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| 53   | B I O L O G I E      | 17        |

CONTRIBUTION TO THE KNOWLEDGE  
OF TWO BORING GASTROPODS WITH AN ANNOTATED LIST  
OF THE GENERA *MAGILUS* MONTFORT, 1810  
AND *LEPTOCONCHUS* RÜPPELL, 1835

BY

C. MASSIN

33519

(With one plate and four textfigures)

**BULLETIN**

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ABSTRACT

*Magilus antiquus* MONTFORT, 1810 is an active borer, digging a hole in front of its tube. This hole communicates with the exterior by a short chimney. The small operculum of *Magilus* spp. is unable to close the aperture of the tube but does close the chimney well. The tube orientation could not be related to any constancy.

*Leptoconchus striatus* RÜPPELL, 1835 has a post-larval free-living stage. The young shell sinks down actively in the coral host. Communicating burrows of *L. striatus* could be the result of young animals developing around their mother shell.

Diagnosis are proposed for the genera *Magilus* MONTFORT, 1810 and *Leptoconchus* RÜPPELL, 1835. *Magilus sowerbyi nomen novum* is proposed in place of *M. costatus* SOWERBY in REEVE, 1872. The genus *Magilus* includes six recent species: *M. antiquus*, *M. cumingii*, *M. japonicus*, *M. lankae*, *M. microcephalus*, and *M. sowerbyi*. *M. japonicus* and *M. lankae* could be subspecies of *M. antiquus*. « *Magilus*

*serpuliformis* VONLAIN » in DERANIYAGALA (1968) must be related to the Vermetidae. The genus *Leptoconchus* includes fourteen recent species : *L. cumingii*, *L. cuvieri*, *L. djedah*, *L. ellipticus*, *L. expolitus*, *L. globulosus*, *L. lamarckii*, *L. maillardi*, *L. noumeae*, *L. rostratus*, *L. rueppellii*, *L. serratus*, *L. solidiusculus*, and *L. striatus*. *L. peronii* is a *nomen oblitum* and *L. oblongus* a *nomen nudum*. *L. schrenckii* and *L. tenuis* are to be considered synonyms of *L. striatus*. Under the names *L. ellipticus*, *L. expolitus*, and *L. rostratus*, maybe there are in each case two different species.

*Coralliobia fimbriata*, *C. robillardi*, and *C. smithi*, which have been assigned to the genera *Magilus* and/or *Leptoconchus*, must be reported to the genus *Coralliobia*.

#### RESUME

*Magilus antiquus* MONTFORT, 1810 est un mollusque perforant actif, creusant une cavité en avant de son tube. Cette cavité communique avec l'extérieur par une courte cheminée. Le petit opercule des *Magilus* spp. est incapable de fermer l'ouverture du tube, en revanche il peut facilement obturer la cheminée d'accès à l'extérieur. L'orientation du tube ne peut être mis en relation avec aucune constante.

*Leptoconchus striatus* RÜPPELL, 1835 possède un stade postlarvaire libre. La jeune coquille s'enfonce activement dans le corail hôte. Les trous confluent de *L. striatus* peuvent résulter du développement de jeunes individus autour de leur coquille mère.

Des diagnoses sont données pour les genres *Magilus* MONTFORT, 1810 et *Leptoconchus* RÜPPELL, 1835. *Magilus sowerbyi nomen novum* est proposé à la place de *M. costatus* SOWERBY in REEVE, 1872. Le genre *Magilus* comprend six espèces actuelles : *M. antiquus*, *M. cumingii*, *M. japonicus*, *M. lankae*, *M. microcephalus*, et *M. sowerbyi*. *M. japonicus* et *M. lankae* pourraient être des sous-espèces de *M. antiquus*. « *Magilus serpuliformis* VONLAIN » cité par DERANIYAGALA (1968) est à rapprocher des Vermetidae. Le genre *Leptoconchus* renferme quatorze espèces actuelles : *L. cumingii*, *L. cuvieri*, *L. djedah*, *L. ellipticus*, *L. expolitus*, *L. globulosus*, *L. lamarckii*, *L. maillardi*, *L. noumeae*, *L. rostratus*, *L. rueppellii*, *L. serratus*, *L. solidiusculus* et *L. striatus*. *L. peronii* est un *nomen oblitum* et *L. oblongus* un *nomen nudum*. *L. schrenckii* et *L. tenuis* sont considérés comme des synonymes de *L. striatus*. Les noms *L. ellipticus*, *L. expolitus* et *L. rostratus* recouvrent peut-être chaque fois deux espèces différentes.

*Coralliobia fimbriata*, *C. robillardi* et *C. smithi*, qui ont été décrits comme appartenant aux genres *Magilus* et/ou *Leptoconchus*, doivent être rattachés au genre *Coralliobia*.

## ACKNOWLEDGEMENTS

I am deeply indebted to Dr. J. VAN GOETHEM for the facilities he made available at the I. R. Sc. N. B. I would like to express my thanks to Dr. J. VAN GOETHEM and to Dr. K. WOUTERS for help and critical comments on the manuscript; to Miss E. DELAYE who drew figures one and three; to Mr. J. DARDENNE for the photography.

## 1. INTRODUCTION

The presence of *Leptoconchus striatus* RÜPPELL, 1835 in corals of the family Fungiidae from Hansa Bay (Papua New Guinea) is mentioned in BOUILLON *et al.* (in press). Observations on additional fungiids from the same locality and on other corals of the collections of the I. R. Sc. N. B. gave me some new data on the position of *Leptoconchus striatus* and of *Magilus antiquus* MONTFORT, 1810 in the coral host.

A great confusion exists between the genera *Magilus* MONTFORT, 1810 and *Leptoconchus* RÜPPELL, 1835. TRYON (1880), BAKER (1892), and SOWERBY (1919) made a revision of these two genera. Each of them placed an amazing number of species in synonymy with *M. antiquus* without any argument or discussion. It is a fact that many species of *Leptoconchus* and *Magilus* have closely resembling juveniles and that a great intraspecific variation occurs. However this is not a reason to gather all the known species under the same name. In the annotated list of the above mentioned genera (fossils excluded) I will try at least to solve the problem of the *nomina oblita* and the *nomina nuda* and to eliminate the species which do not belong to the genera *Magilus* and *Leptoconchus*. This work is only an initial approach to the problem and I have not examined the type material of the species studied.

## 2. POSITION IN THE CORAL HOST

2.1 *Magilus antiquus* MONTFORT, 1810

The general opinion on the presence of a tube in the genus *Magilus* is the following: the young specimens of the genus *Magilus*, free-living, find a hole in a coral, occupy it, and then become sedentary. As the coral grows around it, to keep its aperture close to the surface of the coral, the two lips of the shell are extended in the form of a tube. There is no boring effect of the mollusc but a growth in the form of a tube to avoid being covered over by the coral host (RÜPPELL, 1832; CARUS, 1837; SOWERBY *in* REEVE, 1872; FISCHER, 1887; SOWERBY, 1919; LAMY, 1924, 1930; DEMOND, 1957). Generally the tube is believed to open at the surface of the coral but according to CARUS (1837) the extremity of the tube pro-



jects beyond the coral. I could find only two drawings showing *Magilus antiquus* inside the coral host (SOWERBY *in* REEVE, 1872, LAMY, 1924). In these two cases the tube grows perpendicular or almost perpendicular to the coral surface, the siphonal canal being at level with the coral surface. There is no indication of the diameter of the outside opening on the coral surface.

My observations on *Magilus antiquus*, *Magilus sowerbyi* *nom. nov.* (see 3.2), and *Magilus microcephalus* SOWERBY *in* REEVE, 1872 from the collections of the I. R. Sc. N. B. are quite different from those of the literature. *Magilus* spp. are very often found in the collections without the coral host or with only a little part of it. When the coral block surrounding the *Magilus* spp., is large enough to include the coral surface it is clear that the tube of *Magilus* spp. is generally nearly parallel to the surface and not perpendicular to it (fig. 1). The extremity of the tube does not reach the surface of the coral. In front of the aperture of the tube there is an hemispherical cavity dug by the animal. This cavity communicates with the exterior by a more or less short rounded canal (diameter 5 mm for a tube of 20 mm diameter). The siphonal canal on the ventral side of the tube is inserted in this canal but remains just below the coral surface (fig. 1).

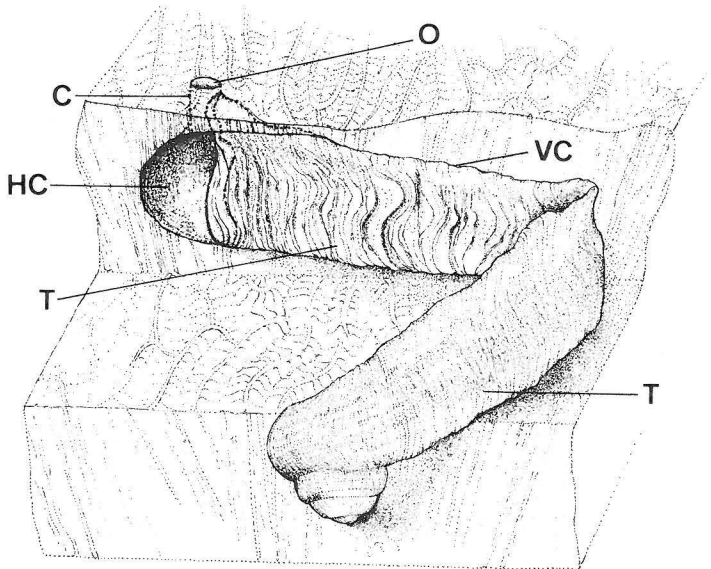


Fig. 1. — Position of *Magilus antiquus* in a coral.

C: chimney; HC: hemispherical cavity; O: opening at the surface of the coral;  
T: tube; VC: ventral keel.

Consequently *M. antiquus* is a boring mollusc which digs actively in the calcareous skeleton of the coral. The boring mechanism must be exclusively chemical since any movement of the tube is excluded. Another

proof of the active boring mechanism is when a young shell or a young raising tube crosses an old one (full of calcareous deposit) and nearly cuts it in two. If *M. antiquus* were only a passive animal growing to counter-balance the growth of the coral, a new growing tube would never cut an old one. Moreover, if two tubes cross, they should avoid each other and not cut each other as they do.

The growth, nearly parallel to the coral surface, could indicate that *Magilus* spp. grow faster than the coral and try to remain entirely hidden inside.

Only in one case I observed a *M. antiquus* growing almost perpendicularly to the surface of the coral. Unfortunately the coral was broken at the apex of the tube. Nevertheless there is still evidence of a hole in front of the shell aperture but I do not know if this hole communicates entirely with the coral surface or only by a narrow canal.

This difference in boring behaviour is very strange because in all cases the *Magilus* spp. were found in corals of the genus *Leptoria*, starting the tube in the same shell position (apex down, anterior canal up). I do not have enough information to relate this behaviour to any constancy.

The opercule of *Magilus* spp. is far too small to close the aperture of the tube and has been said « to be of but little use to the animal » (BAKER, 1892). However the opercule is certainly big enough to close the short chimney connecting the end of the tube with the exterior.

## 2.2. *Leptoconchus striatus* RÜPPELL, 1835

Figure 2 summarizes all the positions of *Leptoconchus striatus* observed in the *Fungia* spp. from Papua New Guinea. The positions 1, 2, 3, 4, 5, and 7 on the figure have been described in a previous paper (BOUILLON *et al.*, in press). The chimney of the burrows 1, 2, and 4 ending outside and figured perpendicularly to the oral or aboral surface of the coral, can also be oblique. The length of the chimneys is highly variable as cited by GOHAR & SOLIMAN (1963) for other *Leptoconchus* spp. The opening of burrow 3 (fig. 2) can be deeper in the mouth opening but generally opens at the boundary between stomodeum and coelenteron.

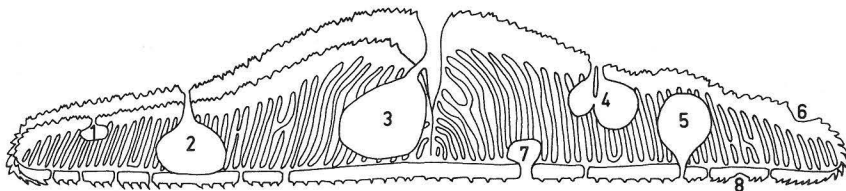


Fig. 2. — Diagrammatic longitudinal section through a *Fungia* (*Fungia*) *fungites* showing the eight (1 to 8) observed positions of *Leptoconchus striatus*.

On the oral surface of a *Fungia* (*Fungia*) *fungites* (LINNAEUS, 1758) I had the opportunity to observe a very young *L. striatus* (fig. 2, position 6; plate I, fig. 5) which had just started its burrow. The shell measures 3.0 mm in height and 1.8 mm in diameter. The animal had begun to perforate the septa. The apex of the shell is lower than the base which is still resting on a septum. Three septa are perforated and one of them (the one which is the nearest to the apex of the shell) is regenerating, enclosing progressively the *L. striatus*.

A very young *L. striatus* (3.0 mm in height and 1.9 mm in diameter) was found on the aboral face of a *Fungia* (*Verrillofungia*) *concinna* VERRILL, 1864 between two barnacles. There is no trace of a boring activity. Another young *L. striatus* (3.7 mm in height and 2.4 mm in diameter) was also found on the aboral face of a *F. (V.) concinna* but the shell was half hidden in a hole bored in the theca of the coral (8, fig. 8).

Also in a *F. (V.) concinna* I found five communicating burrows of *L. striatus* more or less of equal size. All of them open on the aboral face. Figure 6 (plate I) shows three of the holes and their round chimneys communicating with the aboral face. One of the burrows is occupied by an empty adult shell (according to the shape, a female) inhabited by a very young *L. striatus* (4.0 mm in height and 2.4 mm in diameter). This number of five *L. striatus* found in a single coral is the maximum number observed in a *Fungia* spp. from Papua New Guinea. Such an intensity of « parasitism » is not exceptional for *Fungia* spp. as YOUNG (1974) noted 16 *Fungiacava eilatensis* SOOT-RYEN, 1969 in one single *Fungia* sp.

When penetrating into the coral, the young *L. striatus* is already too large to slide between the septa as suggested by BOUILLON *et al.* (in press) : only the larvae can do so, if they penetrate into the coral at all. The young animal must be immune against nematocysts and is able to bore into the coral starting either by the oral face or by the aboral face. In order to be entirely hidden in the coral, the boring activity must be short and rapid because position 1 (fig. 2) is rare in the *Fungia* spp. (BOUILLON *et al.*, in press). The presence of 5 communicating burrows of more or less equal size may indicate that some of the young larvae incubated in an egg capsule undergo the metamorphosis in the mother burrow and start their boring activity around the mother shell. GOHAR & SOLIMAN (1963) observed a positive phototactic and a negative geotactic response for the new hatched larvae of *Leptoconchus cumingii*, *L. lamarckii* DESHAYES, 1863 and *L. globosus* DESHAYES (= *L. striatus* RÜPPELL, 1835). In the case of *L. striatus* from Papua when the young develop around the mother shell or when the mother burrow opens on the aboral face of the coral, phototacticism and geotacticism must be inhibited or inverted.

*L. striatus* is thus free-living as a larva and some time after metamorphosis. This post-larval free stage may explain why the operculum is still present in young animals. Once the animal is embedded in the

coral, the operculum becomes useless and disappears progressively as noticed by BOUILLON *et al* (in press).

### 3. SYSTEMATICS OF THE GENERA *MAGILUS* MONTFORT, 1810 AND *LEPTOCONCHUS* RÜPPELL, 1835

#### 3.1. Diagnosis of the genera

To the genus *Magilus* I am assigning those species having a shell with a long tube prolonging its aperture. This easily recognizable character can only be used to distinguish adult animals. For young ones the distinction between *Magilus* spp. and *Leptoconchus* spp. can only be established by the thickness of the shell (BOUILLON *et al.*, in press). The animal, when better known, could present other characters. The compilation of the bibliography and my own observations allow me to suggest two possible differences between the respective animals of *Magilus* spp. and *Leptoconchus* spp. *Magilus* spp. are only found in scleractinian corals of the subfamily Faviinae, whereas *Leptoconchus* spp. are found in species of this subfamily but also in those belonging to other families (Meandrinidae, Oculidae, Acroporidae, Fungiidae). In all the descriptions of the animal of *Leptoconchus* spp. (RÜPPELL, 1835; DESHAYES, 1863; MARTENS, 1880; GOHAR & SOLIMAN, 1963; BOUILLON *et al.*, in press), egg capsules are always mentioned whereas they have never been described in the case of *Magilus* spp. This could indicate (information is too scanty on the subject to be definitive) a different reproductive behaviour. Moreover the animal of *Leptoconchus* spp. has a much more developed penis (GOHAR & SOLIMAN, 1963; BOUILLON *et al.*, in press) than *Magilus* spp. (see RÜPPELL, 1832; CARUS, 1837).

I propose the following diagnosis for the genera *Magilus* and *Leptoconchus*.

*Magilus* MONTFORT, 1810 : Mollusc (Gastropoda, Coralliophylidae) living in scleractinian corals. Young shell thin, white, with a few whorls (3 to 4), roughened externally with wavy squamose striae, and bearing generally longitudinal ridges which are more prominent on the last whorl; shell more or less turbinated; spire obtuse. The two lips of the aperture of the adult shell extend into an irregular, elongated, thickened tube which is ventrally carinated. When the tube is growing, the animal progressively thickens the shell and fills it with calcareous deposit. In old animals the tube is also filled, the animal occupying only this part of the tube nearest to the aperture. Radula absent. Operculum present, opaque, but smaller than the aperture of the tube.

*Leptoconchus* RÜPPELL, 1835 : Mollusc (Gastropoda, Coralliophylidae) living in scleractinian corals. For young and adult shell thin, white,

sometimes translucent; few whorls (3 to 4), last one very large; shell generally covered with wavy squamose striae; longitudinal ridges present or absent. Aperture ovate, pyriform; anterior canal distinct. Aperture never prolonged by a tube; shell never filled with calcareous deposit. Operculum present, reduced, transparent, often lost in post-larval stages. Radula absent.

All the shells quoted as *Leptoconchus* spp. in the literature, but living on the coral and with a particularly thickened or fimbriated external lip, are considered here as belonging to the genus *Coralliobia* H. & A. ADAMS, 1853.

### 3.2 *Magilus* MONTFORT, 1810

#### *Magilus antiquus* MONTFORT, 1810

*Magilus antiquus* MONTFORT, D., 1810, p. 43, 1 fig. - LAMARCK, J.B., 1818, p. 374. — SOWERBY, G. B., 1830, p. 253, pl. 21, fig. 2-3. — RÜPPELL, E., 1832, p. 1, fig. 1-5. — CARUS, C. G., 1837, p. 191, fig. 1-8. — DESHAYES, G. P. in CUVIER, G., 1850, pl. 2, fig. 4. — DESHAYES, G. P., 1863, p. 117. — SOWERBY in REEVE, L., 1872, pl. 1, fig. 1a, 1e. — MARTENS, E., 1880, p. 63. — TRYON, G. W., 1880, p. 214, pl. 68, fig. 400. — FISCHER, P., 1887, p. 648, pl. 5, fig. 19. — BAKER, F. C., 1892, p. 38, pl. 9, fig. 1. — SOWERBY, G. B., 1919, p. 75 (*partim*; not the synonyms cited by SOWERBY). — LAMY, E., 1924, p. 582, fig. 3. — THIELE, J., 1931, p. 301. — WENZ, W., 1938-44, p. 1134, fig. 3223. — DEMOND, J., 1957, p. 316, fig. 25. — SABELLI, B. & MARI, A., 1973, p. 13. — KIRA, T., 1975, p. 67, pl. 25, fig. 19.

*Magilus Antiquus*; CHENU, J. C., 1843, p. 1, pl. 1, fig. 1-2.

*Campulotus antiquus*; H. & A. ADAMS, 1858, p. 138, pl. 14, fig. 10.

Coral host : *Goniastrea retiformis* (LAMARCK), *Leptoria* spp., *Madrepora phrygia* (ELLIS & SOLANDER), *Platygyra* spp.

Geographical range : Red Sea, Madagascar, Réunion, Mauritius, Sri Lanka, Java, Cocos Keeling Atoll, Japan (Southern Honshû), Mariana Islands (Saipan), Bismarck Archipelago, Northern Australia, Hawaii.

*M. antiquus* has a globose shell which in some case is more or less depressed or turbinated. The shell is transversely striated with undulating lamellae. Longitudinal ridges crossing the lamellae are generally present, their development varying greatly from one specimen to another. The margin of the aperture of the shell is prolonged by a tube, right or convoluted, of which the ventral side is carinated. The longitudinal ridges of the shell are not always prolonged on the tube but the lamellae are prolonged.

The most striking feature of *M. antiquus* and its allies is the progressive filling up of the shell and the tube with calcareous deposit. Before the tube starts growing, there is already a thickening of the shell. The animal of *M. antiquus*, described by RÜPPELL (1832) and (CARUS) (1837), is the only known of the genus.

*M. antiquus* has been found in corals of the genera *Goniastrea*, *Platygyra*, and *Leptoria*. The corals from the collections of the I. R. Sc. N. B. containing *M. antiquus*, belong to the genus *Leptoria*.

As suggested by ROBERTSON (1970) this could indicate a host specificity for *M. antiquus*, because the three cited genera belong to the subfamily *Faviinae*.

*M. antiquus* is a widespread species in the whole Indo-Pacific Ocean from Mauritius to the Hawaiian Islands. As the other *Magilus* spp., it is unknown in the Eastern Pacific and along the Western American coasts.

### *Magilus cumingii* (H. & A. ADAMS, 1863)

*Campulotus cumingii* H. & A. ADAMS, 1863, p. 430. — BAKER, F. C., p. 38 (cited as a synonym of *M. antiquus*).

*Magilus cumingii*; TRYON, G. W., 1880, p. 217 (non SOWERBY in REEVE, 1872) (cited as a synonym of *M. sowerbyi*).

Coral host : unknown.

Geographical range : ? California.

*Magilus cumingii* has been considered as a synonym of *M. sowerbyi* by TRYON (1880) and as a synonym of *M. antiquus* by BAKER (1892). TRYON (1880) claimed that the description of *M. cumingii* is very similar to the one of *M. sowerbyi*. However, the holotype of *M. cumingii* is apparently lost (KEEN, 1971; p. 546), there is no drawing of it, and the type locality is doubtful. In these conditions it is quite impossible to establish its relationship with other *Magilus* spp.

### *Magilus japonicus* DERANIYAGALA, 1968

*Magilus antiquus*; KIRA, T., 1962 (in the references only the edition of 1975 is mentioned), p. 66, pl. 25, fig. 19.

*Magilus japonicus* DERANIYAGALA, P. E. P., 1968, p. 54. — DERANIYAGALA, P. E. P., 1969, p. 316.

Coral host : unknown.

Geographical range : Southern Honshû and further south.

DERANIYAGALA (1968) created the species *M. japonicus* according to a specimen of *M. antiquus* illustrated by KIRA (1962, see KIRA 1975). *M. japonicus* is said to differ from *M. antiquus* by a more conical helicoid shell, by a more cylindrical tube without a well defined « lateral

ridge » (the « lateral ridge » is most probably the ventral keel of a particular twisted specimen). As I noticed, the shape of the shell of *M. antiquus* is highly variable and the section of the tube is trigono-oval to almost round. *M. japonicus* could be considered as a geographical subspecies of *M. antiquus*.

### *Magilus lankae* DERANIYAGALA, 1968

*Magilus lankae* DERANIYAGALA, P. E. P., 1968, p. 53. — DERANIYAGALA, P. E. P., 1969, p. 316, fig. 1.

Coral host : unknown.

Geographical range : Sri Lanka (Mihiripanna Sea).

DERANIYAGALA (1968), created the species *M. lankae* which differs from *M. antiquus* « in size and in that its sculpture marks are small and close set ». *M. lankae* measures 24 mm in height and *M. antiquus* between 15 and 32 mm in height. The value of H/B (H : height; B : diameter) is the same for both species. *M. antiquus* has highly variable sculptures and costae. Consequently the characters retained by DERANIYAGALA (1968) to distinguish *M. lankae* from *M. antiquus* are not satisfactory. *M. antiquus* has been collected along the coast of Sri Lanka (DEMOND, 1957). These specimens may have the same characteristics as the specimen collected by DERANIYAGALA. More information is needed to elucidate that problem and provisionally I consider *M. lankae* as a valid species. However, it may be a geographical subspecies of *M. antiquus*.

### *Magilus microcephalus* SOWERBY *in* REEVE, 1872

*Magilus Microcephalus* SOWERBY *in* REEVE, L., 1872, pl. 2, fig. 3. *Magilus microcephalus*; TRYON, G. W., 1880, p. 216, pl. 68, fig. 401. — SOWERBY, G. B., 1919, p. 75 (considered as a synonym of *M. antiquus*). — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

Coral host : unknown.

Geographical range : no reference in the literature; according to the collections of the I. R. Sc. N. B. : Mauritius, Cargados.

*Magilus microcephalus* has been described as a new species by SOWERBY (*in* REEVE, 1872) with many reservations. TRYON (1880), BAKER (1892), and SOWERBY (1919) consider it as a *M. antiquus* which has started very early to make a tube. The main difference between *M. antiquus* and *M. microcephalus* is the shell height when the tube starts growing. However, as shown in the figure 3, all the intermediate stages of shell height exist between the large ones (*M. antiquus*) and the small ones (*M. microcephalus*).

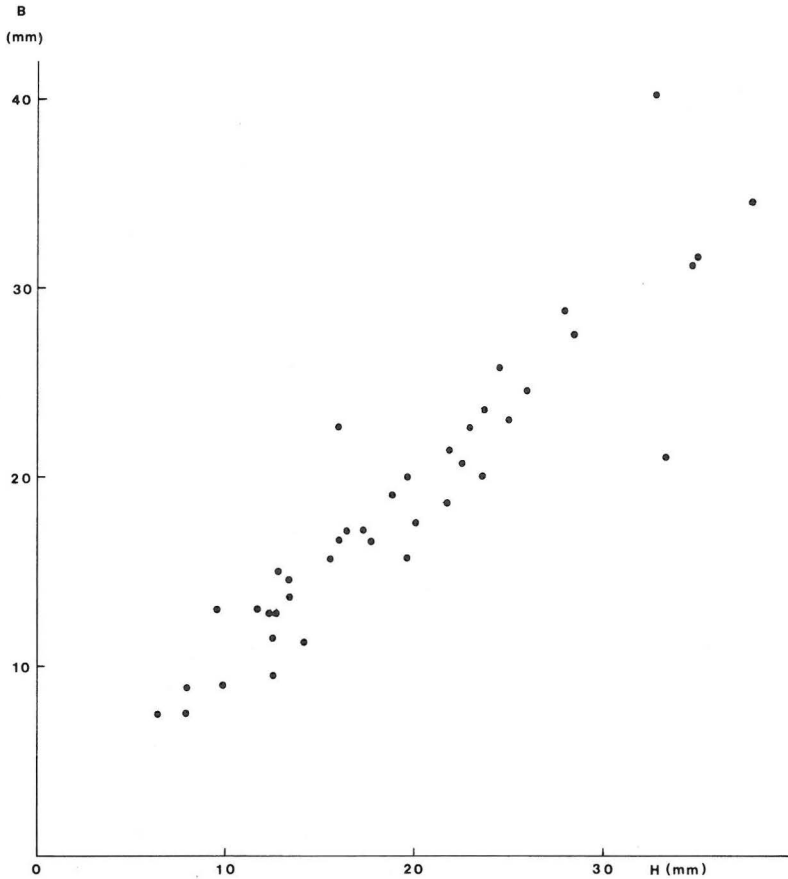


Fig. 3. — Scatter diagram showing the relationship between shell height (H) and shell diameter (B) of *Magilus antiquus* and *M. microcephalus*.

The diagram clearly indicates that it is impossible to distinguish both species according to the shell height.

If differences are to be found between these two species, it is certainly not the shell height. The coral host, the animal (both are presently unknown for *M. microcephalus*) or the geographical range might be taken into account.

### *Magilina serpuliformis* VÉLAIN, 1877

*Magilina serpuliformis* VÉLAIN, C., 1877, p. 160, pl. 2, fig. 16-18. — TRYON, G. W., 1880, p. 218, pl. 69, fig. 425-426. — FISCHER, P., 1887, p. 649.

*Magilus serpuliformis*; DERANIYAGALA, P. E. P., 1968, p. 53.



Coral host : none; lives attached to underwater supports.

Geographical range : St. Paul and Amsterdam Islands (South Indian Ocean).

*Magilus sepuliformis* VONLAIN (sic) has been reported by DERANIYA-GALA (1968). This species was described under the name of *Magilina serpuliformis* VÉLAIN, 1877. The shell and tube of *Magilina serpuliformis* present similarities with the genus *Magilus*. However, the shell of *Magilina* is very small (a few mm) and not buried in coral, but rather is fixed to a hard substrate. The distribution of *Magilina* spp. (latitude 40° south) is quite different from that of *Magilus* spp. (never below latitude 30° south; see fig. 4).

I agree with the opinion of VÉLAIN (1877), TRYON (1880), and FISCHER (1887) that *Magilina* spp. must be related to the Vermetidae and not to the genus *Magilus*.

### *Magilus sowerbyi* nom. nov.

*Magilus costatus* SOWERBY in REEVE, L., 1872, pl. 2, fig. 5 (non CHENU, 1843). — TRYON, G. W., 1880, p. 217, pl. 69, fig. 421. — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*). — SOWERBY, G. B., 1919, p. 76 (considered as a synonym of *M. antiquus*).

Coral host : unknown.

Geographical range : no reference in the literature; according to the collections of the I. R. Sc. N. B., Mauritius.

*Magilus costatus* SOWERBY in REEVE, 1872 (non CHENU, 1843), with its elevated longitudinal ridges on the shell and the tube, has been very often considered as a *M. antiquus* with well developed costae (TRYON, 1880; BAKER, 1892; SOWERBY, 1919). According to BAKER (1892), the variation of the costulation forms a continuous series. In the material of the I. R. Sc. N. B. collections I found that the costulation generally increases with the shell height in *Magilus* spp., the largest shells bearing the highest ridges. However, two small specimens (H = 9 and 10 mm) present a very strong costulation on the shell and the tube, much more pronounced than that of large specimens (H = 30 mm and more). There is a big difference between these two specimens and *M. antiquus*. For this reason I consider *M. costatus* as a distinct species. Unfortunately this name is a junior homonym of *Magilus costatus* (fossil of Dax, France) described by CHENU (1843). I here propose the name *Magilus sowerbyi* nom. nov. pro *Magilus costatus* SOWERBY in REEVE, 1872 (non CHENU, 1843).

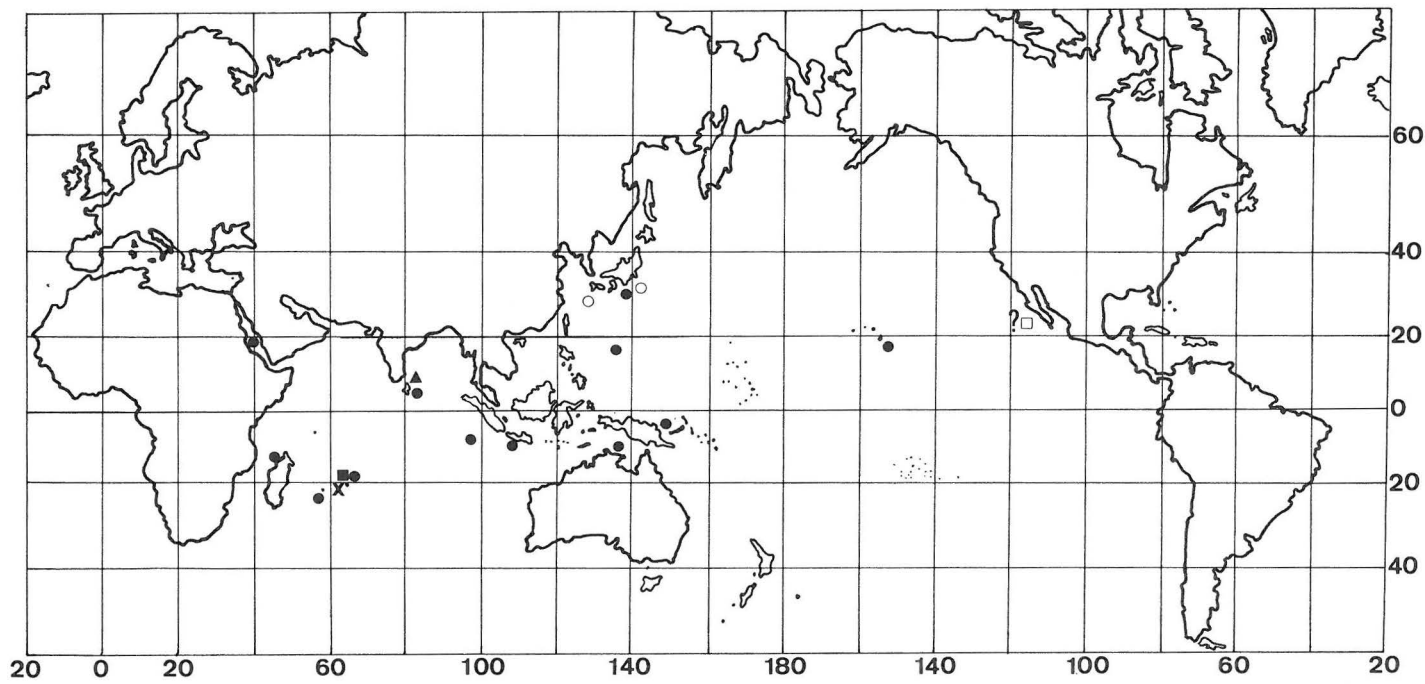


Fig. 4. — World distribution of the genus *Magilus*.

● : *Magilus antiquus*; □ : *Magilus cumingii*; ○ : *Magilus japonicus*;  
 ▲ : *Magilus lankae*; ■ : *Magilus microcephalus*; X : *Magilus sowerbyi*.

3.3 *Leptoconchus* RÜPPELL, 1835*Leptoconchus cumingii* DESHAYES, 1863

*Leptoconchus Cumingii* DESHAYES, G. P., 1863, p. 125, pl. 12, fig. 26-27.  
— BAKER, F. C., 1892 (not the synonyms cited by BAKER), pl. 9, fig. 4, 6.

*Leptoconchus Cumingii*; MARTENS, E., 1880, p. 62, pl. 21, fig. 2.

*Leptoconchus cumingii*; SMITH, E. A., 1903, p. 610. — GOHAR, H. A. F. & SOLIMAN, G. N., 1963, p. 100, fig. 2, 4-7, 9-15, 17, 18 A-D, 19-22, pl. 1, fig. 1-2. — SOLIMAN, G. N., 1969, p. 891, fig. 3C-E, 4A, 4D-E.

*Leptoconchus cumingii*; SOWERBY, G. B., 1919, p. 76 (cited as a young of *M. antiquus*).

? *Magilus antiquus*; SOWERBY in REEVE, L., 1872, pl. 1, fig. 1b.

*Magilus Cumingii*; SOWERBY in REEVE, L., 1872, fig. 2, pl. 2 (*non* H. & A. ADAMS). — TRYON, G. W., 1880, p. 217, pl. 69, fig. 418.

Coral host : *Millepora* spp., *Goniastrea* spp., *Favia stelligera* (DANA).

Geographical range : Réunion, Mauritius, Red Sea, Maldive and Laccadive Archipelagoes.

*Leptoconchus cumingii* is a very characteristic species possessing the most turbinated shell of the genus. All the described specimens lack the transversal costulation. *M. antiquus* can also be turbinated and some specimens of the I. R. Sc. N. B. collections are nearly as turbinated as *L. cumingii*. However, *M. antiquus* generally has a transversal costulation and for that reason I agree with BAKER (1892), that fig. 1b of SOWERBY's *M. antiquus* in REEVE (1872) represents in fact a *L. cumingii*.

*Leptoconchus cuvieri* DESHAYES, 1863

*Leptoconchus Cuvieri* DESHAYES, G. P., 1863, p. 128, pl. 13, fig. 6-7. — MARTENS, E., 1880, p. 62. — LAMY, E., 1924, p. 583, fig. 1-2.

*Leptoconchus cuvieri*; SOWERBY, G. B., 1919, p. 76 (cited as a young of *M. antiquus*).

*Magilus Cuvieri*; SOWERBY in REEVE, L., 1872, pl. 2, fig. 4. — TRYON, G. W., 1880, p. 216, pl. 68, fig. 405. — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

Coral host : unknown.

Geographical range : Réunion, Mauritius, Red Sea (Djedah).

The shell of *L. cuvieri* presents affinities with the one of *L. striatus* but it has a more acuminate apex. The most striking difference between these two species is the very characteristic smooth shell of *L. cuvieri*, while *L. striatus* presents rugose lamellae.

### *Leptoconchus djedah* (CHENU, 1843)

*Magilus Djedah* CHENU, J. C., 1843, p. 1, pl. 1, fig. 3-4. — TRYON, G. W., 1880, p. 216, pl. 68, fig. 403 (cited as a synonym of *M. antiquus*). — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

Coral host : unknown.

Geographical range : Red Sea (Djedah).

*Leptoconchus djedah* is characterized by a smooth shell. The species looks like a *L. striatus*. *L. djedah* has been described and figured only by CHENU (1843) from a very small specimen (H = 6 mm). It is probably a juvenile. The adult form could be *L. cuvieri*, the shell of which is also smooth.

### *Leptoconchus ellipticus* (SOWERBY, 1830)

*Magilus ellipticus* SOWERBY, G. B., 1830, p. 253 (*M. elliptecus* in the text), pl. 121, fig. 1.

? *Magilus ellipticus* SOWERBY *in* REEVE, L., 1872, pl. 3, fig. 7. — TRYON, G. W., p. 216, pl. 68, fig. 408 (cited as a synonym of *M. antiquus*). — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

*Leptoconchus ellipticus*; SMITH, E. A., 1903, p. 610. — SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

Coral host : unknown.

Geographical range : Mauritius, Maldive and Laccadive Archipelagoes.

*Leptoconchus ellipticus* is only known from a drawing of SOWERBY, G. B. (1830) without any description. This species is not listed in the Index Animalium of SHERBORN (1926). The *L. ellipticus* figured by SOWERBY (*in* REEVE, 1872) refers to the work of SOWERBY « Genera of shell » that I suppose is the « Genera of recent and fossil shells » of SOWERBY, G. B. (1830). However, the drawings and description of SOWERBY (*in* REEVE, 1872) are very different from the species figured by SOWERBY, G. B. (1830). The drawings of SOWERBY, G. B. (1830) are very similar to a young male of *L. striatus*. At the moment I do not know if there exists one or two species under the name of *L. ellipticus*. Therefore all the names which refer to the *L. ellipticus* of SOWERBY (*in* REEVE, 1872) are preceded by a question mark.

### *Leptoconchus expolitus* SHIKAMA, 1963

*Leptoconchus expolitus* SHIKAMA, T., 1963, p. 63, pl. 1, fig. 3-5.

Coral host : *Hydropora exesa* (PALLAS), *Physophyllia ayleni* (WELLS).  
Geographical range : Japan (southern end of Wakayama pref.).

The two figures of the shell of *L. expolitus* are very different. Figs 3a and 3b present some affinities with fig. 6 of *L. noumeae* (see RISBEC, 1953). Figs 4a and 4b are very similar to *L. striatus* but show a more turbinated shell than the latter (according to SHIKAMA with a less turbinated shell). The description of SHIKAMA is closer to his fig. 3 than to his fig. 4. If fig. 3 and 4 of SHIKAMA really belong to the same species, it would be an additional argument for the high intraspecific variation among the genus *Leptoconchus*.

### *Leptoconchus globulosus* (SOWERBY *in* REEVE, 1872)

*Magilus globulosus* SOWERBY *in* REEVE, L., 1872, pl. 3, fig. 10. — TRYON, G. W., 1880, p. 217, pl. 69, fig. 414 (cited as a synonym of *L. rueppellii*). — BAKER, F. C., 1892, p. 39 (cited as a synonym of *L. cumingii* DESHAYES, 1863). — SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

Coral host : unknown.

Geographical range : unknown.

There is great indecision about the species *Leptoconchus globulosus*. TRYON (1880) considered it as a synonym of *L. rueppellii*, BAKER (1892) and SMITH (1903) as a synonym of *L. cumingii* and SOWERBY (1919) as a young form of *M. antiquus*. In fact only SOWERBY (*in* REEVE, 1872) considered it as a valid species.

GOHAR & SOLIMAN (1963) and SOLIMAN (1969) mentioned « *L. globosus* DESHAYES ». I think it is a *lapsus calami* for *L. globulosus* (SOWERBY *in* REEVE, 1872). However I do not cite the « *L. globosus* » of GOHAR & SOLIMAN under the name of *L. globulosus* because according to their drawings and photography I am convinced that it is in fact a *L. striatus*.

### *Leptoconchus lamarckii* DESHAYES, 1863.

*Leptoconchus Lamarckii* DESHAYES, G. P., 1863, p. 127, pl. 12, fig. 1, 3.

*Leptoconchus Lamarckii*; MARTENS, E., 1880, p. 63.

*Leptoconchus lamarckii*; HABE, T., 1975, p. 85, pl. 27, fig. 22. — TINKER, S. W., 1974, p. 124, 3 fig., p. 105.

*Leptoconchus lamarckii*; HIRASE, S. & TAKI, I., 1951, pl. 111, fig. 18.

*Magilopsis lamarckii*; SOWERBY, G. B., 1919, p. 77. — DEMOND, J., 1957, p. 317.

*Magilopsis lamarckii*; MORRISON, J. P. E., 1954, p. 14. — GOHAR H. A. F. & SOLIMAN, G. N., 1963, p. 100, fig. 1, 18 F, 24-26, pl. 1, fig. 1, 3. — SOLIMAN, G. N., 1969, p. 891, fig. 3A, 4C, F. — KAY, E. A., 1979, p. 257, fig. 90D. — SCHOENBERG, O., 1981, p. 7, 1 fig.

*Magilus Lamarckii*; SOWERBY *in* REEVE, L., 1872, pl. 4, fig. 14. — TRYON, G. W., 1880, p. 217, pl. 69, fig. 415 (cited as a synonym of

*M. maillardi*. — BAKER, F. C., 1892, p. 40 (cited as synonym of *M. maillardi*).

*Coralliobia (Magilopsis) lamarcki*; WENZ, W., 1938-44, p. 1134, fig. 3223.

Coral host : *Madrepora* spp., *Acropora* spp., *Goniastrea* spp., *Cyphastrea* spp., *Fungia* spp., *Montipora* sp.

Geographical range : Réunion, Mauritius, Madagascar, Red Sea (Al-Ghardaqa), Japan (Honsû and southern), Formosa, Mariana Islands, Marshall and Gilbert Islands, Micronesia, Tuamotu and Hawaiian Islands.

*Leptoconchus lamarckii* with its pyriform shell bearing a spindle-shaped rostrum, and with its functional operculum, is one of the most characteristic *Leptoconchus* species. I do not understand why it was considered as a synonym of *L. maillardi* by TRYON (1880) and by BAKER (1892).

According to the numerous citations in the literature, *L. lamarckii* is certainly the most common species of *Leptoconchus* and is also the most widespread species of this genus in the Indo-Pacific Ocean. This well known species seems to indicate that some *Leptoconchus* spp. are not dependent on a well defined coral host (see also *L. striatus*).

### *Leptoconchus maillardi* DESHAYES, 1863

*Leptoconchus Maillardi* DESHAYES, G. P., 1863, p. 124, pl. 12, fig. 28-29.

— MARTENS, E., 1880, p. 63. — ? BAKER, F. C., 1892, p. 40, pl. 9, fig. 7.

*Magilopsis maillardi*; SOWERBY, G. B., 1919, p. 77.

*Magilus Maillardi*; SOWERBY in REEVE, L., 1872, pl. 4, fig. 16. — TRYON, G. W., 1880, p. 217, pl. 69, fig. 416.

Coral host : unknown.

Geographical range : Réunion.

BAKER (1892) has had no difficulty in separating *L. maillardi* from any related species. However, I am not sure that BAKER really had *L. maillardi* in his material because his figure 7 on plate 9 looks very much like a *L. lamarckii* (which he considered as a synonym of *L. maillardi*). SOWERBY (1919) considered *L. maillardi* as a possible abnormal form of *L. lamarckii*. With its long tapered aperture, strong costulation and elevated spire, *L. maillardi* is certainly closely related to *L. lamarckii* and *L. solidiusculus*. However, without evidence to the contrary, I consider *L. maillardi* as a valid species.

### *Leptoconchus noumeae* RISBEC, 1953

*Leptoconchus noumeae* RISBEC, J., 1953, p. 117, fig. 1-6.

Coral host : unknown.

Geographical range : New Caledonia (Noumea).

It is very difficult to know whether this species belongs really to the genus *Leptoconchus* or not. RISBEC (1953) himself is not sure of it. The heliciform depressed shell is rather different from the other *Leptoconchus* spp. which are generally globose or pyriform. The external anatomy of *L. noumeae* is also quite different (e.g. by the absence of optic tentacles) from the anatomy of *L. striatus* (see DESHAYES, 1863), *L. cumingii* (see GOHAR & SOLIMAN, 1963), and *L. lamarckii* (see GOHAR & SOLIMAN, 1963).

*Leptoconchus oblongus* SOWERBY in H. & A. ADAMS, 1858.

*Nomen nudum*

*Leptoconchus oblongus* H. & A. ADAMS, 1858, p. 138. — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

*Leptoconchus oblongus* has been attributed by H. & A. ADAMS (1858) to SOWERBY. However I am unable to find any information on *L. oblongus* in the works of the SOWERBYS (1st and 2nd of the name). TRYON (1880, p. 246) considered it as an error for *L. ellipticus* (SOWERBY) but his comment is followed by a question mark. In the absence of any definition, drawing, holotype, geographical range and coral host *L. oblongus* is to be considered a *nomen nudum*.

*Leptoconchus peronii* (LAMARCK, 1818). *Nomen oblitum*

*Magilus Peronii* LAMARCK, J. B. P., 1818, p. 374. — CHENU, J. C., 1843, p. 1, pl. 1, fig. 5-7. — TRYON, G. W., 1880, p. 216 (cited as a synonym of *M. antiquus*).

*Magilus peronii*; SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

*Leptoconchus Peronii*; H. & A. ADAMS, 1858, p. 137, pl. 14, fig. 4. — ADAMS, A., 1870, p. 424. — DUNKER, G., 1882, p. 45. — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

Coral host : Madreporarian.

Geographical range : Japan, Mauritius.

The original description of LAMARCK (1818), without drawing, is very incomplete and does not allow to define the species. The drawings found in the literature (CHENU, 1843 and H. & A. ADAMS, 1858) are different to such a degree that they could refer to four different species. ADAMS, A. (1870), LISCHKE (1871b), and DUNKER (1882), however, consider *L. peronii* as a senior synonym of *L. striatus*. The drawing of H. & A. ADAMS (1858) seems to confirm this opinion. One specimen of the collections of the I. R. Sc. N. B. was labelled *L. peronii* by CRAVEN (1892) and closely resembles *L. striatus*. But SOWERBY

(in REEVE, 1872) pointed out that « there is so much uncertainty respecting LAMARCK's *L. peronii* that it is better to adopt the specific name given by the describer of the genus *Leptoconchus* » (*L. striatus*). This opinion was accepted by further authors and except in DUNKER (1882), *L. peronii* has remained unused as a senior synonym of *L. striatus*. It is to be considered a *nomen oblitum*.

### *Leptoconchus rostratus* A. ADAMS, 1864

*Leptoconchus rostratus* ADAMS, A., 1864, p. 310. — ADAMS, A., 1870, p. 424. — LISCHKE, C. E., 1874, p. 33. — DUNKER, G., 1882, p. 45, pl. 6, fig. 20-21. — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

? *Magilus rostratus*; SOWERBY in REEVE, L., 1872, pl. 4, fig. 15. — TRYON, G. W., 1880, p. 216, pl. 68, fig. 409-410 (cited as a synonym of *M. antiquus*). — SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

Coral host : Madreporarian.

Geographical range : Japan (Kino-O-Shima).

As pointed out by LISCHKE (1874), the drawing and description of *Leptoconchus rostratus* in SOWERBY (in REEVE, 1872) are quite different from the original description of A. ADAMS (1864). Especially the longitudinal ridges of the last whorl (« *anfractu ultime liris transversis instructo* » sic) are absent from the description of SOWERBY (in REEVE, 1872) and from the drawings of DUNKER (1882). However as intraspecific variations are so important in the genus *Leptoconchus*, the description of A. ADAMS (1864) and of SOWERBY (in REEVE, 1872) do not refer necessarily to two different species as LISCHKE (1874) thought.

### *Leptoconchus rueppellii* DESHAYES, 1863

*Leptoconchus Ruppellii* DESHAYES, G. P., 1863, p. 126, pl. 13, fig. 4-5.

*Leptoconchus Rüppellii*; MARTENS, E., 1880, p. 62.

*Leptoconchus ruppellii*; SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

*Magilus Ruppellii*; SOWERBY in REEVE, L., 1872, pl. 4, fig. 11. — TRYON, G. W., 1880, p. 217, pl. 68, fig. 412.

*Magilus Rüppellii*; BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).

Coral host : unknown.

Geographical range : Réunion, Mauritius.



*Leptoconchus rueppellii* has an elongated aperture but no rostrum. *L. rueppellii* has an intermediate shape between *L. lamarckii* and *L. cumin-gii*, and presents some affinities with *L. ellipticus* (SOWERBY, 1830).

#### *Leptoconchus serratus* (SOWERBY *in* REEVE, 1872)

*Magilus serratus* SOWERBY *in* REEVE, L., 1872, pl. 3, fig. 8. — TRYON, G. W., 1880, p. 216, pl. 68, fig. 407 (cited as a synonym of *M. antiquus*). — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*). — SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

Coral host : unknown.

Geographical range : unknown.

TRYON (1880), BAKER (1892), and SOWERBY (1919) consider *Leptoconchus serratus* as a synonym of *M. antiquus*. I think that this species is closely related to *L. striatus*, differing only by the crenulated edge of the external lip. *L. serratus* is extremely rare and maybe only an abnormal form of *L. striatus*.

#### *Leptoconchus solidiusculus* (SOWERBY *in* REEVE, 1872)

*Magilus solidiuscula* SOWERBY *in* REEVE, L., 1872, pl. 4, fig. 12. — TRYON, G. W., 1880, p. 217, pl. 69, fig. 417 (cited as a synonym of *L. maillardi*). — BAKER, F. C., 1892, p. 40 (cited as a synonym of *L. maillardi*).

*Magilus solidiusculus*; SOWERBY, G. B., 1919, p. 76 (cited as a young form of *M. antiquus*).

Coral host : unknown.

Geographical range : Hawaiian Islands.

*Leptoconchus solidiusculus* has been considered a *M. antiquus* by SOWERBY (1919) and a *L. maillardi* by TRYON (1880) and by BAKER (1892). According to the shape of the shell and the geographical range of *L. solidiusculus* it could well be a young form or a subspecies of *L. lamarckii*. *L. solidiusculus* is a rare species because it has not been collected any more (according to the literature) since the work of SOWERBY (*in* REEVE, 1872). Unless more information on this species becomes available, I consider it as a valid one.

#### *Leptoconchus striatus* RÜPPELL, 1835

*Leptoconchus striatus* RÜPPELL, E., 1835, p. 259, pl. 35, fig. 9-10. — SOWERBY, G. B., 1842, p. 171, fig. 11. — DESHAYES, G. P., 1863, p. 214, pl. 14, fig. 1-5. — MARTENS, E., 1880, p. 62, pl. 21, fig. 21. — FISCHER, P., 1887, p. 648, pl. 3, fig. 20. — SOWERBY, G. B., 1919,

- p. 76, (cited as a synonym of *M. antiquus*). — HIRASE, S. & TAKI, I., 1951, pl. 11, fig. 17. — ?HABE, T., 1975, p. 85, pl. 27, fig. 23. — BOUILLON, J. *et al.*, in press.
- Magilus striatus*; SOWERBY in REEVE, L., 1872, pl. 3, fig. 6. — TRYON, G. W., 1880, p. 216, pl. 68, fig. 406 (cited as a synonym of *M. antiquus*). — BAKER, F. C., 1892, p. 39 (cited as a synonym of *M. antiquus*).
- Leptoconchus globosus*; GOHAR, H. A. F. & SOLIMAN, G. N., 1963, p. 100, fig. 3, 18E, 23, pl. 1, fig. 1. — SOLIMAN, G. N., 1969, p. 891, fig. 3B, 4B.
- Leptoconchus rostratus*; YOKOYAMA, M., 1924, p. 16, pl. 1, fig. 5.
- Leptoconchus Schrenckii* LISCHKE, C. E., 1871a, p. 40. — LISCHKE, C. E., 1871b, p. 45, pl. 4, fig. 9-10. — DUNKER, G., 1882, p. 45. — BAKER, F. C., 1892, p. 38 (cited as a synonym of *M. antiquus*).
- Magilus Schrenckii*; TRYON, G. W., 1880, p. 216, pl. 68, fig. 411 (cited as a synonym of *M. antiquus*).
- Leptoconchus serratus (Lapsus calami)*; ADAMS, A., 1864, p. 310. — TRYON, G. W., 1880, p. 254 (cited as an error for *L. striatus*). — BAKER, F. C., 1892, p. 38, (cited as a synonym of *M. antiquus*).
- Magilus tenuis* CHENU, J. C., 1843, p. 1, pl. 1, fig. 8. — TRYON, G. W., 1880, p. 216, pl. 68, fig. 404 (cited as a synonym of *M. antiquus*). — BAKER, F. C., 1892, p. 39 (cited as a synonym of *M. antiquus*).
- ? *Magilus antiquus*; SOWERBY in REEVE, L., 1872, pl. 1, fig. 1c, 1d.

Coral host : *Meandrina* spp., *Astrea* spp., *Fungia (Fungia) fungites* (LINNAEUS), *Fungia (Verrillofungia) concinna* VERRILL, F. (*Verrillofungia repanda* DANA, F. (*Ctenactis*) *echinata* (PALLAS), F. (*Pleu-ractis*) *paumotensis* STUTCHBURY.

Geographical range : Red Sea, Mauritius, Réunion, Seychelles Islands, Indian Ocean, Papua New Guinea, Japan, New Caledonia.

*Leptoconchus striatus* has been cited as a synonym of *L. peronii* by ADAMS, A. (1870), LISCHKE (1871b), and DUNKER (1882). However I consider *L. peronii* as a *nomen oblitum* (cf. supra) and consequently *L. striatus* is to be regarded a valid species.

The reference to HABE (1975) is preceded by a question mark because I am not sure of his determination. *L. striatus* as figured in the work of HABE, is exceptionally turbinated. Moreover its lustrous shell is quite unusual for a *L. striatus*.

*L. rostratus* described by YOKOYAMA (1924) does not have the acute rostrum at the aperture. As this is the only valuable character to distinguish *L. rostratus* from *L. striatus* I consider the specimen figured by YOKOYAMA (1924) as a *L. striatus*. It has to be noticed that this is the only fossil record (Upper-Pleistocene) of actually living *Leptoconchus* spp.

*Leptoconchus schrenckii* has only been figured by LISCHKE (1871b). He distinguished his species from *L. striatus* by the absence of an anterior

canal, by the presence of violet spots on the shell, by the suture and spire not being covered by calcareous secretion, and by the absence of transversal costulation at the basis of the last whorl. All the differences between *L. schrenckii* and *L. striatus* fall within the large variation of the shell characters and the sexual dimorphism of *L. striatus* as observed by BOUILLON *et al.* (in press). The drawing and description of LISCHKE (1871b) correspond exactly to some males of *L. striatus* found in *Fungia* spp. (BOUILLON *et al.*, in press). This is the reason why I consider *L. schrenckii* as a synonym of *L. striatus*.

I am unable to find any references on « *Leptoconchus serratus* RÜPPELL » in A. ADAMS, 1864 in the work of RÜPPELL. TRYON (1880) thought this *L. serratus* to be an error for *L. striatus*. I agree with this opinion and I consider *L. serratus* RÜPPELL in A. ADAMS, 1864 as a *lapsus calami* for *L. striatus* RÜPPELL.

According to the very short description and drawings of CHENU (1843) it is impossible to distinguish *Leptoconchus tenuis* from *L. striatus*. I have examined many specimens of *L. striatus* in the collections of the I. R. Sc. N. B. corresponding exactly to the figure of CHENU (1843). Therefore I consider *L. tenuis* (CHENU, 1843) as a synonym of *L. striatus* RÜPPELL, 1835.

The two drawings (1c, 1d) of *M. antiquus* given by SOWERBY (*in* REEVE, 1872) are also added to the synonymy list of *L. striatus*. However, some uncertainty persists because *L. striatus* and a young *M. antiquus* without a tube differ only by the thickness of the shell (BOUILLON *et al.*, in press).

### 3.4 *Coralliobia* H. & A. ADAMS, 1853

As I pointed out in § 3.1, only the species which had been quoted as *Leptoconchus* and/or *Magilus* in the literature, but belonging now to the genus *Coralliobia*, are mentioned here. Consequently this is not an extensive annotated list of the genus *Coralliobia*.

#### *Coralliobia fimbriata* (A. ADAMS, 1852)

*Concholepas* (*Coralliobia*) *fimbriata* ADAMS, A., 1852, p. 93.

*Leptoconchus* (*Coralliobia*) *fimbriata*; H. & A. ADAMS, 1853-58, p. 138.

*Magilus fimbriatus*; SOWERBY *in* REEVE, L., 1872, pl. 3, fig. 9. — TRYON, G. W., 1880, p. 217, pl. 69, fig. 419-420.

*Coralliobia* (*Coralliobia*) *fimbriata*; WENZ, W., 1938-44, p. 1134, fig. 3224.

*Coralliobia fimbriata*; KURODA, T., 1953, p. 128, fig. 5-6. — SHIKAMA, T., 1963, p. 62, 2 fig. — HABE, T., 1975, p. 85, pl. 27, fig. 21. — KAY, E. A., 1979, p. 225, fig. 90E-F.

Coral host : unknown.

Geographical range : Philippines, Hawaiian Islands, Japan (Ryukyu, Nase, Amani-Oshima Island), Indo-pacific West, Indian Ocean, Mauritius.

*Coralliobia fimbriata* has been assigned to the genus *Leptoconchus* by H. & A. ADAMS (1853-58) and to the genus *Magilus* by SOWERBY (in REEVE, 1872) and TRYON (1880). However, the general shape of this shell and the fact that it lives on the coral and not hidden in the coral, exclude this species from the genera *Leptoconchus* and *Magilus*.

### *Coralliobia robillardi* (LIENARD, 1870)

*Leptoconchus Robillardi* LIENARD, E., 1870, p. 305. — LIENARD, E., 1871, p. 73, pl. 1, fig. 5. — G & H. NEVILL, 1871, p. 5, pl. 1, fig. 1. *Magilus Robillardi*; SOWERBY in REEVE, L., 1872, pl. 4, fig. 13. — TRYON, G. W., 1880, p. 218, pl. 69, fig. 422-23 (cited as a synonym of *C. fimbriata*).

*Coralliobia cumingi*; KEEN, A. M., 1971, p. 546, fig. 1070.

*Coralliobia robillardi*; SOWERBY, G. B., 1919, p. 77. — BARTSH, P. & REHDER, H. A., in KEEN, A. M., 1971, p. 546.

Coral host : unknown.

Geographical range : Mauritius, Indian Ocean, Clipperton Island, Columbia.

*Coralliobia robillardi* has been assigned to the genus *Leptoconchus* (see LIENARD, 1870, 1871; G. & H. NEVILL, 1871) and to the genus *Magilus* (see SOWERBY in REEVE, 1872; TRYON, 1880), but for the same reasons as for *C. fimbriata* it cannot be considered as belonging to one of these two genera.

I also reported here the *C. cumingii* mentioned by KEEN (1971). This author stated « species that match the original description well (of *Campulotus cumingi* H. & A. ADAMS, 1864) are in the collection of the Los Angeles County Museum, taken alive on the coral *Pavona* at Gorgonia Islands, Columbia ». However, in the original description, H. & A. ADAMS wrote « *anfractu ultimo in tubum elongatum porrecto* » and the figures of KEEN (1971) show no trace of a tube. Moreover, the original description mentions a turbinated shell (« *testa turbinata* »); this is not the case in the illustration of KEEN. According to her figures, *Coralliobia cumingii* is identical to many *Coralliobia robillardi* from the collections of the I. R. Sc. N. B.

*C. robillardi* and *C. fimbriata* are two closely related species which have been considered synonyms by TRYON (1880) but distinct species by SOWERBY (1919).

### Coralliobia smithi YEN, 1942

*Coralliobia smithi* YEN, T. C., 1942, p. 226, pl. 21, fig. 143.

*Coralliobia fimbriata*; SMITH, E. A., 1899, p. 311, fig. 2.

Coral host : unknown.

Geographical range : North-west Australia, China.

According to YEN (1942) the holotype of this species is labelled in the collection of the British Museum as *Leptoconchus fimbriatus*. Drawings and description of SMITH (1899) and YEN (1942) allow to assign this species without any doubt to the genus *Coralliobia*.

#### 4. DISCUSSION AND CONCLUSION

Observations on dry material collected in Papua New Guinea indicate that *Leptoconchus striatus* invades the coral in the form of juveniles of which the shell is more or less 3 mm in height. This type of « infection » by juveniles seems to be the most frequent one among coral boring molluscs (SOLIMAN, 1969). Settlement under the form of larvae has not been observed but is possible since larvae of *L. cumingii* for a few days remain unaffected, although directly lying on the coral (GOHAR & SOLIMAN, 1963). *Leptoconchus* spp. present a free-living stage after metamorphosis such as *Magilus* spp. (see SOWERBY in REEVE, 1872; LAMY, 1924). Consequently the metamorphosis seems not to be induced by the contact with the coral host.

When *L. striatus* settles on *Fungia* spp. and is progressively covered over by the septa, either an active boring process of the mollusc or a passive covering by the growth of the coral could be involved. At the beginning *L. striatus* rests on the septa, the aperture of the shell upwards, with the axis of the columella parallel to the oral surface of the coral. However, the apex of the shell sinks down more quickly than the base and when *L. striatus* disappears in the coral the axis of the columella is perpendicular to the coral surface. I think that only an active boring mechanism can explain this rotary motion of the shell.

In *Fungia*-corals *L. striatus* and some other *Leptoconchus* species lie in the coelenteron and are directly in contact with the latter (no aragonite protection as in *Fungiacava eilatensis*, see GOREAU *et al.*, 1972). This means that *L. striatus* could benefit from the food ingested by the coral. It must also remain immune against the nematocysts located in the acontia (filaments at the free edge of the mesenteries).

SOWERBY (in REEVE, 1872) and LAMY (1924) asserted that the boring behaviour of *Magilus* spp. and *Leptoconchus* spp. changes according to the circumstances (growth rate of the coral, shell position in the coral). I think, according to the observations of GOHAR & SOLIMAN (1963) and to my own observations, that the boring behaviour and the burrow

shape are specifically determined and that they could help to identify some species. Information about the coral host, the genitalia and the reproductive behaviour would also provide characters to distinguish the genus *Magilus* from the genus *Leptoconchus*, and/or characters to distinguish the species belonging to these genera.

I agree with BAKER's opinion (1892) «until the anatomy of all the forms is thoroughly worked and their life history studied we cannot hope for anything than a provisional classification». This opinion is still valid because the observations on the anatomy and biology of the animals of the genus *Leptoconchus* (see GOHAR & SOLIMAN, 1963; BOUILLON *et al.*, in press) are limited and because information on the animal of *Magilus* is scanty. It would be premature to insert them in a diagnosis as it should be. Nevertheless the indications given by the anatomy support the idea that *Magilus* and *Leptoconchus* are two distinct genera.

In the genus *Magilus* there are six described species: *Magilus antiquus*, *M. cumingii*, *M. japonicus*, *M. lankae*, *M. microcephalus*, and *M. sowerbyi*. *M. japonicum* and *M. lankae* are possible subspecies of *M. antiquus*. «*Magilus serpuliformis* VONLAIN» in DERANIYAGALA (1968) must be related to the Vermetidae.

In the genus *Leptoconchus* I recognize the following valid species: *Leptoconchus cumingii*, *L. cuvieri*, *L. djedah*, *L. ellipticus*, *L. expolitus*, *L. globulosus*, *L. lamarckii*, *L. maillardi*, *L. noumeae*, *L. rostratus*, *L. rueppellii*, *L. serratus*, *L. solidiusculus*, and *L. striatus*.

*L. peronii* is a *nomen oblitum* and *L. oblongus* a *nomen nudum*. *L. schrenckii* and *L. tenuis* are to be considered synonyms of *L. striatus*. Under the names *L. ellipticus*, *L. expolitus*, and *L. rostratus* there may be in each case two different species. *L. djedah* and *L. solidiusculus* are maybe juveniles respectively of *L. cuvieri* and *L. lamarckii*.

*Coralliobia fimbriata*, *C. robillardi*, and *C. smithi*, which have been assigned to the genus *Magilus* and/or to the genus *Leptoconchus*, must be reported in the genus *Coralliobia*, principally because they live on the coral and not in it.

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## 5. REFERENCES

ADAMS, A.

1852. Description of a new genus, and of several new species of Mollusca from the Cumingian collection. — *Proc. zool. Soc. Lond.*, 20 : 92-95.  
1864. On some genera and species of Mollusca from the seas of China and Japan. — *Ann. Mag. nat. Hist.*, 13 : 307-310.  
1870. On some species of probosciferous Gastropods which inhabit the seas of Japan. — *Ann. Magn. nat. Hist.*, ser. 4, vol. 5 : 418-430.

ADAMS, H. & ADAMS, A.

1853-58. The genera of recent Mollusca. — *John Van Vorst, London*, 3 vol.

1863. Descriptions of species of shells, chiefly from the Cumingian collection. — *Proc. zool. Soc. Lond.*, 1863 : 428-435.

BAKER, F. C.

1892. Notes on a collection of shells from the Mauritius, with a consideration of the genus *Magilus* of MONTFORT. — *Proc. Rochester Acad. Sci.*, 2 : 19-40.

BOUILLON, J., MASSIN, C. & VAN GOETHEM, J.

1981. *Fungiacava eilatensis* SOOT-RYEN (Bivalvia, Mytilidae) et *Leptoconchus striatus* RÜPPELL (Gastropoda, Coralliophylidae) mollusques perforant des *Fungia* (Anthozoa, Fungiidae) récoltés en Papouasie Nouvelle-Guinée. — *Bull. Scé. Acad. r. Sci. Outremer. Cl. Sci. nat. med.*, 4.

CARUS, C. G.

1837. Über die sonderbare Selbstversteinerung des Gehäuses einer Schnecke des Rothen Meeres. — *Mus. Senckenberg.*, 2 : 193-204 + 1 pl.

CHENU, J. C.

1843-53. Illustrations conchyliologiques. — A. Franck (ed.), Paris.

CUVIER, G.

1850. Le règne animal distribué d'après son organisation. Les mollusques. — 1 vol. + atlas de DESHAYES, G. P., 266 pp. + 139 pls. Masson et Cie ed., Paris.

DEMOND, J.

1957. Micronesian Reef-associated Gastropods. — *Pacif. Sci.*, 21 : 275-341.

DERANIYAGALA, P. E. P.

1968. A new gastropod of the genus *Magilus* MONFORT from Ceylon. — *Proc. 24th ann. Sess. Ceylon Ass. Adven. Sci.*, 53-54.

1969. A remarkable snail from Ceylon. — *Loris*, 11 : 316.

DESHAYES, G. P.

1839-53. Traité élémentaire de Conchyliologie. — Masson et Cie ed., Paris, 4 vol.

1863. Catalogue des Mollusques de l'île de la Réunion, in Notes sur l'île de la Réunion. — L. Maillard ed., Paris, 144 pp. + 14 pls.

DUNKER, G.

1882. Index Molluscorum Maris Japonici. — *Cassel*, 301 pp. + 16 pls.

FISCHER, P.

1887. Manuel de conchyliologie et de paléontologie conchyliologique. — F. Savy ed., Paris, 1187 pp. + 23 pls.

GOHAR, H. A. F. & SOLIMAN, G. N.

1963. On the biology of three coralliophilids boring in living corals. — *Publ. mar. biol. Stn. Ghardaqa*, 12 : 99-126.

GOREAU, T. F. & GOREAU, N. I.

1972. On the mode of boring in *Fungiacava eilatensis* (Bivalvia, Mytilidae). — *J. zool. Lond.*, 166 (1) : 55-60.

HABE, T.

1975. Shells of the Western Pacific in color. II. — *Hoikusha, Osaka*, 233 pp. + 66 pls.

HIRASE, S. & TAKI, I.

1951. An illustrated handbook of shells in natural colors from the Japanese Islands and adjacent territory. — *Bunkyôkaku, Tokyo*, 46 pp. + 134 pls.

KAY, E. A.

1979. Hawaiian marine shells, in Reef and shore fauna of Hawaiian section 4: Mollusca. — *Bernice P. Bishop Mus. spec. Publ.*, 64 (4) : 653 pp., Bishop Museum Press, Honolulu, Hawaii.

KEEN, A. M.

1971. Sea shells of tropical West America : marine mollusks from Baja California to Peru. — *Stanford Univ. Press, Stanford, California*, 2nd ed., 1064 pp.

## KIRA, T.

1975. Shells of the Western Pacific in color. I. — *Hoikusha, Osaka*.

## KURODA, T.

1953. New genera and species of Japanese Rapidae. — *Venus, Kyoto*, 17 : 117-130.

## LAMARCK, Chevalier de, J. B. P.

1818. Histoires naturelles des animaux sans vertèbres. — *Paris*, vol. 5, 1<sup>e</sup> éd., 612 pp.

## LAMY, E.

1923. Concurrence vitale entre magiles et polypier. — *Bull. Mus. Hist. nat.*, 29 : 582-584.

1930. Quelques mots sur la lithophagie chez les gastéropodes. — *J. Conch., Paris*, 74 : 1-34.

## LIENARD, E.

1870. Description d'espèces nouvelles provenant de l'île Maurice. — *J. Conch., Paris*, ser. 3, T. 10, vol. 18 : 304-305.

1871. Description d'espèces nouvelles provenant de l'île Maurice. — *J. Conch., Paris*, ser. 3, T. 11, vol. 19 : 71-74.

## LISCHKE, C. E.

1871a. Diagnosen neuer Meeres-Conchylien von Japan. — *Malakozool. Bl.*, 1871 : 39-45.

1871b. Japanische Meeres-Conchylien. — *Cassel*, 2ter theil, 184 pp. + 14 pls.

1874. Japanische Meeres-Conchylien. — *Cassel*, 3ter theil, 123 pp. + 9 pls.

## MARTENS, E., von

1880. Die Mollusken der Maskarenen und Seychellen in Beiträge zur Meeresfauna der Insel Mauritius und der Seychellen. — *Berlin*, 176 pp. + 4 pls.

## MONTFORT, D. de

1810. Conchyliologie systématique et classification méthodique des coquilles. — *Paris*, T. 2, 676 pp.

## MORRISON, J. P. E.

1954. Ecological Notes on the mollusks and other animals of Raroia. — *Atoll Res. Bull.*, 34 (1) : 1-18.

## NEVILL, G. &amp; NEVILL, H.

1871. Descriptions of the New Mollusca from the Eastern Regions. — *J. Asiat. Soc. Beng.*, 40 (2) : 1-11.

## REEVE, L.

1872. Monograph of the genus *Magilus* in *Conchologia iconae*. — Vol. 10.

## RISBEC, J.

1953. Note au sujet de trois mollusques rares ou peu connus. — *Bull. Soc. zool. Fr.*, 78 : 115-122.

## ROBERTSON, R.

1970. Review of the predators and parasites of stony corals, with special reference to symbiotic prosobranch Gastropods. — *Pacif. Sci.*, 24 (1) : 43-54.

## RÜPPELL, E.

1832. Mémoire sur le *Magilus antiquus* MONTFORT. — *Mém. Soc. Hist. nat. Strasbourg*, 1 : 1-4 + 1 pl.

1835. Description d'un nouveau genre de mollusque de la classe des Gastéropodes Pectinibranches. — *Trans. zool. Soc. Lond.*, 1 : 259-260 + pl. 35, fig. 9 & 10.

## SABELLI, B. &amp; MARI, A.

1973. Shells of all the seas. Annotations on the family Magilidae. — *La Conchiglia*, 1 (47) : 8-13.

## SCHOENBERG, O.

1981. A hidden habitat. — *Hawaii. Shell News*, 29 (1) : 7.

## SHERBORN, C. D.

1926. Index Animalium part IX Index *Dorsalis-Euristormis*. — *Trustees of the British Museum, London*, pp. 2009-2248.



SHIKAMA, T.

1963. On some noteworthy marine Gastropoda from southwestern Japan. — *Sci. Rep. Yokohama natn. Univ.*, sect. 2, 10 : 61-66.

SMITH, E. A.

1899. Notes on some marine shell from North-West Australia with descriptions of new species. — *Proc. malac. Soc. Lond.*, 3 : 311-314.  
1903. Marine Mollusca in The Fauna and Geography Mald. Laccad. Archip. — 2 (2) : 589-630 + 2 pls.

SOLIMAN, G. N.

1969. Ecological aspects of some coral-boring gastropods and bivalves of the northwestern Red Sea. — *Am. Zool.*, 9 : 887-894.

SOWERBY, G. B. (2nd of the name)

1830. Genera of Recent and Fossil Shells. — London, 2 vols.  
1842. A conchological manual. — London, 2nd edit. 313 pp. + 562 figs.

SOWERBY, G. B. (3rd of the name)

1919. Notes on *Magilus* and its allies, substituting the generic name *Magilopsis* for *Leptoconchus lamarkii* DESHAYES. — *Proc. malac. Soc. Lond.*, 13 : 75-77.

THIELE, J.

1931. Handbuch der systematischen Weichtierkunde, 1ster Band. Gastropoda. — *G. Fisher, Jena*.

TINKER, S. W.

1974. Pacific sea shells: A handbook of common marine molluscs of Hawaii and the south seas. — *C. E. Tuttle Cie, Rutland (Vermont)*, 240 pp. + 106 pls.

TRYON, G. W.

1880. Manual of Conchology. Vol. II, Muricinae, Purpurinae. — *Philadelphia*, 289 pp. + 70 pls.

VÉLAIN, CH.

1877. Observations générales sur la faune des îles St. Paul et Amsterdam suivies d'une description des mollusques. — *Archs. Zool. exp. gén.*, 7 : 1-144 + 5 pls.

WENZ, W.

1938. Gastropoda. Teil I: Allgemeiner Teil und Prosobranchia, in Handbuch der Paläozoologie. — *Gebrüder borntraeger, Berlin*, Band 6, pp. 949-1649.

YEN, T. C.

1942. A review of Chinese gastropods in the British Museum. — *Proc. malac. Soc. Lond.*, 24 (5-6) : 170-289.

YOKOYAMA, M.

1924. Mollusca from the Coral Bed of Awa. — *J. Coll. Sci. imp. Univ. Tokyo*, 45, art. 1 : 1-62.

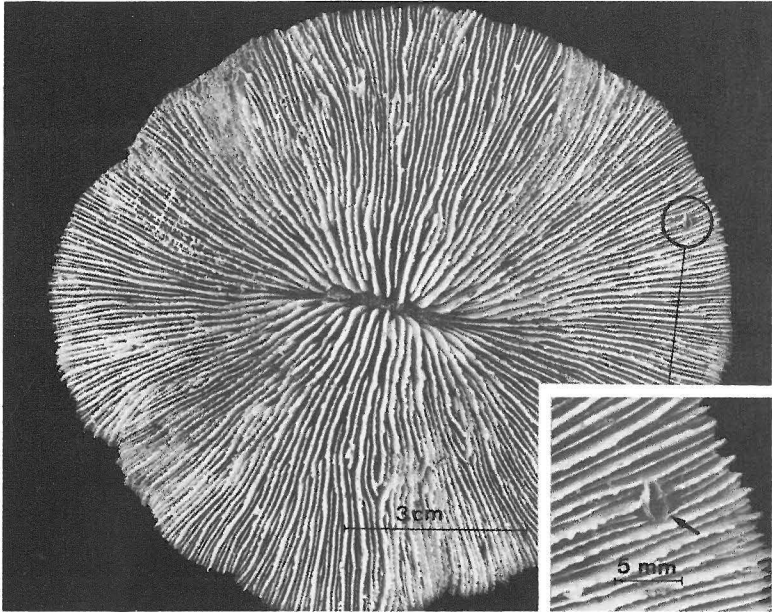
YOUNG, C. M.

1974. Coral reefs and Molluscs. — *Trans. Roy. Soc. Edinb.*, 69 (7) : 147-166.

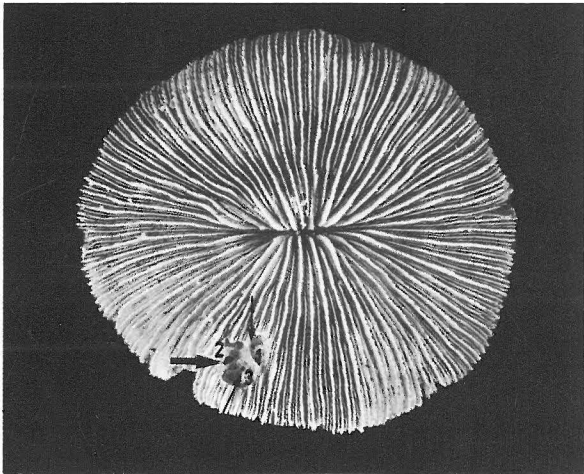
#### LEGEND OF THE PLATE

##### PLATE I

- Fig. 5. — Young *Leptoconchus striatus* sinking down in a *Fungia* (*Fungia*) *fungites*. The arrow indicates a septum enclosing already the apex of the shell.
- Fig. 6. — Three burrows (1, 2 and 3) of *Leptoconchus striatus* in a *Fungia* (*Verrilliofungia*) *concinna*. Septa have been broken to show the burrows. The thin arrows indicate the chimneys communicating with the aboral face. The thick arrow shows the hole of communication between burrow 2 and a lower burrow. Natural size.



5



6

C. MASSIN. — Contribution to the knowledge of two boring gastropods  
with an annotated list of the genera *Magilus* MONTFORT, 1810  
and *Leptoconchus* RÜPPELL, 1835.