

A NEW SPECIES OF AMMONICERA (OMALOGYRIDAE, ALLOGASTROPODA) FROM BRAZIL

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Abstract *Ammonicera plana*, a new species of *Omalogyridae*, is described from the infratidal zone of the north coast of São Paulo State, Brazil. Distinguishing shell characters are: five dark spiral bands per whorl; great lateral compression; poor development of shell sculpture and the presence of a lateral spiral ridge. The anatomy is compared with that of the European *Omalogyra atomus*, from which it differs; in having mixed testis and ovarium; no large glands near the anus and in lacking vesicula seminalis. The anatomical data support the inclusion of the *Omalogyridae* in the *Allogastropoda* rather than in the euthyneuran *Rissoelloidea*.

Key words *Ammonicera plana* n. sp., *Omalogyridae*, Brazil, anatomy.

INTRODUCTION

The family *Omalogyridae* are amongst the most minute molluscs, rarely exceeding 1 mm and many half this size. Perhaps, because of their size they have only recently been the subject of more extensive study (Rolán, 1991, 1992, in particular for Atlantic species).

Omalogyrid anatomical data are even more scant, only Fretter (1948), for the European *Omalogyra atomus*, gives a comprehensive description. The systematic position has been discussed by Haszprunar (1985, 1988) using data from Fretter, 1948 and by Healy (1988) using sperm data. Haszprunar (1985) initially included the *Omalogyridae* in the *Rissoelloidea* but later (1988) suggested a relationship with the *Allogastropoda*. In particular, the lack of a true penis and the separation of the ovary and testis suggested an affinity with the *Architectonicidae*.

To date, only one species of *Omalogyridae* has been recorded from Brazilian waters: *Omalogyra planorbis* (Dall, 1927) in Rios, 1994: 181. This species was subsequently given a new generic placement in *Palazzia* (Warén, 1991). In studies on the fauna associated with the coral *Mussismilia hispida* (Verrill) carried out by João Miguel M. Nogueira (Doctoral thesis) on the north coast of São Paulo, specimens of an unusual *omalogyrid* were collected. Examination of the shell indicated that they were of an undescribed species of the genus *Ammonicera* Vayssièrè, 1893.

Despite the few specimens available the gross anatomy was examined which adds to the wider understanding of the family but does not yet resolve the problems with their phylogeny.

MATERIAL AND METHODS

Only eleven specimens were available and all were fixed in 4% formalin for one day and then preserved in 70% ethanol. After breaking the shells, two specimens were dehydrated in an ethanol series, stained in carmine, and fixed and cleared in creosote; these

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were then dissected. Two specimens were decalcified in Railliet-Henry fluid, sectioned at 4 μ m using standard histological techniques and then stained with Mallory's trichrome. Four specimens were dried and used for scanning electron microscopy of the shell and operculum in the Laboratório de Microscopia Eletrônica do IBUSP.

Shell terminology follows Rolán (1992) and anatomical terminology follows Fretter (1948). All drawings were made using a camera lucida.

SYSTEMATICS

OMALOGYRIDAE

Genus *Ammonicera*
Ammonicera plana n. sp.
 Figs 1-14

Holotype MZUSP 28222

Paratypes 2 sp. on SEM stubs and 2 on histological slides, all from type locality, MZUSP 28225. 1 each from São Paulo, São Sebastião, Vitoria Island, 23°45'S 45°01'W, 08.i.1993, MZUSP 28211 and 28223. São Paulo, Ubatuba, Palmas Island, i.1993 MZUSP 28224.

Type locality Brazil, São Paulo State, Ubatuba city, Mar Virado Island, 23°30'S 45°25'W.

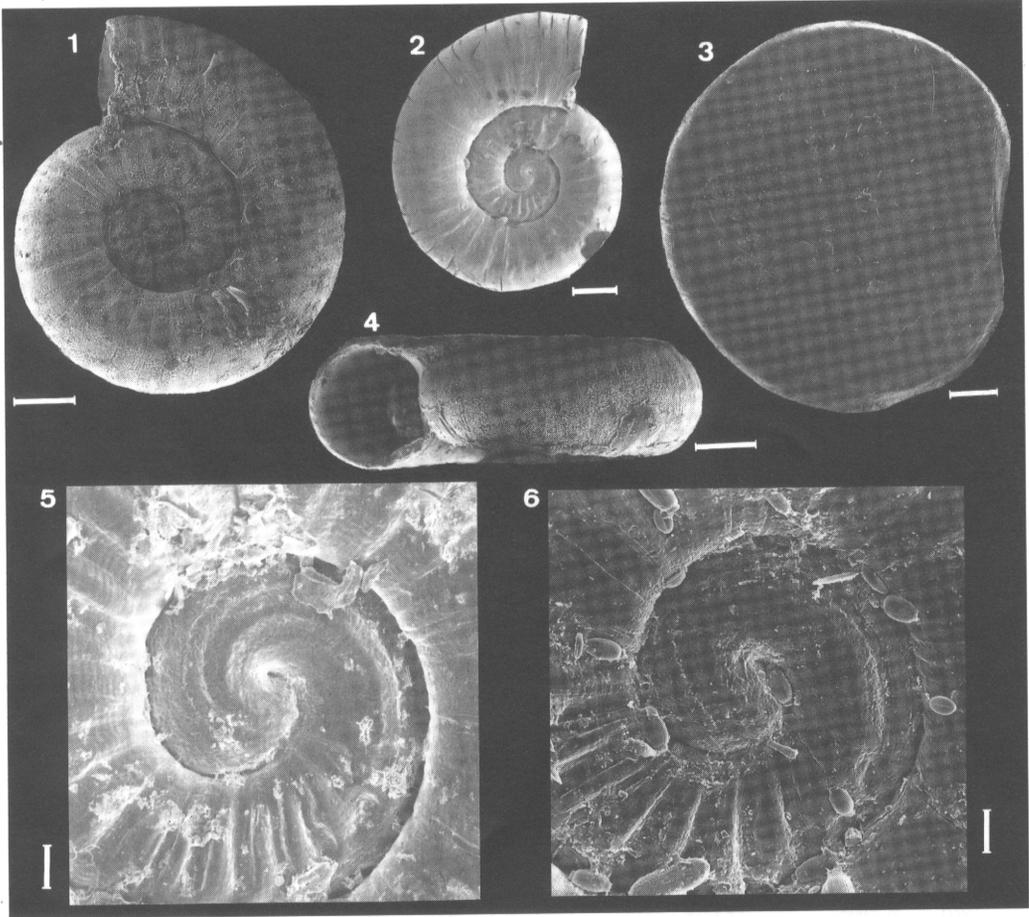
Diagnosis A sub-tidal species from south-east Brazil; shell with five coloured bands per whorl, lateral band generally marking a low spiral cord; spiral, axial sculpture and protoconch sculpture poorly developed; shell very laterally compressed.

Description Shell. Very small reaching 1mm in diameter, planispiral, biconcave, very laterally compressed (Figs 1, 2, 4), opaque, translucent. Yellow in colour with five brown spiral lines per whorl (Fig. 10), one on the periphery, two close to the suture and two in the mid lateral region. In some specimens these spiral lines are discretely elevated, appearing as low lateral chords (Figs 1, 2). Protoconch (Figs 5, 6) of about 3/4 of a whorl; a central depression bordered by low elevations; surface somewhat irregular. Teleoconch of up to two whorls, elongated. First whorl with about twenty axial ridges, irregularly spaced, and with minute spiral striae. Spiral and axial sculptures fade gradually by the beginning of the second whorl. Second whorl mostly smooth except for growth lines and undulations (Figs 1, 2). Aperture semi-circular (Fig. 4); lips simple.

Head-Foot. All structures without pigments, pale beige in colour, semi-transparent. Head proportionately small, not prominent, lacking tentacles (Figs 7,9,11). Eyes well developed, dark, on small protuberances of the head tegument (Fig. 11). Pair of cephalic lobes on anterior extremity of head (Fig. 12), long, tip rounded, dorso-ventrally flattened. Mouth lying between head and limits of foot and between lobes (Figs 12, 13). Foot proportionately small (Figs 9, 11, 13), without divisions. Anterior pedal gland small (Fig. 9). Posterior pedal gland very large, occupies foot and head up to the posterior region of the nerve ring (Figs 9, 13); its aperture a short tube in the middle region of the pedal sole. Columellar muscle proportionately short (Figs 9, 11, 13), with few but strong muscle fibres. All head-foot structures lie in the same sagittal plane of the shell (Fig. 11).

Operculum. Corneus, yellow, transparent, palcispiral, circular, and occupies entire aperture (Fig. 3).

Mantle. Mantle border simple, bifolded, without appendages (Figs 7, 8). Mantle cavity



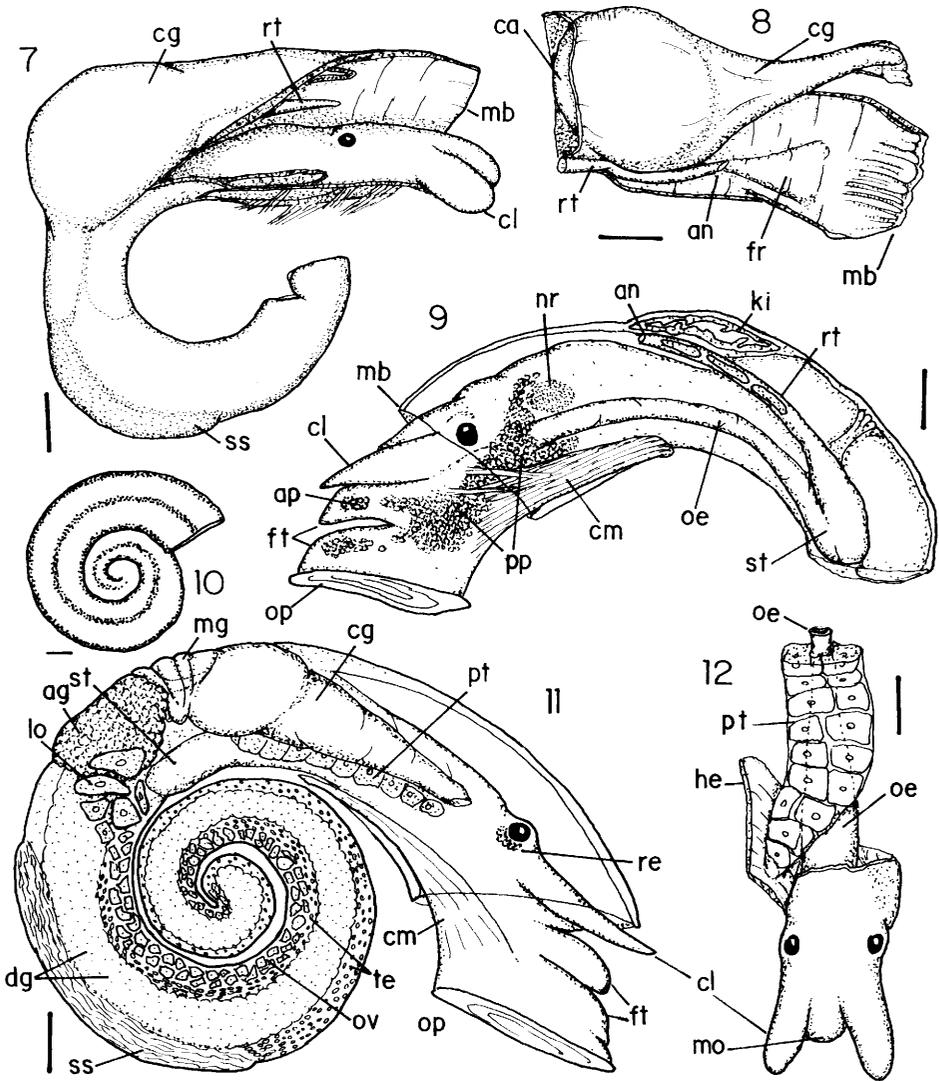
Figs 1-6 *Ammonicera plana* n. sp. Shell.

short, about half the length of the head-foot; lacking gills and osphradium or any other special gross structures (Figs 7, 8). Kidney and anus on the left side, genital ducts on right posterior region. When developed, female gonoducts occupying most of the cavity space. From the anus lies an expanding thickening of the mantle (Fig. 8, fr), in cross section appears as a series of small low ciliated folds and lies over a similar development of the head tegument (Fig. 14). Hypobranchial gland between rectum and genital ducts, small, flattened (Figs 13, 14).

Excretory-circulatory systems. Kidney proportionately small, with low folds and apparently hollow internally (Figs 9, 13, 14); situated far back in roof of pallial cavity (Fig. 9) on left of midline. Heart and vessels not seen.

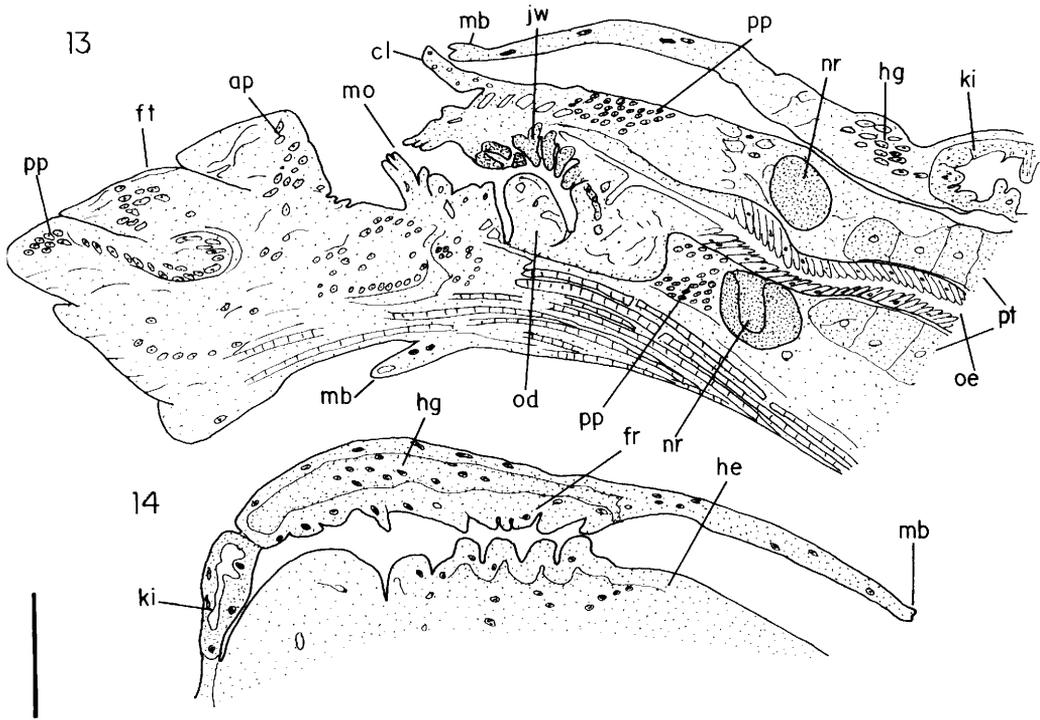
Digestive system. Mouth walls bulging anteriorly (Fig. 13), thick, muscular, covered internally by cuticle. This cuticle thickens dorsally as jaws in several plates (Fig. 13, *ju*). Odontophorical structures situated ventral to cuticle thickenings (Fig. 13, *od*). Radula not seen. Oesophagus proportionately long, dorso-ventrally flattened, inner surface with epithelium of tall ciliated cells sloping posteriorly (Fig. 13). Stomach in middle region of last whorl, ventral to albumen gland, U-shaped (Fig. 9), apparently without appendages. Intestine a simple tube, short, somewhat straight (Fig. 9). Anus relatively towards the rear of the pallial cavity (Figs 7, 8).

Genital system. Gonad occupying inner surface of all whorls from beginning into the



Figs 7-12 *Ammonicera plana* n. sp. Head-foot.

posterior region of last whorl and accompanying digestive gland (Fig. 11). Female portion of gonad mainly concentrated on inner regions (Fig. 11, ov). Ovules becoming larger near albumen gland. Male portion of gonad mainly concentrated on lateral and external regions of each whorl, but also found in inner region where spermatids remain dorsally on the ovule zone (Fig. 11, te). Testis and ovarium anatomically mixed. Concentration of mature sperm in external region of last whorl to the head in the following sequence; concentration of large ova (lo); albumen gland hemispherical situated just dorsal of the stomach (ag); mucous gland small and folded (mg); capsule gland large (cg), rounded posteriorly, tapering gradually and situated in the right side of the pallial cavity between the roof and floor (Figs 7, 8); opens via a single pore posterior and ventral to the right eye (Fig. 11). Male glands indistinct, other than sperm sac (noted



Figs 13–14 *Ammonicera plana* n. sp. Head-foot.

above) there is only a mass of glandular tissue, of aligned very large cells, occupying most of the inner space of the posterior half of the haemocoel surrounding the oesophagus. This tissue is apparently prostate and follows the capsule gland ventrally (Figs 11, 12, pt); no aperture was found.

Development The specimens sectioned histologically were of differing sizes; a larger one with about three whorls and a smaller one with no more than two whorls. The larger was a simultaneous hermaphrodite with mature ova and sperm; the smaller had only testis but in small quantity around the digestive gland, mature sperm were present in the sperm sac, the prostate was developed but the female glands were immature. These observations suggest that *A. plana* begins as a male developing later into a simultaneous hermaphrodite.

Distribution Known only from the coast of São Paulo State, Brazil.

Habitat Crawling on the coral *Mussismilia hispida* at a depth of 5 m.

Derivation of name *plana* L. referring to the flattened nature of the shell.

DISCUSSION

Of the ten species of Omalogyridae recorded from the west Atlantic (Castellanos, 1988; Rolán, 1992; Rios, 1994) *Ammonicera plana* is similar only to *A. lineofuscata* Rolán, 1992 from Cuba. *Ammonicera plana* differs in having five, not three, coloured spiral bands; in the lateral bands marking a low spiral chord; in having weaker spiral and axial sculpture and in the protoconch which is less evident and more compressed laterally. Is there any chance that it could be an amphi-Atlantic species.

Despite the gross examination of the anatomy of *A. plana* some differences from *Omalogyra atomus* (Fretter, 1948) can be seen:

1) in *A. plana* the buccal mass is anterior to the nerve ring but contraction may account for this;

2) the large glands opening into the mantle cavity close to the anus in *O. atomus*, and mistaken for eggs by some (Lebour, 1937), are absent in *A. plana*;

3) the vesicula seminalis is absent in *A. plana* but well developed in *O. atomus*;

4) In *A. plana* the testis and ovarium are anatomically mixed and completely associated with the digestive gland (Fig. 11) whereas in *O. atomus* they are separate and there is a free region of the digestive gland (see Fretter, 1948: 600, Fig. 2). The systematic implications of these differences cannot be assessed without the examination of many more species of omalogyrids.

Other than the small size and simultaneous hermaphroditism there are no other characters which justify the inclusion of the omalogyrids within the Rissoelloidea a superfamily associated with the Euthyneura (Simone, 1995). The gonoducts of omalogyrids, among several other characters, differ considerably from the rissoellids in that they run in the floor of the pallial cavity and not in the haemocoel. This feature occurs in several Allogastropoda and basal Opisthobranchia and supports the inclusion of the Omalogyridae in the Allogastropoda as advocated by Haszprunar (1988).

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REFERENCES

- CASTELLANOS Z.A. 1988 Novedades sobre micromoluscos subantarticos (Mollusca, Gastropoda) *Neotropica* **36(92)**: 89–92.
- FRETTER V. 1948 The structure and life history of some minute prosobranchs of rock pools: *Skeneopsis planorbis* (Fabricius), *Omalogyra atomus* (Philippi), *Rissoella diaphana* (Alder) and *Rissoella opalina* (Jeffreys) *Journal of the Marine Biological Association UK* **27**: 597–632.
- HASZPRUNAR G. 1985 The Heterobranchia, a new concept of the phylogeny of the higher Gastropoda *Zeitschrift für Zoologische Systematik und Evolutionsforschung* **23**: 15–37.
- HASZPRUNAR G. 1988 On the origin and evolution of major gastropod groups, with special reference to the Streptoneura *Journal of Molluscan Studies* **54**: 367–441.
- HEALY J.M. 1988 Sperm morphology and its systematic importance in the Gastropoda *Malacological Review supplement* **4**: 251–266.
- LEBOUR M.V. 1936 Notes on the eggs and larvae of some British prosobranchs *Journal of the Marine Biological Association UK* **20**: 547–565.

- RIOS E.C. 1994 *Seashells of Brazil* second edition. Fundacao Universidade do Rio Grande, Rio Grande 368 pp.
- ROLAN E. 1991 La familia Omalogyridae G.O. Sars, 1878 (Mollusca, Gastropoda) en el archipelago de Cabo Verde *Graellsia* **47**: 105–116.
- ROLAN E. 1992 The family Omalogyridae G.O. Sars, 1878 (Mollusca, Gastropoda) in Cuba with descriptions of eight new species *Apex* **7(2)**: 35–46.
- SIMONE L.R.L. 1995 *Rissoella ornata*, a new species of Rissoellidae (Mollusca: Gastropoda: Rissoelloidea) from southeastern coast of Brazil *Proceedings of the Biological Society of Washington* **108(4)**: 560–567.
- WARREN A. 1991 New and little known Mollusca from Iceland and Scandinavia *Sarsia* **76 (1–2)**: 53–124.