

Marine microgastropods from the Republic of Maldives

1. Genus *Ammonicera* Vayssière, 1893, with description of four new species (Prosobranchia: Omalogyridae)

Willy SLEURS

Koninklijk Belgisch Instituut voor Natuurwetenschappen, Recent Invertebrates Section,
Vautierstraat 29, B-1040 Brussels, Belgium

INTRODUCTION

This is the first of a series of forthcoming papers on marine microgastropods, collected during two expeditions to North Malé Atoll, Republic of Maldives, in 1976 and 1980, supported by the Belgian National Foundation for Scientific Research (N.F.W.O.). This paper deals with the species of the genus *Ammonicera* Vayssière, 1893 (Prosobranchia, Omalogyridae).

ABBREVIATIONS

A.M. — Australian Museum, Sydney; D_{\max} — maximum diameter of the shell; D_{\min} — minimum diameter of the shell; H_{ap} — height of the aperture; K.B.I.N. — Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels; M.N.H.N. — Muséum National d'Histoire Naturelle, Paris.

MATERIAL AND METHODS

The material has been collected by Dr. J. van Goethem by SCUBA-diving or by hand-sampling. The samples, originally fixed in 5% buffered formalin, were washed in the laboratory and the microgastropods picked out beneath a Wild binocular microscope. All specimens were preserved in 75% alcohol, apart from some paratypes which were mounted for Scanning Electron Microscopy (S.E.M.) The radula was obtained by destroying the shell. The method used for mounting the radula is described by Ponder & Yoo (1977).

LIST OF STATIONS

- MAL80/6: Baros Island, western reef top; many extensive sand patches, covered with *Halimeda*-algae; 16.I.1980.
MAL80/11: Baros Island, northern beach at -1 m at high tide; coral formations and sand patches, covered with *Halimeda*-algae; 17.I.1980.
MAL80/14: Baros Island, east side at -1 m at high tide; coral formations with extensive sand patches and coral rubble, covered with *Halimeda*-algae; 18.I.1980
MAL80/17: Baros Island, north side at -0.3 m at low tide; dead coral fragments with extensive sand patches, covered with *Halimeda*-algae; 18.I.1980

MAL80/19: Baros Island, north side at -0.3 m; between red and green algae, growing on dead coral branches of *Acropora* sp.; 19.I.1980

SYSTEMATICS

Ammonicera extracarinacostata sp. nov. (figs. 3, 8, 11)

Derivatio nominis. — The name refers to the strong axial ribs on the outer side of the ventral and dorsal sides of the shell.

Type locality. — Republic of Maldives, North Malé Atoll, Baros Island (MAL80/19).

Holotype. — A specimen with soft parts, in K.B.I.N. Paratypes. — Four specimens with soft parts in K.B.I.N.

Description. — Shell fragile, transparent. Protoconch: $\frac{1}{2}$ whorl, with two obvious, narrow central grooves and one peripheral groove just above the suture; transition to the teleoconch marked; last quarter of protoconch with obsolete axial ribs on the peripheral side. Teleoconch: about one whorl; suture well-marked, deeply impressed; whorl strongly angulate; one strong carina at a distance of about $\frac{2}{3}$ from the total width of the whorl, measured from the suture of either the dorsal or the ventral side of the shell; one additional strong carina on the periphery; about twenty strong axial ribs between the carinae of the ventral and the dorsal side of the shell, intersecting the peripheral keel; very weak axial pleats between the suture, and the dorsal and the ventral keel respectively; numerous microscopical spiral lirae on the teleoconch, becoming obsolete near the suture. Aperture: subquadrate; peristome continuous; inner lip thin, slightly attached to the periphery of the previous whorl. Colour: transparent, colourless.

Shell-dimensions (in mm):

	D _{max}	D _{min}	H _{ap}
Holotype	0.45	0.38	0.17
Paratype	0.43	0.36	0.15
Paratype (figs. 3, 8, 11)	0.43	0.36	0.16
Paratype	0.35	0.29	0.13
Paratype	0.34	0.29	0.15

Operculum and radula unknown.

Material. — The type-material.

Distribution. — Only known from the type-locality.

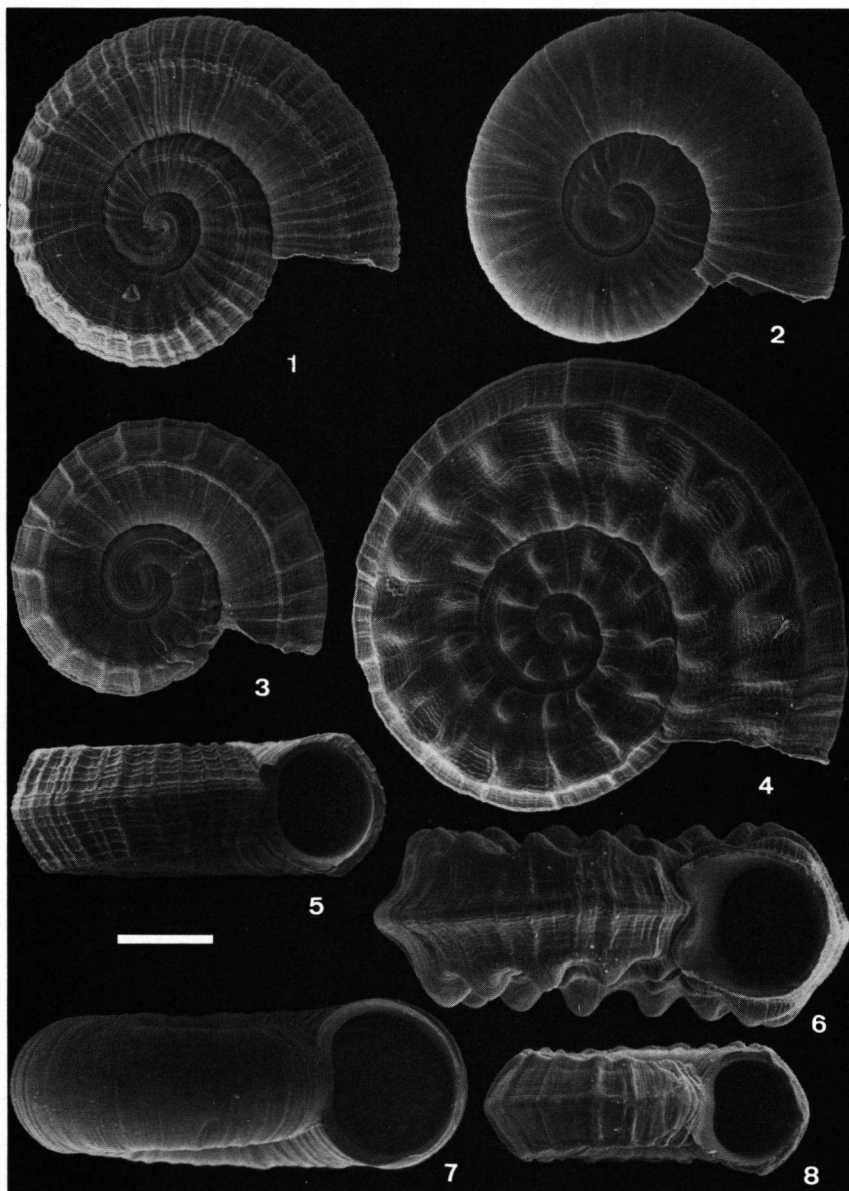
Discussion. — The presence of the strong axial ribs on the outer side of the ventral and dorsal carina and on the periphery are the features which readily distinguish this species from its congeners.

Ammonicera plicata sp. nov. (figs. 2, 7, 10, 13, 14)

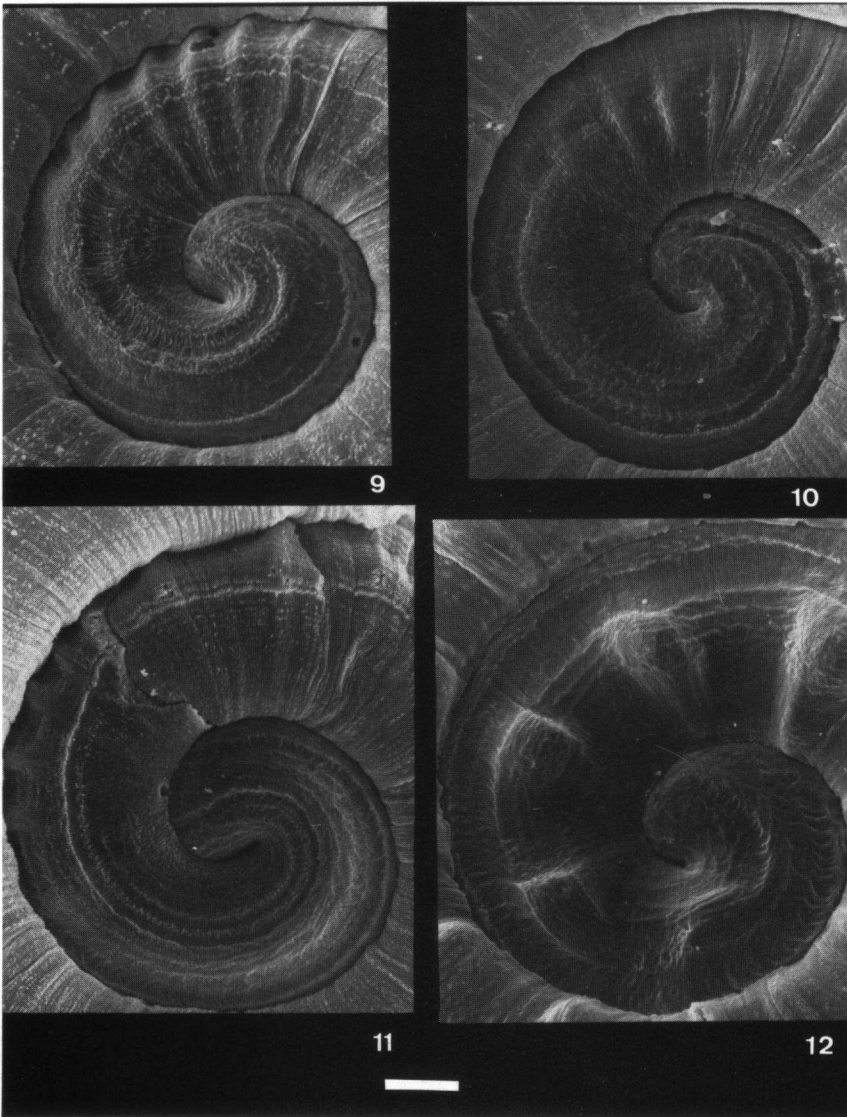
Derivatio nominis. — The name refers to the axial costulae on the teleoconch.

Type-locality. — Republic of Maldives, North Malé Atoll, Baros Island (MAL80/19).

Holotype. — A specimen with soft parts, in K.B.I.N. Paratypes. — Twenty-four specimens with soft parts and one empty shell in K.B.I.N.; one specimen with soft parts in A.M. and another one with soft parts in M.N.H.N.



Figs. 1-8. New species of *Ammonicera*. 1, 5 - *A. tenuicostata*, paratypes from sta. MAL80/11; 2, 7 - *A. plicata*, paratypes from sta. MAL80/19; 3, 8 - *A. extracarinacostata*, paratype from sta. MAL80/11; 4, 6 - *A. binodosa*, paratypes from sta. MAL80/11. Scale 0.1 mm.



Figs 9-12. Protoconch of new species of *Ammonicera*. 9 - *A. tenuicostata*, same specimen as fig. 1; 10 - *A. plicata*, paratype from sta. MAL80/19; 11 - *A. extracarinacostata*, same specimen as fig. 3; 12 - ?*A. binodosa*, same specimen as fig. 4. Scale 20 μm .

Description. — Protoconch: $\frac{1}{2}$ whorl with one strong spiral groove, becoming obsolete at the beginning of the teleoconch; transition to teleoconch obsolete. Teleoconch: between 1-1 $\frac{1}{2}$ whorls; suture well-marked, deep and strongly impressed; last whorl strongly convex with numerous, irregularly spaced, weak axial costulae, becoming obsolete at the periphery; costulae somewhat stronger on the first half of the teleoconch; very fine spiral lirae between the axial costulae. Aperture: subcircular; peristome continuous; inner and outer lips very thin. Colour: transparent, yellowish-brown.

Shell-dimensions (in mm):

	D _{max}	D _{min}	H _{ap}		D _{max}	D _{min}	H _{ap}
Holotype	0.65	0.55	0.23	Paratypes	0.43	0.35	0.17
Paratypes	0.62	0.54	0.22		0.42	0.34	0.17
(fig. 10)	0.58	0.49	0.22		0.41	0.34	0.18
(fig. 7)	0.57	0.48	0.21		0.39	0.32	0.15
	0.55	0.48	0.22		0.38	0.31	0.16
A.M.	0.53	0.45	0.20		0.38	0.32	0.17
	0.49	0.42	0.20		0.38	0.31	0.15
(fig. 2)	0.48	0.40	0.19		0.38	0.32	0.16
M.N.H.N.	0.47	0.38	0.18		0.37	0.31	0.15
	0.47	0.40	0.20		0.35	0.29	0.16
	0.46	0.38	0.17		0.35	0.30	0.15
	0.45	0.37	0.18		0.34	0.29	0.15
	0.45	0.38	0.18		0.34	0.28	0.15
	0.45	0.37	0.17				

Operculum: subcircular, horny, paucispiral with a central nucleus.

Radula: formula. 1-1-0-1-1, each radular row consisting of two dagger-like teeth, articulating at the outside with a very small marginal tooth; basal part of the dagger-like teeth with one very long, sharp and strongly projecting central cusp, and two small lateral projections; basal portion of the marginal teeth subrectangular and flat-sided, presenting one blunt cusp, the latter articulating with the outer lateral projection of the dagger-like tooth (figs. 14, 15).

Material. — Type-material; 27 specimens with soft parts and 6 empty shells from station MAL80/19.

Distribution. — Only known from the type-locality.

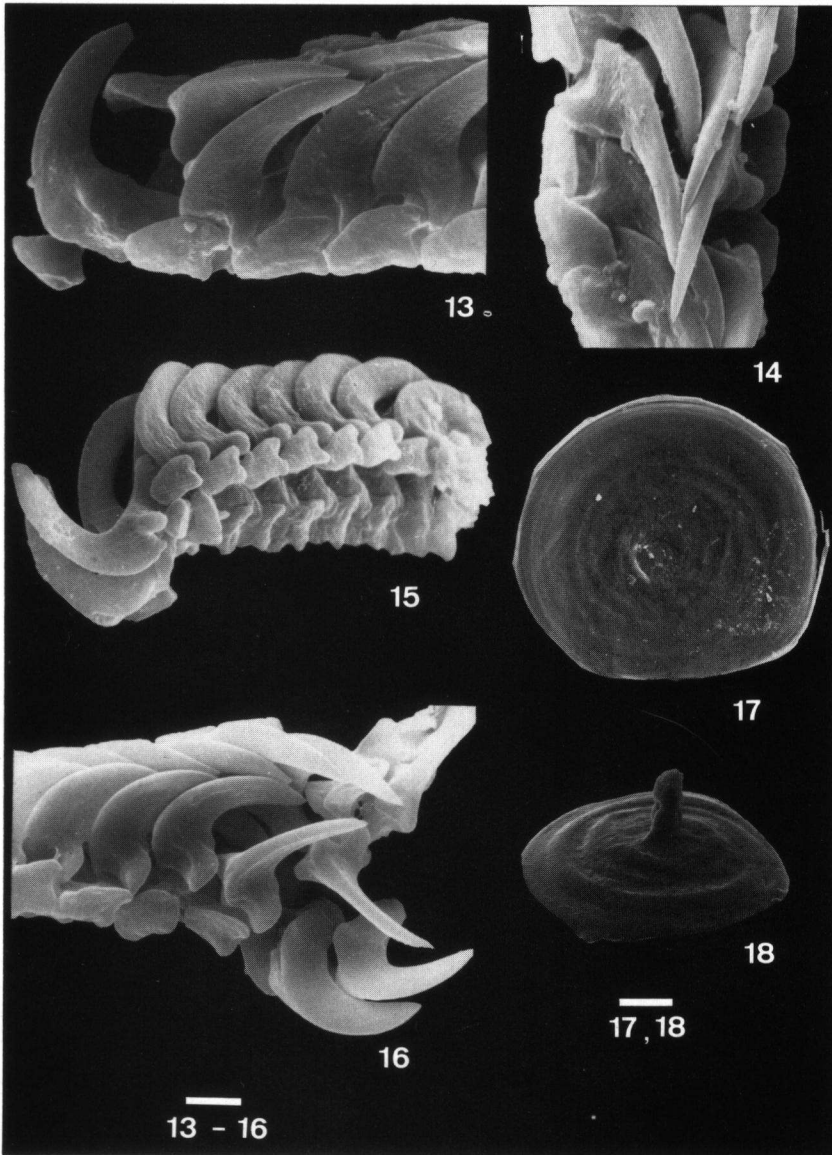
Discussion. — *Ammonicera plicata* sp. nov. is most closely related to *A. japonica* Habe, 1972, but differs from the latter in having a larger and more flattened shell, the axial costulae being weaker and the strong nodules on the ventral and dorsal sides of the shell being absent. Moreover, the protoconch of *A. plicata* does not show the reticulate sculpture of *A. japonica* on the outer side. The shell colour is paler in *A. plicata* sp. nov. than in *A. japonica*.

Ammonicera tenuicostata sp. nov. (figs. 1, 5, 9, 15, 17)

Derivatio nominis. — The name refers to the weak axial ribs on the teleoconch.

Type-locality. — Republic of Maldives, North Malé Atoll, Baros Island (MAL80/11).

Holotype. — A specimen with soft parts, in K.B.I.N. Paratypes. — Nine specimens with soft parts in K.B.I.N.; one paratype with soft parts in A.M. and another one with soft parts in M.N.H.N.



Figs. 13-18. New species of *Ammonicera*. 13-14 - *A. plicata*, radula (13, lateral view; 14, dorsal view); 15, 17 - *A. tenuicostata* (15, radula, lateral view; 17, inside of operculum); 16, 18 - ?*A. binodosa* (16, radula, dorso-lateral view; 18, lateral view of inside of operculum). Scale figs. 13-16 2 μm , figs. 17-18 20 μm .

Description. — Shell relatively large for the genus, fragile, transparent. Protoconch: with about $3/4$ whorl; one relatively wide groove on the inner side of the whorl; groove with weak lamellae on the last half portion; one flattened, rather strong ridge on the outer side of the inner groove; one shallow groove at the outer side of the protoconch. Teleoconch: with about $1\frac{1}{2}$ whorls; one weak carina in the middle of the ventral side of the shell, and another one in the middle of the dorsal side; numerous, irregularly spaced, weak axial riblets on the teleoconch, intersected by numerous spiral lirae, being more numerous on the peripheral side of the shell; shell strongly angulate in apertural view; suture well-marked, deeply impressed. Aperture: subcircular; peristome continuous; inner and outer lips thin, the former attached to the previous whorl. Colour: transparent, yellowish-brown.

Shell-dimensions (in mm):

	D _{max}	D _{min}	H _{ap}
Holotype	0.48	0.42	0.17
Paratypes (figs. 1, 9)	0.51	0.43	0.17
(fig. 5)	0.49	0.42	0.18
	0.46	0.39	0.17
A.M.	0.42	0.35	0.17
	0.40	0.34	0.15
	0.35	0.31	0.15
M.N.H.N.	0.34	0.28	0.12
	0.32	0.28	? slightly damaged
	0.32	0.25	0.15

Operculum: typical of the genus (fig. 17).

Radula: typical of the genus (fig. 15).

Material. — The type-material; 1 specimen with soft parts from station MAL80/17; 1 specimen with soft parts from station MAL80/14; 2 specimens with soft parts from station MAL80/6.

Distribution. — Only known from the type-locality.

Discussion. — *Ammonicera tenuicostata* sp. nov. is related to *A. vangoethemi* Sleurs, 1984, but differs from the latter in having a strongly angulate body-whorl, and by the presence of a weak carina on the ventral and dorsal sides of the shell; there are more numerous axial ribs and spiral lirae on the teleoconch of *A. tenuicostata* sp. nov.

? *Ammonicera binodosa* sp. nov. (figs. 4, 6, 12, 16, 18)

Derivatio nominis. — The name refers to the double row of nodules on the ventral and dorsal sides of the shell.

Type-locality. — Republic of Maldives, North Malé Atoll, Baros Island (MAL80/11).

Holotype. — A specimen with soft parts in K.B.I.N. Paratypes. — Fourteen specimens with soft parts and one empty shell in K.B.I.N.; one specimen with soft parts in A.M. and another paratype with soft parts in M.N.H.N.

Description. — Shell robust, relatively large for the genus. Protoconch: with about 1 whorl; transition to the teleoconch obscure; one broad, shallow groove on the outer side; initial part of the groove with relatively strong, irregularly spaced lamellae; lamellae obscure on the remaining portion of the groove; about four axial ribs, ending at the inside of the groove and becoming strongly nodulous here. Teleoconch: about

1½ whorls; first half whorl with one spiral row of strong nodules on the exterior part, crossed by about six very fine spiral threads, the latter being absent on the inner part of the whorl; last whorl of the teleoconch with a double spiral row of strong and broad nodules, the exterior ones being stronger than the inner ones; two rows separated by one broad, shallow groove; the interspaces between the nodules with very fine spiral threads, the latter becoming more obsolete on the nodules; number of nodules varying from 13-17 (16 in the holotype); periphery with one strong carina, becoming stronger on the last part of the whorl; interspace between the nodules and the carina with weak, irregularly spaced, axial ribs; suture obvious, deeply impressed. Aperture: sub-quadrate; peristome continuous; inner lip completely attached to the previous whorl. Colour: semitransparent, dark brown.

Shell-dimensions (in mm):

	D _{max}	D _{min}	H _{ap}	Number of nodules on the last whorl
Holotype	0.65	0.56	0.18	17
Paratypes	0.69	0.58	0.18	17
A.M.	0.68	0.57	0.18	14
	0.66	0.57	0.18	15
	0.66	0.57	0.18	15
(figs. 4, 12)	0.65	0.55	0.22	16
	0.65	0.55	0.18	14
	0.65	0.56	0.18	16
	0.65	0.57	0.18	16
	0.64	0.55	0.18	16
	0.64	0.55	0.18	15
(fig. 6)	0.63	0.55	0.18	15
	0.63	0.54	0.17	16
	0.63	0.54	0.17	14
M.N.H.N.	0.63	0.55	0.17	16
	0.60	0.53	0.17	15
	0.57	0.49	0.18	13
	0.54	0.46	0.17	16
	0.50	0.43	0.18	13

Operculum: subcircular, paucispiral, with about four whorls and one strong central apophysis (fig. 18).

Radula: typical of the genus (fig. 16).

Material. — Type-material; 69 specimens with soft parts and 35 empty shells from station MAL80/11; 11 specimens with soft parts and 21 empty shells from station MAL80/14.

Discussion. — ?*Ammonicera binodosa* sp. nov. superficially resembles *A. nodicarinata* Sleurs, 1984, from Papua New Guinea; the latter, however, has only one row of nodules on the ventral and dorsal sides of the shell, and the spiral groove on the protoconch is narrower than in ?*A. binodosa* sp. nov. The operculum of *A. nodicarinata* lacks the apophysis of ?*A. binodosa* sp. nov.

?*A. binodosa* sp. nov. has the same overall features as observed in the other *Ammonicera* species, i.e. the presence of a spiral groove on the protoconch, the ornamentation of the teleoconch and the typical radular features, the latter showing no differences with any other species so far studied. The operculum, however, differs from all other species so far studied, by the presence of a strong central apophysis; therefore this new species *binodosa* is only tentatively placed in *Ammonicera* Vayssière, 1893.

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SUMMARY

Three new species of *Ammonicera* Vayssière, 1893, from the Republic of Maldives are described: *A. extracarinacostata*, *A. plicata* and *A. tenuicostata*. A fourth new species ?*A. binodosa* is tentatively classified with *Ammonicera*, because it differs from the type-species in having an atypical operculum.

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