designated type species of the genus *Drupina*, yet this is a junior synonym of *D. grossularia* (see above).

***Drupa (Drupina) lobata* (Blainville, 1832)**

Original reference: Nouv. Annals du Muséum d'Histoire Naturelle de Paris 3 (1): 210.

Type material: The type specimen is presumably in the National Museum of Natural History in Paris.

Range: Indian Ocean: From the Red Sea along eastern Africa down to southern Madagascar and eastwards through the Indian Ocean to eastern Thailand, Sumatra and West-Australia.

According to Emerson and Cernohorsky (1973) the ranges of *D. lobata* and *D. grossularia* overlap in the Indonesian Archipelago. Yet, according to Mienis (1980) *D. lobata* in Indonesia is only known from southwestern Sumatra and Java, while *D. grossularia* occurs in the rest of the Indonesian Archipelago.

Distinctive features: Size up to 35mm in length. Last whorl with 5 strong spiral ribs, in between which 1-4 spiral cords ornamented with tiny scales are visible. The second and third spiral rib bear a number of low, rounded nodules, gradually decreasing in size in the direction of the outer lip. However, the one closest to the outer lip is very prolonged and forms a large process. Process of the second spiral rib half open, the one of the third spiral rib closed. Spire low, less than 10% of total shell length, usually eroded. Abapical half of columella with 2-5 (usually 3) very faint folds. Inner lip with 6 singular denticles, the uppermost one usually slightly deeper into the aperture. Colour brown with paler spiral cords. Columella and inner lip dark brown to blackish; denticles paler. Aperture itself off-white, often with a yellowish gleam.

As a matter of fact, this species is very similar to *D. grossularia*, but can easily be distinguished by the brown colour in the columella and inner lip.

Remarks: One could argue that, because of the similarity between the two species and the fact that the ranges do not overlap except for the Red Sea, *D. grossularia* and *D. lobata* are two forms or subspecies of the same species. More (anatomical) research is needed to reveal the actual relationship between these two taxa. For the time being and until further proof, we consider both *D. grossularia* and *D. lobata* valid species. Originally described within the genus *Purpura* Bruguière, 1798.

Subgenus *Ricinella* Schumacher, 1817

The subgenus *Ricinella* can be recognized by the wide aperture and the singularly arranged teeth in the inner lip.

***Drupa (Ricinella) clathrata clathrata* (Lamarck, 1816)**

Original reference: Tableau Encycl. Méthodique, p. 2 pl. 395 figs. 5a, 5b

Type material: Holotype in Museum of Natural History, Geneva, Switzerland.

Range: Pacific: from Japan down to the Philippines and the Coral Sea; eastwards to the Marquesas and Pitcairn Islands.

Distinctive features: Size up to 57mm in length. Body whorl with 5 spiral ribs bearing some 7 or 8 strong, pointed knobs, gradually becoming larger towards the aperture. A sixth, rudimentary rib bearing 4 or 5 knobs only runs from the columella to the siphonal canal. Other whorls with only one knobbed spiral rib on the shoulder. In between these knobbed ribs 3 or 4 slightly raised spiral cords are visible. Spire of moderate height. A real parietal shield is absent, yet the adapical half of the columella may be slightly extended. Columella with a very strong parietal ridge, a fold in the middle and 2-4 abapical plications. Aperture wide, inner lip with 4-6 singularly arranged denticles. Some specimens develop interrupted grooves starting from these denticles and running into the aperture. Colour brown, aperture and columella purplish with paler to whitish denticles, parietal ridge, folds and plications and brown dots in between the columellar plications and on the margin of the inner lip.

Remarks: Originally described within the genus *Ricinula*.

***Drupa (Ricinella) clathrata miticula* (Lamarck, 1822)**

Original reference: Histoire Naturelle des animaux sans vertèbres, vol. 7 p. 231.

Type material: Lectotype (selected out of two syntypes by Emerson & Cernohorsky (1973)) in Museum of Natural History, Geneva, Switzerland.

Range: Indian Ocean: from the Seychelles Islands down to Madagascar and eastwards to eastern Indonesia.

Distinctive features: Size up to 38mm in length. Body whorl with 5 spiral ribs bearing

a number of rounded knobs, gradually becoming larger towards the outer lip. Spire rather low, often eroded. No parietal shield, yet a small extension of the adapical part of the columella is possible. Abapical half of columella with four plait-like ridges. Aperture wide, inner lip with 6 singularly placed small teeth, sometimes extending into the aperture like small white, broken lines. Colour pale brown, aperture and columella with a pinkish purple overcast; inner lip, ridges and denticles paler (usually off-white to yellow).

This subspecies can easily be recognized from the nominate species by the shorter spines, the paler base colour and the clearer purple colour in the aperture.

Remarks: Originally described within the genus *Ricinula*.

***Drupa (Ricinella) rubusidaeus* Röding, 1798**

Original reference: Museum Boltenianum, pars secunda. p. 55.

Type material: As the type material is no longer traceable, Emerson and Cernohorsky (1973) selected the specimen figured by Knorr (1768: pl. 24, fig. 7) lectotype.

Range: Indo-Pacific: From Japan down to northern Australia and from the Red Sea and eastern Africa east to the Hawaiian Islands and the Tuamotu Islands.

Distinctive features: Size up to 55mm in length. Last whorl with 5 rows of 6-10 strong, elongated knobs, abapically decreasing in size. A sixth, rudimentary row, consisting of 5 or 6 knobs, only runs from the columella to the siphonal canal. In between these rows, 3 or 4 spiral cords consisting of small scales are visible. Other whorls only with a row of small elongated knobs on the shoulder. No parietal shield, but a thick columellar gloss with a sharp razorlike edge abapically. Columella smooth apart from 3 or 4 very weak abapical folds. Many specimens show a half-opened umbilicus, revealing many small-scaled cords. Aperture wide with 7 or 8 small denticles on the inner lip, which develop very weak spiral grooves running into the aperture. Colour creamish white, sometimes with brownish pointed knobs. Aperture and columella from almost white with a purplish tinge to vivid pink with a bright yellow margin; denticles paler, usually white.

Remarks: Type species of the subgenus *Ricinella*. *Ricinella purpurata* Schumacher, 1817 was designated type species of the genus *Ricinella*. Yet, this species is a junior synonym of *Drupa rubusidaeus*.

Drupa (Ricinella) speciosa (Dunker, 1867)

Original reference: *Novitates conchologicae*. p. 100-101; pl. 33 fig 7-8.

Type material: Lectotype (selected out of 4 syntypes by Emerson & Cernohorsky (1973)) in the Cuming collection in the British Museum for Natural History, London, UK.

Range: Restricted to the Tuamotu Islands and the Pitcairn Islands (Pacific Ocean).

Distinctive features: Size up to 30mm in length. Last whorl with 5 spiral ribs wearing usually 9 tubercles, originating from the intersection of spiral and axial ribs. In between these spiral ribs, 2-5 spiral cords with many small scales can be noticed. This sculpture continues on the spire. No parietal shield, but a thick columellar gloss with a sharp edge. Columella with 4-6 strong plications on the abapical half; spiral sculpture coming through on adapical half. Inner lip with 6-8 singularly placed denticles abapically and 2 deep, half-opened grooves on the adapical 1/3. Colour creamish; columella and aperture pinkish purple with much paler plications, denticles and inner lip.

Remarks: Originally described within the genus *Ricinula*.

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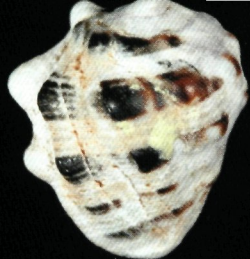
Plate 1: Subgenus *Drupa* s.s.

- Fig. 1-2: *Drupa (Drupa) denticulata* Houart & Vilvens, 1997. Dorsal and ventral view.
- Fig. 3-4: *Drupa (Drupa) elegans* (Broderip & Sowerby, 1829). Dorsal and ventral view.
- Fig. 5-6: *Drupa (Drupa) morum morum* Röding, 1798. Dorsal and ventral view.
- Fig. 7-8: *Drupa (Drupa) morum iodostoma* (Lesson, 1840). Dorsal and ventral view.
- Fig. 9-11: *Drupa (Drupa) ricinus ricinus* (Linnaeus, 1758). Dorsal and ventral view.
- Fig. 12-13: *Drupa (Drupa) ricinus lischkei* Hidalgo, 1904. Dorsal and ventral view.

Plate 2: Subgenera *Drupina* and *Ricinella*

- Fig. 14-15: *Drupa (Drupina) grossularia* Röding, 1798. Dorsal and ventral view.
- Fig. 16-17: *Drupa (Drupina) lobata* (Blainville, 1832). Dorsal and ventral view.
- Fig. 18-19: *Drupa (Ricinella) clathrata clathrata* (Lamarck, 1816). Dorsal and ventral view.
- Fig. 20-21: *Drupa (Ricinella) clathrata miticula* (Lamarck, 1822). Dorsal and ventral view. (Coll. R. Houart.)
- Fig. 22-23: *Drupa (Ricinella) rubusidaeus* Röding, 1798. Dorsal and ventral view.
- Fig. 24-25: *Drupa (Ricinella) speciosa* (Dunker, 1867). Dorsal and ventral view. (Coll. R. Houart)

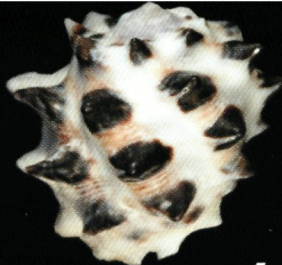
(All shells in the authors' collections, unless stated otherwise.)



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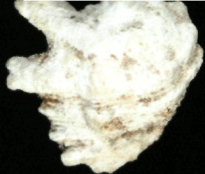
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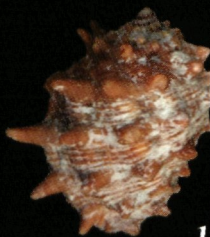
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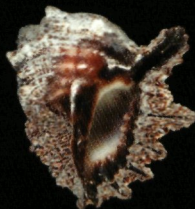
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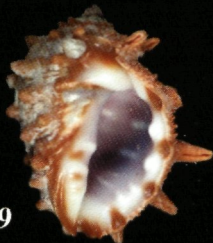
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