Deep water *Nassaria* (Gastropoda: Buccinidae) from Banda and Arafura Seas

Koen FRAUSSEN

Leuvensestraat 25, B-3200 Aarschot, Belgium
koen.fraussen@skynet.be

KEYWORDS. Gastropoda, Buccinidae, Nassaria, new taxa, Indonesia.

ABSTRACT. Some buccinid deep water species of *Nassaria*, collected off the Kai and Tanimbar Islands (Indonesia), are discussed.
Nassaria laevior E. A. Smith, 1899 is confirmed as a distinct species, the specific status being restored and retracted from synonymy with *N. pusilla* (Röding, 1798). *Nassaria amboynensis* Watson, 1881 is confirmed as a distinct species, the specific status being restored and retracted from synonymy with *N. acuminata* (Reeve, 1844). One species is recognized as being identical to the Pliocene *Nassaria rickardi* (Ladd, 1977) from Fiji. Five *Nassaria* species are known by one, or a few, specimens each and are recorded as *Nassaria* sp. Seven new species are added to this fauna: *Nassaria wallacei* sp. nov., *N. tarta* sp. nov., *N. termesoides* sp. nov., *N. incisa* sp. nov., *N. corollaria* sp. nov., *N. moosai* sp. nov. and *N. intacta* sp. nov.

INTRODUCTION

Indonesia harbours a rich biodiversity, which has attracted many naturalists and scientists. The islands and the seas around it are well investigated, and we may remember Georgius Everhardus Rumphius (17^{e} century) and Alfred Russel Wallace (19^{e} century) among many others. The deep sea fauna, however, has received much less attention. In this context, the Muséum national d'Histoire naturelle (Paris, France) and LIPI (Indonesia) cooperated in a survey to the eastern part of the archipelago, to study the deep water benthos. The material reported on in the present study originates from the KARUBAR expedition to Indonesia conducted in 1991. All material listed is, unless otherwise stated, deposited in MNHN. The KARUBAR expedition is one part of the still ongoing sampling programme to study the tropical deep-sea benthos in the Indo Pacific, for a better knowledge of the biodiversity. I refer to Crosnier et all (1997) for a narrative of this cruise and station lists.

The unique character of this fauna is well shown by the impressive number of *Nassaria* species collected (16 species of which only 5 previously known to science) and they certainly are one of the dominant molluscan groups at these depths. The genus *Nassaria* Link, 1807 comprises a number of shallow to moderately deep-water (upper continental shelf) species, restricted to the tropical Indo-West Pacific. Cernohorsky (1981) revised the known recent and fossil species of *Nassaria*.

Abbreviations

KF: collection Koen Fraussen, Belgium
MNHN: Muséum national d'Histoire naturelle, Paris, France.
MZB: Museum of Zoology, Bogor, *Museum Zoologicum Bogoriense*, Pusat Penelitian Biologi, LIPI, Indonesia.
NHM: Natural History Museum, London, England
ZRC: Zoological Reference Collection, Raffles Museum of Biodiversity Research, Singapore
CP: (chalut à perche) beam trawl
DE: (drague épibenthique) epibenthic sledge
DW: (drague Warén) Warén dredge
dd: empty shell, dead collected
lv: collected alive
juv: juvenile or subadult specimen/shell

SYSTEMATICS

Family **BUCCINIDAE** Rafinesque, 1815
Genus ***Nassaria*** Link, 1807
Nassaria Link (1807: 123), type species by subsequent designation (Eames, 1952): *Nassaria lyrata* Link, 1807, a junior synonym of *Neptunea pusilla* Röding, 1798.

Synonyms

Benthindsia Iredale, 1936: 317-318. Type species by original designation: *Benthindsia problematica* Iredale, 1936. Regarded by Cernohorsky (1981: 31) as a junior synonym of *Microfusus* Dall, 1916.
Hindsia A. Adams, 1855: 182. Type species by subsequent designation (Cossmann, 1901): *Buccinum nivea* Gmelin, 1791, a junior synonym of *Neptunea pusilla* Röding, 1798.

Microfusus Dall, 1916: 8, as section of subgenus *Retifusus*. Type species by original designation: *Chrysodomus acutispiratus* Sowerby, 1913. Placed by Cernohorsky (1981: 31) on the subgeneric level.
Nihonophos Mac Neil, 1960: 71. Type species by original designation: *Nassaria magnifica* Lischke, 1871. Regarded by Cernohorsky (1981: 31) as a junior synonym of *Microfusus* Dall, 1916.

For a detailed discussion of the confusing nomenclatorial history of *Nassaria* and *Hindsia* I refer to Cernohorsky (1981: 3-4).
In the present paper the name *Nassaria* Link, 1807 is used in a broad sence. The subgeneric splitting in *Nassaria* (a heavy shell with strong spiral and axial sculpture) and *Microfusus* (a thin and slender shell with subsutural concavity and weak axial sculpture) is not maintained. However both groups are easily recognizable at first sight, a throughfull study of the fossils and recent species shows intermediates. A revision of the genus is beyond the scope of the present paper.

Nassaria amboynensis Watson, 1881
Figs 1-4

Nassaria amboynensis Watson, 1881: 273-274. Type locality: Indonesia, Ambon Island "Amboyna, 15-25 fms".
Listed as synonym of *Nassaria acuminata* (Reeve, 1844) by Cernohorsky, 1981: 21.

Material examined. Tanimbar Islands, KARUBAR stn. CP65, 09°14'S, 132°27'E, 174-176 m, 7 dd.

Range and habitat. Known from Indonesia and the Philippines. Syntopic with *N. species* 4 at stn. CP65.

Remarks. *Nassaria amboynensis* is characterized by a broad, acuminate shape.
The sculpture is strong, with broad axial ribs and sharp spiral cords. The specific status of *Nassaria amboynensis* is hereby restored and retracted from synonymy with *N. acuminata*.
Nassaria acuminata looks similar at first sight, but differs in having thin axial ribs, fine spiral cords, and a more conical spire which is usually higher.

Nassaria laevior E. A. Smith, 1899
Figs 5-12

Nassaria laevior E. A. Smith, 1899: 242. Type locality: "E. Of Andaman Ids., 90 fams."
Listed as synonym of *Nassaria pusilla* (Röding, 1798) by Cernohorsky, 1981: 13.

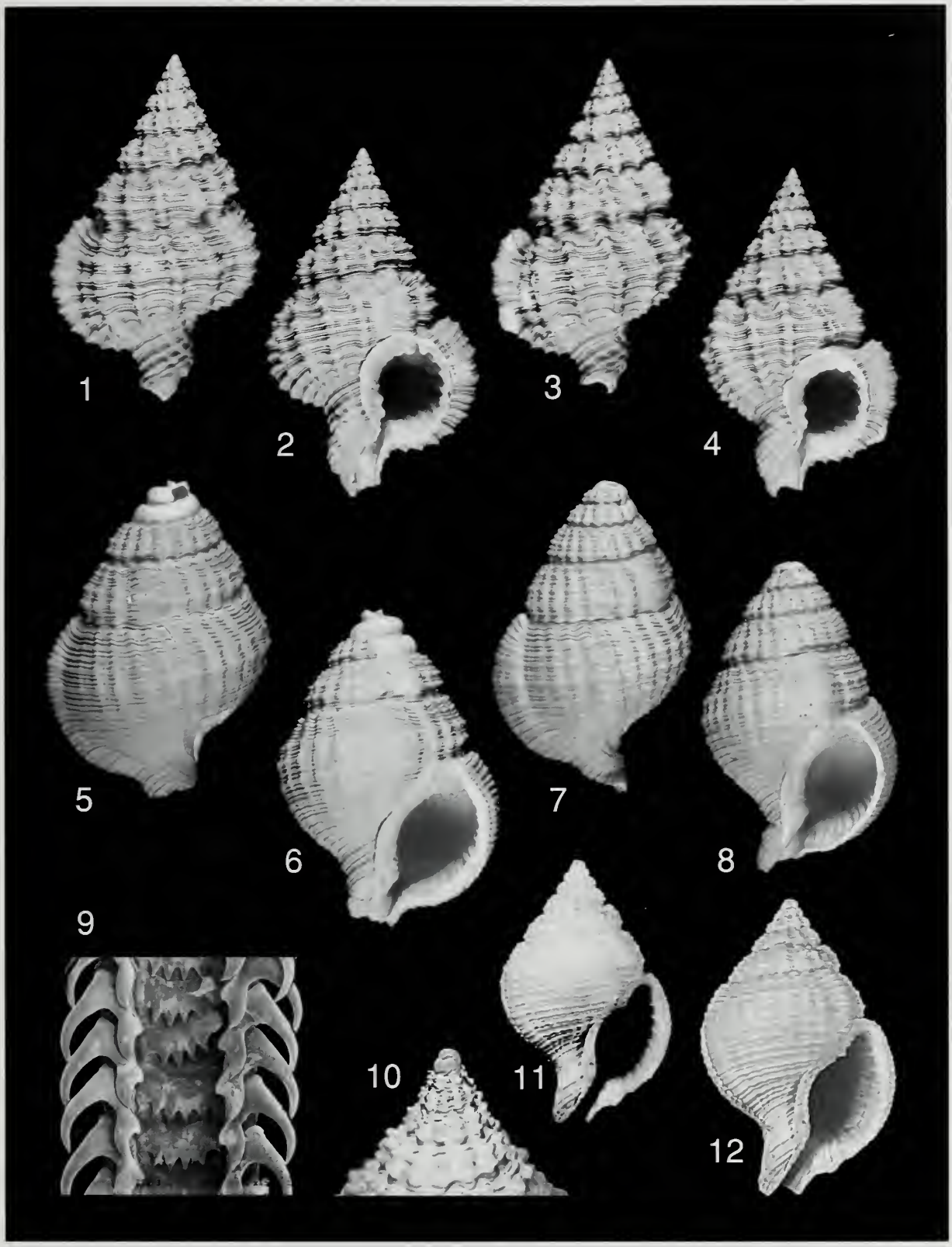
Material examined. Paratype in NHM.
Tanimbar Islands, KARUBAR stn. CP79, 09°16'S, 131°22'E, 250-239 m, 1 lv, 4 dd. - Stn. CP84, 09°23'S, 131°09'E, 246-275 m, 2 dd juv. - Stn. CP85, 09°22'S, 131°14'E, 245-240 m, 1 dd jv.

Range and habitat. Known from deep water in Andaman Sea (type locality) and Indonesia. Syntopic with *N. tarta* sp. nov. at stn. CP84, with *N. corollaria* sp. nov. at stn. CP79 & CP84 and *N. intacta* at stn. CP79 & CP84.

Remarks. *Nassaria laevior* is characterized by a broad, semi-oval shape, occasionally acuminate. The body whorl is big. The whorls are adapically slightly flattened and suprasuturally slightly angulate. Suture deep. The spiral cords are convex with narrow interspaces or without.
The specific status of *Nassaria laevior* is hereby restored and retracted from synonymy with *N. pusilla*.
Nassaria pusilla looks similar at first sight, but differs in having fine spiral cords with narrow interpaces, convex whorls, a more conical spire which is usually higher and a usually smaller size.
The material from KARUBAR (Figs. 1-4) differs slightly from the type material (Figs. 5, 7) in having a higher spire. The siphonal canal is broken in all studied specimens, consequently the shape of the base looks more convex.

Figures 1-12

1-4. *Nassaria amboynensis* Watson, 1881. **1-2.** 33.8 mm, Tanimbar Islands, KARUBAR stn. CP65, MNHN; **3-4.** 33.1 mm, same locality, MNHN.
5-12. *Nassaria laevior* E. A. Smith, 1899. **5-6.** 34.9 mm, Tanimbar Islands, KARUBAR stn. CP79, MNHN; **7-8.** 35.9 mm, same locality, MNHN; **9.** Radula, same locality, MNHN; **10,** Apex of juvenile, KARUBAR stn. CP85, MNHN; **11.** Holotype, after Cernohorsky, 1981, pl.7, fig. 2-3; **12.** Paratype, 23.1 mm, NHM 1904.6.15.140.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Nassaria spinigera (Hayashi & Habe, 1965)
Figs 17-20

Hindsia spinigera Hayashi & Habe, 1965: 12, 14. Type locality: Japan, Honshu, Enshu-Nada, 200 m.

Material examinated. Tanimbar Islands, KARUBAR stn. CP46, 08°01'S, 132°51'E, 271-273 m, 1 dd.
Kai Islands, KARUBAR stn. CP86, 09°26'S, 131°13'E, 223-225 m, 5 dd (3 juv).

Range and habitat. Known from Japan. The range is hereby extended to Indonesia. Syntopic with *N. moosai* sp. nov. at stn. CP46 and with *N. tarta* sp. nov. at stn. CP86.

Remarks. Shell small in size, up to 36.2 mm in length. Characterized by a reddish brown colour, sharp spiral cords on all whorls producing sharp knobs on the axial ribs.
The material from KARUBAR (Figs. 17-19) differs from Japanese specimens in having 2 (of the 4 or 5 primary spiral cords) which are more prominent (instead of all 4 or 5), the remaining cords are slightly weaker, the interspaces covered with sharp axial lamellae.

Nassaria rickardi (Ladd, 1977)
Figs 56-58

Cymatium (*Cymatriton*) *rickardi* Ladd, 1977: 34, pl. 13, figs. 10-11. Type locality: Fiji Islands, Vanua Levu, Pliocene.
Cernohorsky, 1981 (21) recognized the taxon as belonging to *Nassaria*, and placed it in synonymy with *Nassaria* (*Nassaria*) *acuminata* (Reeve, 1844).

Material examinated. Kai Islands, KARUBAR stn. DW28, 05°31'S, 132°54'E, 448-467 m, 15 dd (10 juv.), corroded shells.

Range and habitat. *N. rickardi* is syntopic with *N.* species 1 and *N.* species 3, both recorded above, at stn. DW28. Most specimen are corroded by the acidic, corrosive sediment.

Comparison. These specimens from Kai Island are identical to the holotype from Fiji. The range is hereby extensively enlarged, geographically (Indonesia – Fiji) and geologically (Recent – Pliocene).

N. palembangensis (Haanstra & Spiker, 1932) is much similar but differs in having a broader shape and a lower number of spiral cords on the spire whorls.
For differences with *N. intacta* sp. nov. we refer to the comparison under that species.

. *Nassaria wallacei* sp. nov.
Figs 24-25

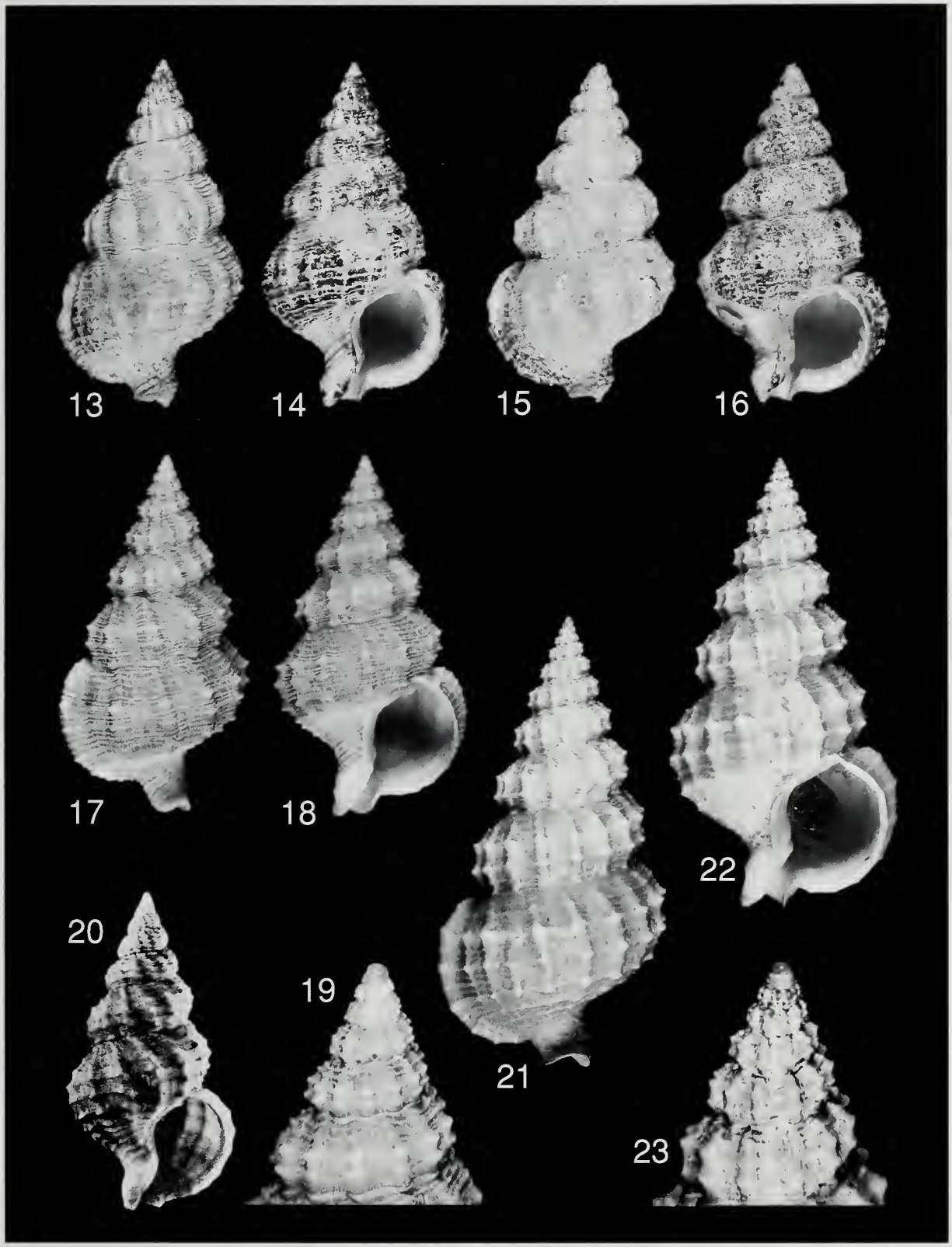
Type material. Holotype (58.1 mm) (KARUBAR stn. DW02), dd, MNHN Moll. 7015.
Type locality. Indonesia, Kai Islands, N/O "Baruna Jaya 1" KARUBAR stn. DW02, 05°47'S, 132°13'E, 209-240 m.

Range and habitat. Known from the holotype only.

Description. Shell large for the genus, 58.1 mm in length, thin but solid, white. Shape broad, acuminate. Teleoconch with 10 convex whorls, from seventh whorl with a weak subsutural concavity.
Protoconch paucispiral, consisting of 1 1/4 whorl, smooth, glossy, diameter 0.9 mm, last 1/4 whorl with a weak spiral fold. Transition to teleoconch marked by 1 fine axial rib and 2 spiral folds.
First teleoconch whorl beginning with 2 strong spiral cords, a third, weak, subsutural spiral cord appearing. Second whorl with 3 spiral cords, interspaces of equal size. Third whorl with 4 spiral cords. Fourth whorl with 4 or 5 spiral cords, some fine secondary spiral threads appearing between. Penultimate whorl with about 16 spiral cords, interspaces broad, 2 cords forming strong knobs when crossing the axials, giving the shell a bicarinate appearance. Body whorl with 3 such knobbed spiral cords.
First teleoconch whorl with 10 broad axial ribs, running from suture to suture. Becoming weaker on following whorls, their number gradually increasing to 15 on penultimate whorl. From seventh whorl with smooth subsutural slope. Body whorl with 14 weak axial ribs on periphery, subsutural slope and base smooth, prelabral varix thick.
Aperture large, round. Outer lip thin, with 25 internal lirae, edge curled outwards. Columella slightly curved, callus projecting, thin, smooth with 1 small adapical denticle. Siphonal canal rather long for the genus, broad, open. Aperture and siphonal canal slightly lesser than 1/2of total shell length.
Periostracum thin, slightly velvety, pale yellowish brown.
Animal, radula and operculum unknown.

Figures 13-23

13-16. *Nassaria moosai* sp. nov. **13-14.** Holotype, 32.2 mm, Tanimbar Islands, KARUBAR stn. CP46, MNHN Moll 7025; **15-16.** Paratype, 33.6 mm, same locality, MNHN Moll 7024.
17-20. *Nassaria spinigera* (Hayashi & Habe, 1965). **17-19.** 36.2 mm, Tanimbar Islands, KARUBAR stn. CP86, MNHN; **20.** Holotype, 33.2 mm, Japan, Enshu-Nada, after Hayashi & Habe, 1965, pl. 1, fig. 5.
21-23. *Nassaria* species 3, 52.1 mm, Kai Islands, KARUBAR stn. CP35, MNHN.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Remarks. *Nassaria wallacei* sp. nov. is a species of high beauty, due to the large size in combination with a delicate shape and subtile sculpture. It's characterized by a large, broad and thin shell, with a fine sculpture and a subsutural concavity.
In the present paper the genus *Nassaria* is used in a broad sence. The subgeneric names as used by Cernohorsky (1981) are here synonymized. Taking in account the axial sculpture which is absent on the subsutural slope and base, the weak spiral sculpture and the thin shell, then *N. wallacei* sp. nov. would belong to *Microfusus* Dall, 1916
Species commonly assigned to *Microfusus* Dall, 1916 (as a subgenus of *Nassaria*) are similar in having a large aperture, a delicate sculpture and a weak subsutural concavity, but differ in having a more slender shape and an usually shorter siphonal canal.

Etymology. *Nassaria wallacei* sp. nov. is named after the famous naturalist Alfred Russel Wallace (1823-1913). His passionate and indefatigable search for specimens, performed by him in extremis and close to selfdesctruction, has result in great discoveries. His patience and intelligence has result in many keen observations. From 1854 till 1862 he travelled the Indonesian Islands, crossing the southern waters which harbour the present new species. I had great joy reading his book The Malay Archipelago and have spend many pleasant hours discussing with friends about his explorations.

Nassaria tarta sp. nov.
Figs 26-30, 48

Type material. Holotype MNHN Moll 7035 (37.7 mm) and paratype 1 MNHN 7016 (KARUBAR stn. CP86). Paratypes 2-9 (KARUBAR stn. CP67) 5 MNHN 7018, MZB, ZRC nr. ZRC.MOL.93, KF nr.4955.

Material examinated. Tanimbar Islands, KARUBAR stn. CP47, 08°01'S, 132°55'E, 235-246 m, 1 dd. - Stn. DW61, 09°05'S, 132°44'E, 235-236 m, 1 dd. - Stn. CP62, 09°01'S, 132°42'E, 246-253 m, 1 dd juv. - Stn. CP67, 08°58'S, 132°06'E, 146-233 m, 11 lv (7 juv) 16 dd (6 juv). - Stn. CP79, 09°16'S, 131°22'E, 239-250 m, 6 dd (4 juv). - Stn. CP84, 09°23'S, 131°09'E, 246-275 m, 4 dd juv. - Stn. CP86, 09°26'S, 131°13'E, 223-225 m, 7 dd (5 juv).

Type locality. Indonesia, Tanimbar Islands, N/O "Baruna Jaya 1" KARUBAR stn. CP86, 09°26'S, 131°13'E, 223-225 m.

Range and habitat. Known from the above listed material only, off Tanimbar Islands. Bathymetric range 146-233 m for living specimens. Empty shells between 225 and 246 m. Syntopic with *N. laevior* at stn. CP 79 & CP 84, with *N. spinigera* at stn. CP86, with *N. intacta* sp. nov. at stn. DW 61, CP 79 and CP 84, and with *N. corollaria* sp. nov. at stn. CP 62.

Description. Shell up to 37 mm in length, thick, solid. Shape pagodoid, with high spire. Teleoconch with 11 slightly angulate whorls. Colour snow-white, occasionally with 2 fine red spiral lines on spire, 4 on body whorl.
Protoconch paucispiral, consisting of 1 1/4 whorl, smooth, glossy, diameter about 0.8 mm, last 1/4 whorl with a weak spiral fold. Transition to teleoconch marked by 1 fine axial ribs covering and 2 spiral folds. First teleoconch whorl beginning with 2 strong spiral cords, a third, weak, subsutural spiral cord appearing. Second whorl with 3 spiral cords, a fourth, weak, subsutural spiral cord appearing. Third whorl with 4 spiral cords. Penultimate whorl with about 16 spiral cords, alternating strong and weak, forming fine knobs when crossing axials.
First teleoconch whorl with 10 axial ribs, running from suture to suture. Their number increasing to 12 on sixth whorl. Penultimate whorl with 11 axial ribs, subsutural slope becoming smooth. Body whorl with 11 weak axial ribs on periphery, subsutural slope and base smooth. Prelabral varix thick, separated from preceding whorl by narrow notch.
Aperture ovate. Outer lip thick, with 9 internal lirae, edge curled outwards. Columella thin, smooth with 1 small adapical denticle and 1 weak abapical spiral fold. Siphonal canal short, rather narrow, open. Aperture and siphonal canal about 2/5of total shell length.
Operculum thin, corneus, pale brown, nucleus terminal, slightly pointed.
Periostracum thin, slightly velvety, pale yellowish brown.
Radula typical of genus, central tooth broad, rectangular with 5 small conical cusps, middle one minute. Lateral teeth bicuspid, outer cusp large, sharp.

Remarks. *Nassaria tarta* sp. nov. is a species of high beauty, due to the large size in combination with a slender shape and acute spire. It differs from all other Recent and fossil *Nassaria* species in having a high spire in combination with angulate whorls and a deep suture.

Etymology. Derived from *tart* a shortening of sweetheart (English), an expression used for a loved one, which refers to the elegant shape of the shell.

Nassaria termesoides sp. nov.
Figs 41-47

Type material. Holotype (30.6 mm) (KARUBAR stn. CP69), MNHN Moll 7032. Paratypes 1-6 (same locality), 3 MNHN Moll 7019, MZB, ZRC nr.ZRC.MOL.98, KF nr.4960.

Material examinated. Kai Islands, KARUBAR stn. DW28, 05°31'S, 132°54'E, 448-467 m, 1 dd, juv.
Tanimbar Islands, KARUBAR stn. CP69, 08°42'S, 131°53'E, 356-368 m, 31 lv (17 juv), 73 dd (25). -

Stn. CP77, 08°57'S, 131°27'E, 346-352 m, 10 lv (4 juv), 14 dd (6 juv).

Type locality. Indonesia, Tanimbar Islands, N/O "Baruna Jaya 1" KARUBAR stn. CP69, 08°42'S, 131°53'E, 356-368 m.

Range and habitat. Known from the above listed material only, off Kai and Tanimbar Islands. Bathymetric range 352-356 m for living specimens. Empty shells between 352 and 448 m.
N. termesoides sp. nov. is syntopic with *N.* species 1 and *N. rickardi* at stn. DW28, and with *Nassaria incisa* sp. nov. at stn. CP69 and CP77.

Description. Shell up to 30.6 mm in length, thick, solid, snow-white. Shape slender, semi-pagodoid with high spire. Teleoconch whorls convex. Suture deep. Sculpture rather reticulate. Apex eroded, transition from protoconch to teleoconch not traceble. Number of whorls 10 in total. (Protoconch of paratype 2 (juvenile) paucispiral, consisting of 1 3/4 whorl, smooth, glossy, rather bulbous, diameter 1.0 mm, transition to teleoconch marked by some minute axial threads.)
First 3 whorls eroded (all adult specimens). (Paratype 2 (juvenile) beginning with 2 sharp spiral cords, second whorl with 3 spiral cords, interspaces of equal size.) Fourth whorl with 3 sharp, spiral cords, forming sharp knobs when crossing axials, interspaces broad. Sixth whorl with 4 spiral cords, adapical one fine, occasionally a fifth spiral partly concealed under lower suture. Penultimate whorl with 4 primary spiral cords, adapical ones weak, abapical ones strong. Body whorl with 8 sharp, primary spiral cords, interspaces broad with 1-3 fine secondary spiral cords. Siphonal canal with some additional, weak spiral cords.
All whorls with about 10-12 strong axial ribs, running from suture to suture, interspaces of equal size on first whorl, gradually increasing in size. From fourth whorl on, interspaces gradually become broader. Labral varix big, separated from preceding whorl by shallow notch.
Aperture round. Outer lip thick, increasing in thickness towards siphonal canal, with some internal lirae, edge thick. Columellar lip sharp, thin, glossy, with 1 weak abapical spiral fold and 2 adapical knobs. Siphonal canal short, broad, open. Aperture and siphonal canal about 3/5 of total shell length.
Periostracum rather thin, slightly velvety, olive green, forming fine incremental lamellae. The periostracum is well intact in the interspaces, on the knobs it is eroded.

Comparison. *Nassaria termesoides* sp. nov. is characterized by a slender shape with high spire and a rather reticulate sculpture. The primary spiral cords are sharp, producing sharp knobs when crossing axial ribs. The spiral cords on the base are weak, rather broad, with broad interspaces.
N. spinigera (Hayashi & Habe, 1965) is similar in shape and sculpture but differs in having 2 primary spiral cords on all whorls, a thin shell and a larger size.
N. perlata Poppe and Fraussen, 2004 from the Philippines is similar in shape and sculpture but differs in having a stronger spiral sculpture, with a higher number of spiral cords on the base and subsutural slope.

Etymology. *Nassaria termesoides* sp. nov. is derived from the Latin *termes* (neutrum) meaning "a branch cut from the tree", which refers to the partly intact, partly eroded periostracum giving the shell the pattern of dead branches which lose bark.

Nassaria incisa sp. nov.
Figs 36-40

Type material. Holotype (39.5 mm) (KARUBAR stn. CP59), MNHN Moll 7031. Paratypes 1-6 (KARUBAR stn. CP69), 2 MNHN Moll 7030, MZB, ZRC nr.ZRC.MOL.97, KF nr.4961.

Material examinated. Tanimbar Islands, KARUBAR stn. CP59, 08°20'S, 132°11'E, 399-405 m, 1 lv. - Stn. CP69, 08°42'S, 131°53'E, 356-368 m, 19 lv (2 juv), 29 dd (11). - Stn. CP70, 08°41'S, 131°47'E, 410-413 m, 1 dd juv. - Stn. CP77, 08°57'S, 131°27'E, 346-352 m, 3 lv, 6 dd (2 juv).

Type locality. Indonesia, Tanimbar Islands, N/O "Baruna Jaya 1" KARUBAR stn. CP59, 08°20'S, 132°11'E, 399-405 m.

Range and habitat. Known from the above listed material only, off Tanimbar Islands. Bathymetric range 352-399 m.
N. incisa sp. nov. is syntopic with *Nassaria termesoides* sp. nov. at stn. CP69 and CP77.

Description. Shell up to 39.5 mm in length, thick, solid. Shape broad, pagodoid with high spire. Suture deep, incised, with broad canaliculation. Colour white. Whorls convex. Apex eroded, transition from protoconch to teleoconch not traceble. Number of whorls 9 1/2 in total. (Protoconch of paratype 2 (juvenile) paucispiral, consisting of 1 whorl, smooth, glossy, rather bulbous, semi-transparant, last 1/4 whorl dull white, diameter 0.8 mm, transition to teleoconch marked by 1 fine axial thread.
All teleoconch whorls with 3 strong, sharp spiral cords. From sixth whorl on the adapical spiral becomes bilirate. Interspaces broad. Penultimate whorl with 3 sharp spiral cords. Body whorl with 12 spiral cords, of which 4 on siphonal canal, interspace between third and fourth cord twice as broad, abapical interspaces narrower.
Fifth whorl with about 14 axial ribs, running from suture to suture. Their number increasing to 16 on

penultimate whorl. Body whorl with 17 weak axial ribs on periphery, base smooth. Prelabral varix big, separated from preceding whorl by broad canaliculation.
Aperture ovate, pinched at both ends. Outer lip thick, with 12 internal lirae, edge curled outwards. Columella thick, smooth, with small adapical denticle. Siphonal canal short, rather narrow, open. Aperture and siphonal canal about 3/5of total shell length.
Operculum thin, corneous, pale brown, nucleus terminal, slightly pointed.
Periostracum thick, velvety, yellowish brown, forming axial lamellae.

Comparison. *Nassaria incisa* sp. nov. is characterized by a slender shape with high spire and deep, canaliculated suture. The primary spiral cords are strong, the adapical one becoming bicarinate. The spiral interspaces are broad, the one situated under the suture twice as broad as rhe other interspaces.
For differences with *N. corollaria* sp. nov. 1 refer to the comparison under that species.
N. bombax (Cernohorsky, 1981) is similar in shape and sculpture but differs in having a broader shape with shorter spire, a smaller size, a subsutural spiral cord which is not bilirate and spiral interspaces of almost equal size.

Etymology. *Nassaria incisa* sp. nov. is derived from *incisum* (Latin, the verb *incidere*) meaning "cut" or "carved", which refers to the deep suture.

Nassaria corollaria sp. nov.
Figs 31-35

Type material. Holotype (26.6 mm) (KARUBAR stn. 62) MNHN Moll 7029. Paratype 1 (KARUBAR stn. DW31), MNHN Moll 7028. Paratype 2-3 (KARUBAR stn. CP83), MNHN Moll 7027. Paratypes 4-6 (KARUBAR stn. CP84) MZB, ZRC nr.ZRC.MOL.96, KF nr.4957.

Material examinated. Kai Islands, KARUBAR stn. DW31, 05°40'S, 132°51'E, 288-289 m, 1 dd juv.
Tanimbar Islands, KARUBAR stn. CP62, 09°01'S, 132°42'E, 246-253 m, 2 dd. - Stn CP79, 09°16'S, 131°22'E, 239-250 m, 1 lv juv, 6 dd. - Stn. CP83, 09°23'S, 131°00'E, 285-297 m, 2 lv (1 juv), 1 dd. - Stn. CP84, 09°23'S, 131°09'E, 246-275 m, 6 lv (3 juv), 2 dd juv. -

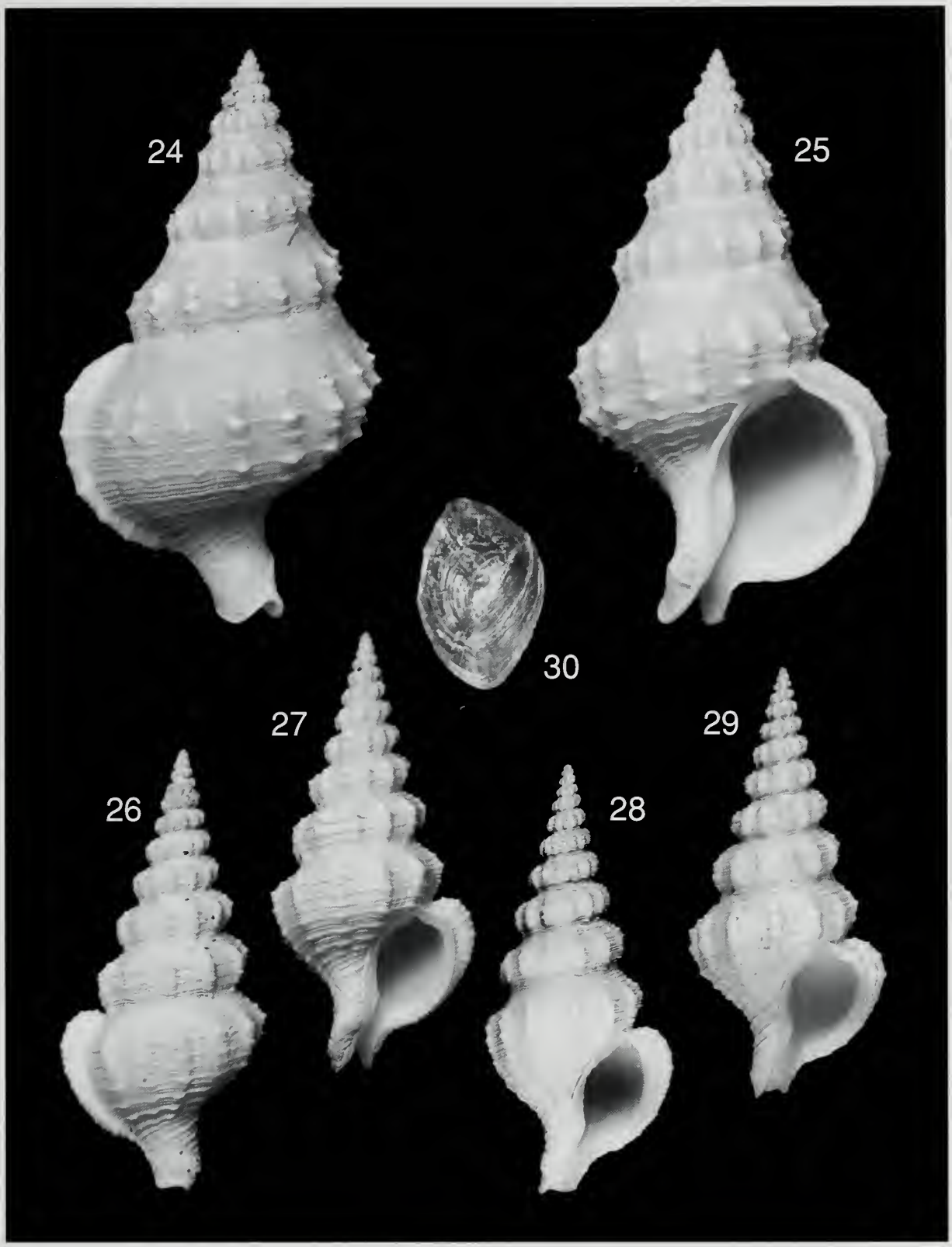
Type locality. Indonesia, Tanimbar Islands, N/O "Baruna Jaya 1" KARUBAR stn. CP62, 09°01'S, 132°42'E, 246-253 m.

Range and habitat. Known from the above listed material only, off Kai and Tanimbar Islands. Bathymetric range 250-285 m for living specimens. Empty shells between 250 and 288 m. Syntopic with *N. laevior* at stn. CP79 & CP84, with *N. tarta* sp. nov. at stn. DW 62, CP79 & CP84 and with *N. intacta* at stn CP79, CP83 & CP84.

Description. Shell up to 27 mm in length, thick, solid. Shape broad, semi-pagodoid with short spire. Suture deep. Colour white. Whorls convex, apex eroded, transition from protoconch to teleoconch not traceble. Protoconch of paratype 2 (juvenile) paucispiral, consisting of slightly lesser than 1 whorl, smooth, glossy, rather bulbous, diameter 0.8 mm, transition to teleoconch marked by 1 fine axial thread.
First teleoconch whorl eroded. Paratype 2 beginning with 2 strong spiral cords, a third, weak, subsutural spiral cord appearing. Second whorl with 3 spiral cords, interspaces of equal size. Third whorl with 4 spiral cords. Penultimate whorl with about 8 spiral cords, alternating strong and weak, forming big knobs when crossing axials.
Upper teleoconch whorls with about 10 strong axial ribs, running from suture to suture, interspaces of equal size. Penultimate whorl with 19 axial ribs, interspaces narrow. Body whorl with 18 weak axial ribs, interspaces twice as broad. Prelabral varix big, separated from preceding whorl by narrow notch.
Aperture ovate, pinched at both ends. Outer lip thick, with 10 internal lirae, edge curled outwards. Columella thin, glossy, with 1 weak abapical spiral fold, spiral sculpture of preceding whorl visible. Siphonal canal short, rather narrow, open. Aperture and siphonal canal about 3/7of total shell length.
Periostracum thin, slightly velvety, pale yellowish brown.

Figures 24-30

24-25. *Nassaria wallacei* sp. nov., holotype, 58.1 mm, Kai Islands, KARUBAR stn. DW02, MNHN Moll 7015. **26-30.** *Nassaria tarta* sp. nov. **26-27.** Holotype, 37.7 mm, Tanimbar Islands, KARUBAR stn. CP86, MNHN Moll 7035; **28.** Paratype 2, 34.0 mm, Tanimbar Islands, KARUBAR stn. CP67, MNHN Moll 7018; **29-30.** Paratype 3, 36.5 mm, operculum: 7.2 mm, same locality, MNHN Moll 7018.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Remarks. *Nassaria corollaria* sp. nov. is characterized by the high number of axials, sculptured with strong knobs, in combination with a rather broad shape.
Paratype 2 is atypical by the secondary spiral cord on the spire which is as strong as the primary.
N. incisa sp. nov. has a similar sculpture on the upper spire whorls but differs in having a deep canaliculated suture and a broader interspace between third and fourth spiral cord.
All other Recent and fossil *Nassaria* species differ in having a lower number of axial ribs, a higher number of spiral cords, and a lesser convex base.

Etymology. *Nassaria corollaria* sp. nov. is derived from *corollarium* (Latin, neutrum) meaning "wreath of honour", a kind of crown, which refers to the multiple crowns of knobs ornamenting the shell.

Nassaria moosai sp. nov.
Figs 13-16

Nassaria (*Microfusus*) *spinigera* from Java Sea, in Cernohorsky 1981, pl. 31, fig. 5. (non Hayashi & Habe, 1965).

Type material. Holotype (33.4 mm) and paratype 1 (KARUBAR stn. CP46), MNHN Moll 7025.

Type locality. Indonesia, Tanimbar Islands, N/O "Baruna Jaya 1" KARUBAR stn. CP46, 08°01'S, 132°51'E, 271-273 m.

Range and habitat. Known from the type material only, both empty shells. Syntopic with *N. spinigera* (Hayashi & Habe, 1965) at stn. CP46.

Description. Shell up to 33.4 mm in length, thick, solid, greyish. Shape slender, acuminate with high spire. Teleoconch whorls convex. Suture deep. Sculpture dominant spiral. Apex eroded, transition from protoconch to teleoconch not traceble. Number of whorls 10 in total.
All whorls covered by broad, well rounded spiral cords. First whorl with 3 or 4, rather sharp, spiral cords, forming knobs when crossing axials, interspaces broad. Number of spiral cords gradually increasing. Penultimate whorl with 12 spiral cords of slightly different strength, adapical ones strong, abapical ones slightly weaker, occasionally alternating weaker. Body whorl with about 19 spiral cords, 10 adapical ones of equal size with narrow interspaces of equal size, 9 abapical ones of slightly different strength with broader interspaces. Siphonal canal with 6 fine spiral cords.
All whorls with 12 or 13 axial ribs, interspaces narrow on adapical whorls, gradually becoming broader. Body whorl with 13 low axial ribs. Prelabral varix weak.
Aperture round. Outer lip thick, with 15 internal denticles, abapical ones slightly stronger. Columellar lip sharp, thin, glossy, with 1 strong adapical fold and 1 abapical spiral fold. Siphonal canal short, broad, open. Aperture and siphonal canal about 2/5 of total shell length.
Periostracum, operculum and radula unknown.

Comparison. *Nassaria moosai* sp. nov. is characterized by the dense spiral sculpture consisting of well rounded spiral cords with narrow interspaces, only slightly unequal in size.
N. spinigera (Hayashi & Habe, 1965) is similar in shape but differs in having sharp primary spiral cords on all whorls and a thin shell.
N. problematica (Iredale, 1936) is similar in shape but differs in having a higher number of primary spiral cords with stronger knobs on the axial ribs.

Etymology. *Nassaria moosai* sp. nov. is named to honour Kasim Moosa, at that time of LIPI (Jakarta) and Principal Investigator of the KARUBAR cruise.

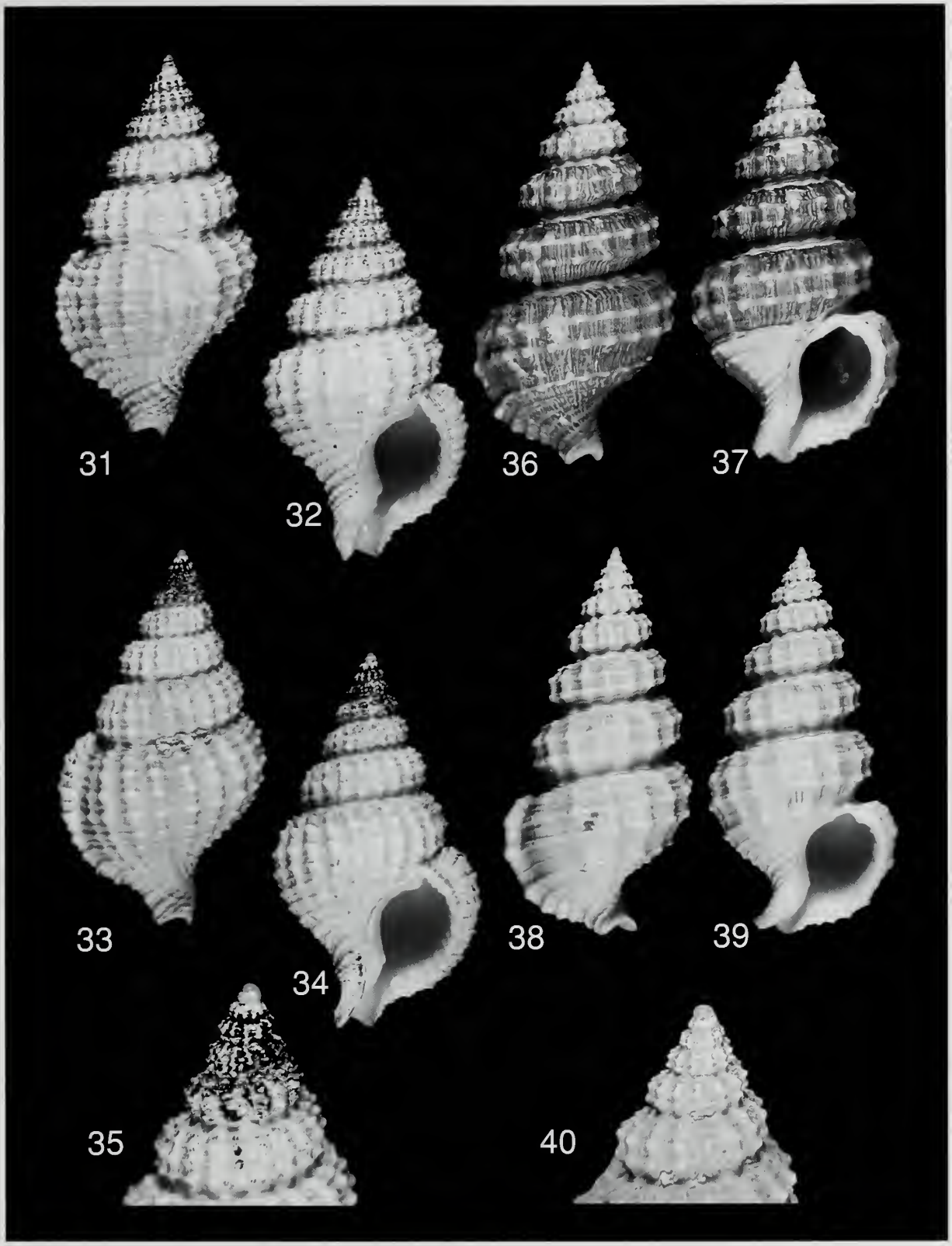
Nassaria intacta sp. nov.
Figs 53-55

Type material. Holotype (21.0 mm) (KARUBAR stn. CP83), MNHN Moll 7023. Paratypes 1-2 (KARUBAR stn. CP79), MNHN Moll 7022. Paratypes 3-4 (KARUBAR stn. DE68), MNHN Moll 7021, KF nr.4956. Paratypes 5-8 (KARUBAR stn. CP84), 2 MNHN Moll 7020, MZB, ZRC nr.ZRC.MOL.94.

Material examinated. Kai Islands, KARUBAR stn. DW15, 05°17'S, 132°41'E, 212-221 m, 3 dd juv.
Tanimbar Islands, KARUBAR stn. DW44, 07°52'S, 132°48'E, 291-295 m, 1 dd juv. - Stn. DW61, 09°05'S, 132°44'E, 235-236 m, 1 dd. - Stn. DE68, 08°54'S, 132°01'E, 280-296 m, 4 dd juv. - Stn. CP79, 09°16'S, 131°22'E, 239-250 m, 3 dd. - Stn. CP83, 09°23'S, 131°00'E, 285-297 m, 1 dd. - Stn. CP84, 09°23'S, 131°09'E, 246-275 m, 6 dd (2 juv).

Figures 31-40

31-35. *Nassaria corollaria* sp. nov. **31-32.** Holotype, 26.6 mm, Tanimbar Islands, KARUBAR stn. CP62, MNHN Moll 7029; **33-35.** Paratype 3, 29.0 mm, Tanimbar Islands, KARUBAR stn. CP83, MNHN Moll 7027. **36-40.** *Nassaria incisa* sp. nov. **36-37.** Holotype, 39.5 mm, Tanimbar Islands, KARUBAR stn. CP59, MNHN Moll 7031; **38-39.** Paratype 2, 36.4 mm, Tanimbar Islands, KARUBAR stn. CP69, MNHN Moll 7030; **40.** Paratype 1, apex of juvenile, same locality, MNHN Moll 7030.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Type locality. Indonesia, Tanimbar Islands, N/O "Baruna Jaya 1" KARUBAR stn. CP83, 09°23'S, 131°00'E, 285-297 m.

Range and habitat. Known from the above listed material only, off Kai and Tanimbar Islands. Bathymetric range (all empty shells): 221 and 291 m. Syntopic with *N. laevior* sp. nov. at stn. CP 79 and with *N. tarta* sp. nov. at stn. DW 61, CP 79 and CP 84. All specimens are corroded by the acidic, corrosive sediment.

Description. Shell small for the genus, about 21 mm in length, thick, solid. Shape slender, with high spire. Teleoconch with 8 whorls, scultpure reticulate. Colour subfossil greyish brown, fresh specimens white, semitransparant..
Protoconch paucispiral, consisting of 1 smooth, glossy, whorl, diameter 0.6 mm, last 1/4 whorl with a fine spiral cord. Transition to teleoconch marked by 1 fine axial ribs covering and 2 spiral folds.
First teleoconch whorl with 3 strong spiral cords, subsutural one fine. Top of spiral cords becoming flattened on further whorls, resulting in becoming rectangular in profile. Third whorl with 8 spiral cords, alternating strong and weak, subsutural one fine. Penultimate whorl with 8 spiral cords, alternating strong and weak. Strong spirals forming big knobs when crossing axials.
First teleoconch whorl with 8 axial ribs, running from suture to suture. Their number increasing to 11 on further whorls, becoming stronger with slightly narrower interspaces. Penultimate and body whorl with 11 axial ribs. Labral varix thick, separated from preceding whorl by narrow notch.
Aperture ovate. Outer lip thick, with 9 or 10 internal lirae. Columella thin, smooth with 1 or 2 small adapical denticles and 1 weak abapical spiral fold. Siphonal canal short, broad, open. Aperture and siphonal canal about 2/5of total shell length.

Remarks. *Nassaria intacta* sp. nov. is characterized by the strong, reticulate sculpture.
N. rickardi (Ladd, 1977) is similar in sculpture but differs in having a broader shape, strong axial ribs (instead of strong knobs), some strong varices, a labral varix which is more winged and with a sharper abapical projection, and the spiral cords which are slightly finer with lesser pronounced knobs on the whorls but much bigger on the base.
N. atjehensis Oostingh, 1939 from the Pliocene of Indonesian is much similar in shape but differs in having finer spiral cords.
N. subtambacana (Wanner & Hahn, 1935) from the Miocene of Indonesian is similar in shape but differs in having a rounded spiral sculpture, a lower number of spiral cords on the base which are also broader, and the broader shape.

Etymology. *Nassaria intacta* sp. nov. is derived from the Latin *intactus*, meaning "unchanged" which refers to the resemblance with the fossil species.

***Nassaria* species 1**
Figs 59-60

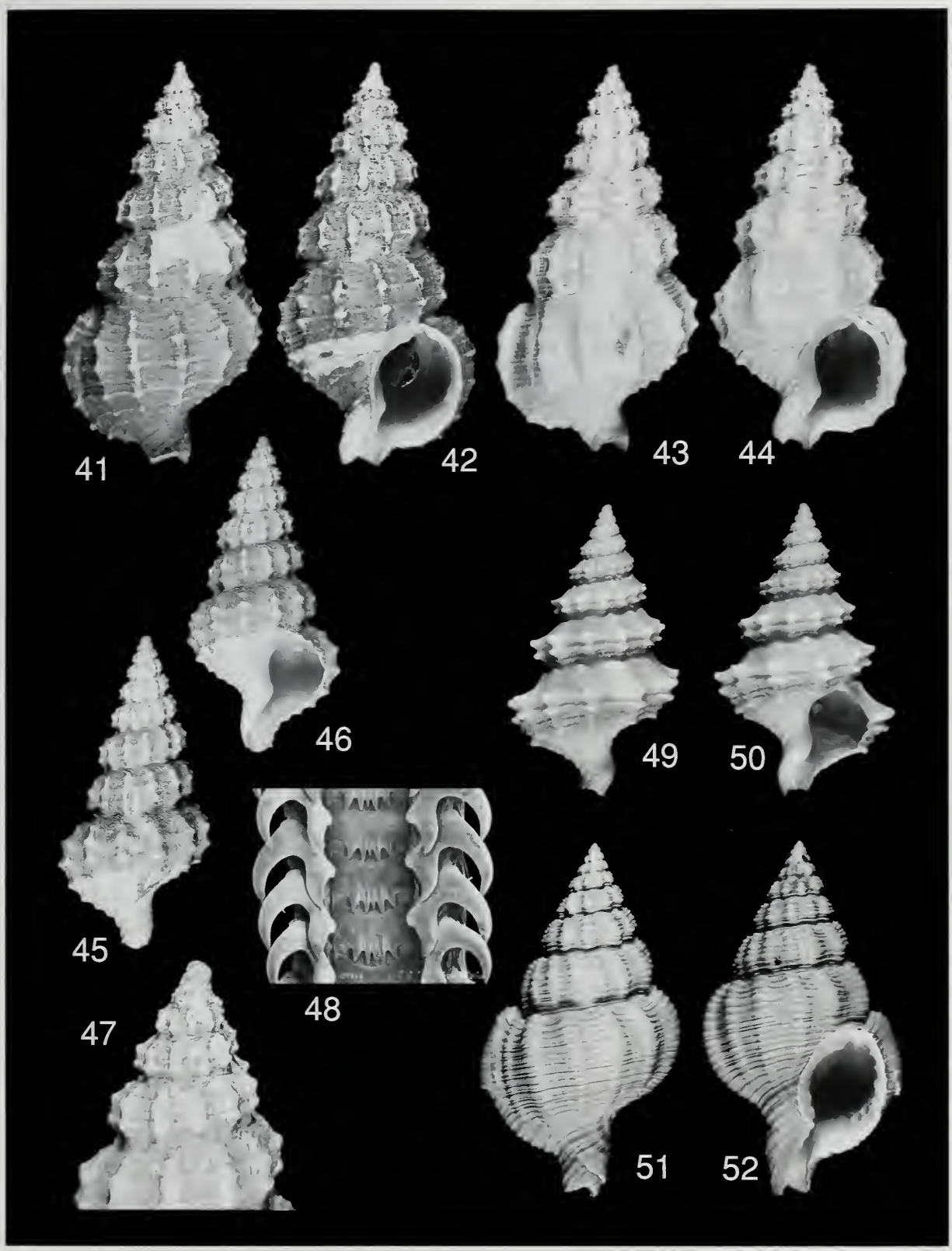
Material examinated. Kai Islands, KARUBAR stn. DW28, 05°31'S, 132°54'E, 448-467 m, 1 dd.

Range and habitat. This *N.* species is syntopic with *N.* species 3, recorded below, and *N. rickardi.*

Remarks. This *Nassaria* species is characterized by the rather weak spiral sculpure, smoother in the interspaces but with knobs when crossing the axials.
Because of the little material available (1 specimen) syntopic with the similar *N. rickardi* (Ladd, 1977) a comparative study is beyond the possibilities, and the species is not described.
N. rickardi (Ladd, 1977) differs by the broader shape and by the strong spiral and axial sculpture.
N. intacta sp. nov. differs by the slender shape, the lower number of spiral cords with smoother interspaces and by the sharp axial ribs with bigger knobs.

Figures 41-52

41-47. *Nassaria termesoides* sp. nov. **41-42.** Holotype, 30.6 mm, Tanimbar Islands, KARUBAR stn. CP69, MNHN Moll 7032; **43-44.** paratype 2, 29.6 mm, same locality, MNHN Moll 7019; **45-46.** 20.5 mm (juvenile), Kai Islands, KARUBAR stn. DW28, MNHN; **47.** paratype 1, apex of juvenile, same locality MNHN Moll 7019.
48. *Nassaria tarta* sp. nov. Radula.
49-50. *Nassaria* species 5, 21.9 mm (juvenile), Kai Islands, KARUBAR stn. DW15, MNHN.
51-52. *Nassaria* species 4, 29.1 mm (juvenile), Tanimbar Islands, KARUBAR stn. CP65, MNHN.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Nassaria species 2
Figs 61-65

Material examinated. Kai Islands, KARUBAR stn. DW13, 05°26'S, 132°38'E, 417-425 m, 2 dd juv. Tanimbar Islands, KARUBAR stn. DW64, 09°31'S, 132°31'E, 180-179 m, 1 dd juv.

Range and habitat. Known by 3 juvenile specimen, all corroded by the acidic, corrosive sediment.

Remarks. This *Nassaria* species is characterized by the presence of a strong spiral sculpure with accentuated secondary spiral cords, in combination with narrow spiral cords on the base, and by the broad shape.
Because of the little material available (3 juvenile specimens) and the resemblance with known fossil species, a comparative study is beyond the possibilities, and the species is not described.
N. rickardi (Ladd, 1977) differs in having convex whorls, more regular spaced spiral cords which are broad on the base, broader interspaces which are smooth or with a fine secondary spiral cords.
N. intacta sp. nov. differs in having a slender shape, a lower number of spiral cords with smoother interspaces and sharp axial ribs with bigger knobs.
N. amboynensis differs in having a strong subsutural spiral cord, and big axial ribs which extend on the subsutural slope.

***Nassaria* species 3**
Figs 21-23

Material examinated. Kai Islands, KARUBAR stn. CP35, 06°08'S, 132°45'E, 390-502 m, 2 lv (1 juv).

Range and habitat. One specimen known.

Remarks. Shell large for the genus, up to 58.1 mm in length, characterized by a high spire, sharp primary spiral cords with fine secondary cords in between, smooth interspaces,
Nassaria spinigera (Hayashi & Habe, 1965) from Kai Islands, recorded above, differs in having a slightly narrower interspace between the 2 prominent spiral cords, sharp axial lamellae, a smaller size and a reddish-brown colour.
Because of the little material available (1 specimens) a comparative study with *N. spinigera* is beyond the possibilities, and the species is not described.

***Nassaria* species 4**
Figs 51-52

Material examinated. Tanimbar Islands, KARUBAR stn. CP65, 09°14'S, 132°27'E, 174-176 m, 1 dd.
Range and habitat. Known by a single specimen. Syntopic with *N. amboynensis* at stn. CP65.

Comparison. This *Nassaria* species is characterized by the presence of numerous fine spiral cords of equal strength, rectangular in profile, separated by deep interspaces of equal size. The axial ribs are slightly angulate at the adapical end.
Because of the little material available (1 specimens) a comparative study is beyond the possibilities, and the species is not described.

***Nassaria* species 5**
Figs 49-50

Material examinated. Kai Islands, KARUBAR stn. DW15, 05°17'S, 132°41'E, 212-221 m, 1 dd juv.

Range and habitat. Known by a single juvenile specimen. Syntopic with *N. intacta* sp. nov. at stn. CP65.

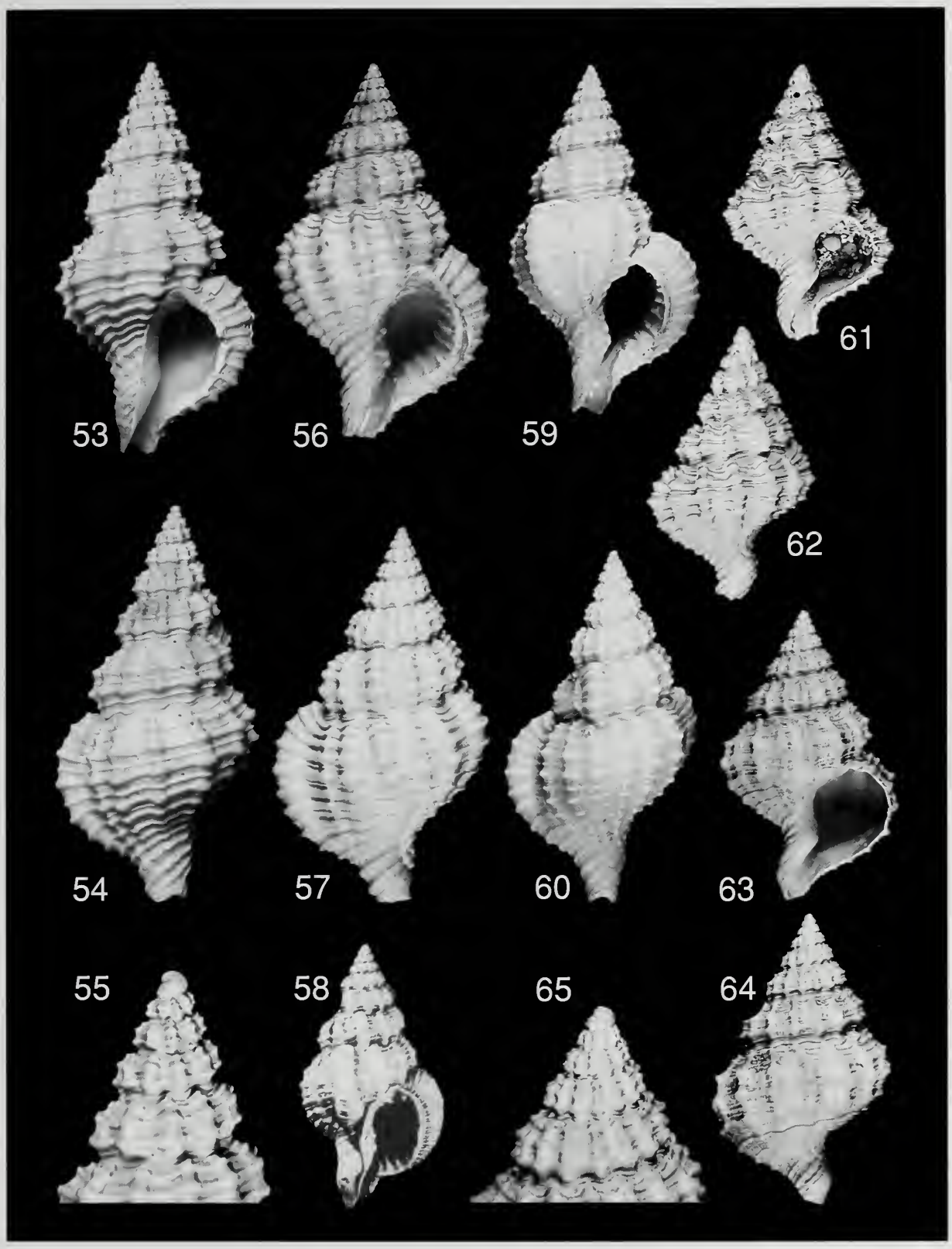
Remarks. This *Nassaria* species is characterized by the peculiar pagodoid shape with sharp carina and broad subsutural slope.
Because of the little material available (1 juvenile specimens), a comparative study is beyond the possibilities, and the species is not described.

Acknowledgments

I am grateful to Philippe Bouchet, Virginie Héros and Philippe Maestrati (MNHN, France) for making the Karubar material available for study. Kevin Monsecour (Belgium) for digital images. Guido T. Poppe (Belgium) for his enthousiasm and support. David Monsecour (Belgium) for correcting the English text.

Figures 53-65

53-55. *Nassaria intacta* sp. nov., holotype, 21.0 mm, Tanimbar Islands, KARUBAR stn. CP83, MNHN Moll 7023.
56-58. *Nassaria rickardi* (Ladd, 1977). **56-57.** 23.5 mm, Kai Islands, KARUBAR stn. DW28, MNHN;
58. Holotype USNM 175030, 27.0 mm, Pliocene, Fiji Islands, Vanua Levu, after Cernohorsky, 1981, pl. 16, fig. 10.
59-60. *Nassaria* species 1, 26.5 mm, Kai Islands, KARUBAR stn. DW28, MNHN.
61-65. *Nassaria* species 2. **61-62.** 14.6 mm (juvenile), Tanimbar Islands, KARUBAR stn. DW64, MNHN;
63-65. 21.8 mm (juvenile), Kai Islands, KARUBAR stn. DW13, MNHN.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