ON A COLLECTION OF NON-MARINE MOLLUSCA FROM THE TALAUD ISLANDS AND FROM MOROTAI (MOLUCCAS)

By

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With 1 map and 4 figures.

In 1926 Dr. H. J. LAM, at that time botanist at the Herbarium and Museum of Systematic Botany at Buitenzorg (Java), undertook a collecting trip to the Minahasa (North Celebes), the Talaud Archipelago, Miangas, Morotai and Tidore (Moluccas).

A detailed itinerary of the entire journey has not yet been published. Some scattered notes on scenery and vegetation and a monograph on Miangas Id. are all I have to go on for descriptions of the localities [1]).

Although bent in the first place on botanical and phytogeographical research, Dr. LAM brought home a highly interesting series of non-marine mollusca from the Talaud Islands and Morotai, collected under his supervision by the native collector ERIE, mantri of the Zoological Museum of Buitenzorg.

This collection was kindly placed in my hands for identification and description and was finally presented to the Zoological Museum at Buitenzorg. Duplicates and the holotypes of two new species were presented to the Amsterdam Zoological Museum.

The Talaud Archipelago is a group of small islands forming the eastern chain of the double row of islands, linking North Celebes to the Philippines (Mindanao). They form part of the Residency of Manado. The Talaud Islands are not volcanic. The largest of the group is Karakelong, now a hilly country, largely composed of eruptive rock, covered by tufaceous material and shales, locally also by elevated coral-reefs. The greatest elevation is Mount Piapi (520 m) on the east coast. South of Karakelong lies the island of Salebaboe, also visited by Dr. LAM.

North East of Karakelong and at some distance from it, the island bridge to Mindanao is continued along the Nenoesa Islands, of which Merampi is the largest. Administratively they belong to the same district as the Talaud Islands proper.

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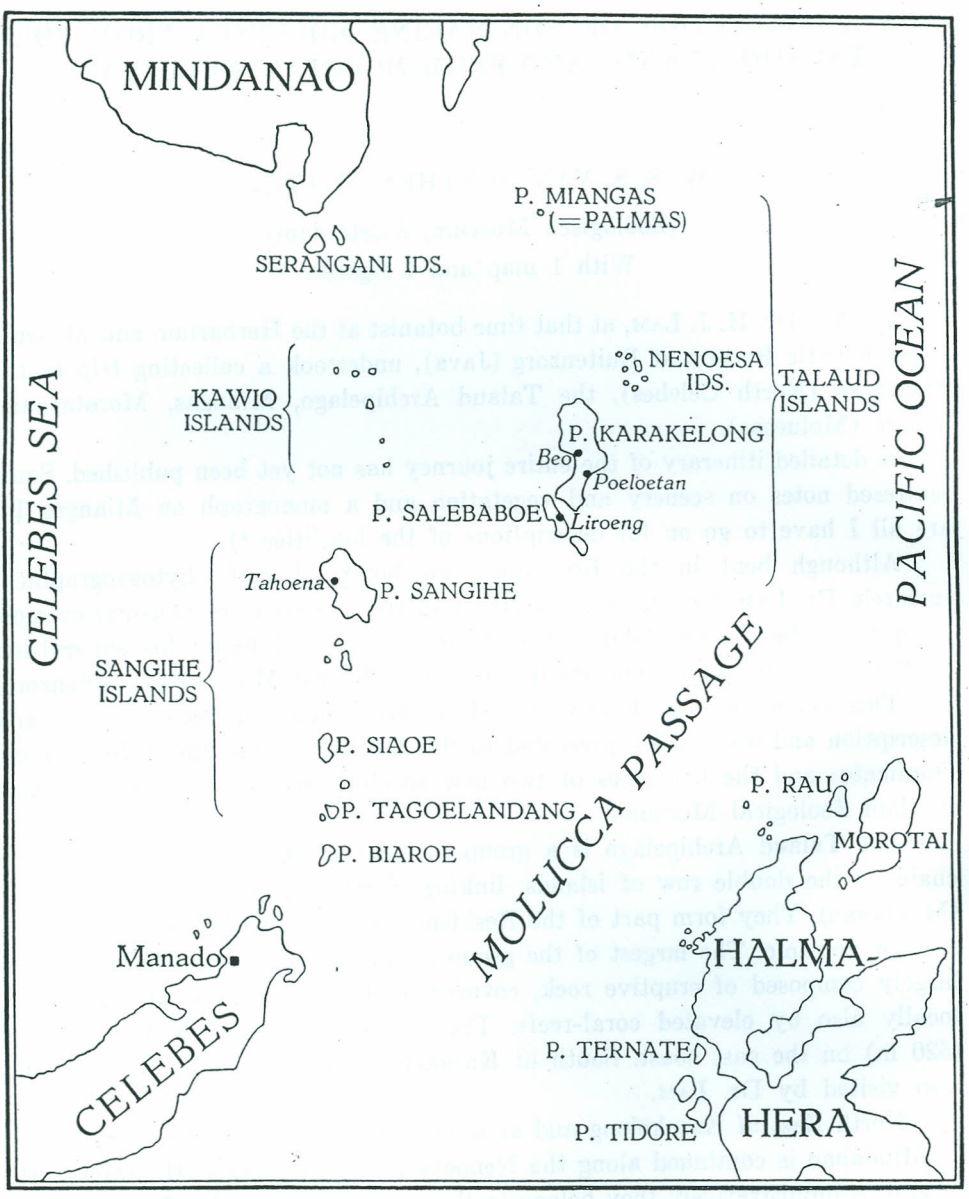
[1]) H. J. LAM, Een plantengeografisch dorado. — Handel. 4de Ned. Ind. Natuurw. Congr. 1926, p. 386 - 397.
H. J. LAM, Botanische aanteekeningen over de Minahassa. — De Trop. Natuur, Vol. 20, 1931, p. 209 - 219.
H. J. LAM, Miangas (Palmas). — Batavia, Ind. Comité, 1932, 66 pp.

Finally there lies solitary in the Ocean the last outpost of Dutch territory, Miangas (or Palmas) Island. To it Dr. LAM paid a special visit, but he did not collect any mollusca.



Sketch map, showing the position of the Talaud Archipelago and Morotai Id. in the Northern Moluccas.

The island of Morotai, situated North East of Halmahera, is high and mountains are largely clad with virgin forest. It forms part of the Residency of Ternate.

Our knowledge of the molluscan fauna of both localities is only very fragmentary, the paper by Möllendorff (Abhandl. & Ber. Kgl. Zool. & Anthropol. Ethnogr. Mus. Dresden, 1896 - 1897, No. 4, p. 1 - 3) being in fact the only special literature. Other records are scattered in regional publications of much wider scope or in general systematic treatises. All this earlier information, combined with the results of Dr. Lam's own collection, together with a few unpublished records in the Amsterdam Zoological Museum, will be treated below in systematic order. For a better understanding it is proposed to discuss separately the two sites: Talaud and Morotai, because they are so fundamentally different faunistically.

In North Celebes Dr. Lam picked up only two weathered young shells of *Xesta citrina* (L.) and one *Amphidromus sinistralis* (Reeve), both on the southern slope of Mount Manimporok near Ratahan.

Some general information about country and inhabitants may be found in:

Talaud Islands

Sidney J. Hickson, A Naturalist in North Celebes.-London 1889

F. A. Ebbinge Wubben, Naar de Talaud-Eilanden.-Tijdschr. Kon. Ned. Aardr. Gen. (2) Vol. 6, 1889, p. 201 - 212 (see also Indische Gids, Vol. 27, 1905, p. 314 - 316)

A. Weber- Van Bosse, Een jaar aan boord H.M. Siboga.-Leiden 1904, p. 121-132

B. Roep, De Talauer-eilanden.-Ind. Gids, Vol. 33, 1911, p. 1236 - 1242

H. Ph. Roothaan, Geologische en petrographische schets der Talaud- en Nanoesa-Eilanden.-Jaarb. Mijnw. Ned. Ind. Vol. 54, 1925 (1928), p. 174 - 220, with map.

Morotai

J. A. F. Schut, Tweemaal naar Morotai.-Tijdschr. Kon. Ned. Aardr. Gen. (2) Vol. 23, 1906, p. 44 - 118

G. J. J. de Jongh, Morotai.-Ibid. (2) Vol. 26, 1909, p. 381 - 397 with map

Meded. Encyclopaedisch Bureau, Part 13, 1917 (Halmahera and Morotai), with map.

TALAUD ISLANDS

Theodoxus bicolor (Récluz)

1842 Récluz, Proc. Zool. Soc. London, p. 172 (*Nerita*)

1879 Martens, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 181, pl. 18, fig. 18, 21 (*Neritina*)

As an appendix to Möllendorff's paper (Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden, 1896, No. 4, p. 3) A. B. M(eyer) listed a few other species of mollusca from Karkellang (sic!) Talaud Ids., identified by O. Boettger. Among these *Theodoxus bicolor* is mentioned s. n. *Neritina* (*Clithon*) *bicolor* Récluz. The species seems to be confined to the Philippine Ids, It was not in Dr. Lam's collection.

Neritodryas cornea (LINNÉ)

1758 LINNÉ, Syst. Nat. Ed. X, p. 777 (*Nerita*)
1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 140-142, pl. 12, fig. 14 - 18 (*Neritina*)

Karakelong Id., Talaud Archipelago, 1926, leg. H. J. LAM ..... 1 sp.

As an appendix to MÖLLENDORFF's paper (loc. cit. p. 3), A. B. M(EYER) gave a list of a few other species of mollusca from Karkellang (sic!) Talaud Ids., identified by A. BOETTGER. Among these *Neritodryas cornea* is mentioned s. n. *Neritina* (*Neritodryas*) *cornea* L.

Neritodryas dubia (GMELIN)

1790 GMELIN, Syst. Nat. Ed. XIII, p. 3678 (*Nerita*)
1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 136, pl. 12, fig. 1 - 7 (*Neritina*)

One of the commonest species in the Indo-Australian region. The Siboga Expedition collected 3 specimens along the shore at Beo, Karakelong Id. (Monogr. 49-1-a, 1908, p. 11). The species was not in Dr. LAM's collection.

Neritodryas subsulcata (SOWERBY)

1836 SOWERBY, Conch. Ill. No. 50, fig. 50, fig. 50 (*Neritina*)
1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 142 - 143, pl. 12, fig. 11 - 12 (*Neritina*)

Poeloetan and Piapi, Karakelong Id., Talaud Archipelago, 1926, leg. H. J. LAM ..... 2 sp.

As an appendix to MÖLLENDORFF's paper (loc. cit. p. 3) A. B. M(EYER) produced a list of a few other species of mollusca from Karkellang (sic!) Talaud Ids., identified by O. BOETTGER. Among these *Neritodryas subsulcata* is recorded s. n. *Neritina* (*Neritodryas*) *subsulcata* SOW. It was also collected by the Siboga Expedition (SCHEPMAN, Monogr. 49-1-a, 1908, p. 10) along the shore near Beo, Karakelong Id.

Neritina communis (QUOY & GAIMARD)

1834 QUOY & GAIMARD, Voy. Astrolabe, Zool. Vol. 3, p. 195, pl. 65, fig. 12 - 14 (*Nerita*)
1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 113 - 116, pl. 11, fig. 1 - 9

The species is very abundant in the Indo-Australian and adjoining regions. SCHEPMAN mentioned it from the shore at Beo, Karakelong Id. (Siboga Exp. Monogr. 49-1-a, 1908, p. 10). Not in Dr. LAM's collection.

Neritina conglobata MARTENS

1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 57, pl. 8, fig. 7 - 9

As an appendix to MÖLLENDORFF's paper (loc. cit. p. 3) A. B. M(EYER) gave a list of a few other species of mollusca from Karkellang (sic!) Talaud Ids., identified by O. BOETTGER. Among these *Neritina conglobata* is mentioned

s. n. *Neritina (Neritaea) conglobata* Mart. The species was originally described from North Celebes. Not in Dr. Lam's collection.

Neritina pulligera (Linné)

1767 Linné, Syst. Nat. Ed. XII, p. 1253 (*Nerita*)
1879 Martens, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 49 - 52, pl. 1, fig. 4, 5

As an appendix to Möllendorff's paper (loc. cit. p. 3) A. B. M(eyer) gave a list of a few other species of mollusca from Karkellang (sic!) Talaud Ids., identified by O. Boettger. Among these *Neritina pulligera* is mentioned s. n. *Neritina (Neritaea) pulligera* L. It was also collected by the Siboga Expedition (Schepman, Monogr. 49-1-a, 1908, p. 9) along the shore at Beo, Karakelong Id. Not in Dr. Lam's collection.

Neritina turrita (Gmelin) var. **cumingiana** (Récluz)

1842 Récluz, Rev. Zool. Vol. 5, p. 74 (*Nerita (Neritina) cumingiana*)
1879 Martens, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 105, pl. 11, fig. 20, 21

Neritina turrita is widely distributed throughout the Indo-Australian region, from the Malay Peninsula in the West to the Society Ids. and Tahiti in the East. The variety has been definitely recorded from Celebes, Philippine Ids., Bali, Batjan, Palau Ids., Caroline Ids. and the Talaud Ids. The last locality is derived from Schepman (Siboga Exp. Monogr. 49-1-a, 1908, p. 10) who mentioned one specimen from the shore at Beo, Karakelong Id. Neither the main form nor the variety were in Dr. Lam's collection.

Neritina variegata Lesson

1830 Lesson, Voy. Coq. Zool. Vol. 2, p. 378
1879 Martens, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 98, pl. 10, fig. 11 - 17

The species is abundant in the entire Malay Archipelago and adjoining regions: Philippines and Pacific Islands. It has been recorded by Schepman (Siboga Exp. Monogr. 49-1-a, 1908, p. 10) from Beo, Karakelong Id. Not in Dr. Lam's collection.

Sulfurina cerinella n. sp. (Fig. 1 and 2)

Shell lens-shaped in outline, uniformly canary- to orange-yellow, with yellowish-white lip. Sculpture consists of numerous fine lines of growth, obliquely crossed by still finer radiating lines. Transparent and glossy.

Whorls 4½, slightly convex, rather acutely carinated at the periphery (sharper than in *Sulfurina citrina*). Ultimate whorl about twice as large as the preceding one. Suture shallow, lined by a fine whitish thread.

Apex rounded. Aperture triangular, a little oblique. Peristome not continuous, somewhat thickened and reflected. No siphonal channel. The corner between basal and columellar side is projecting as a sharp edge.

Umbilicus closed, basal callus finely punctured.

Operculum chalky, white, somewhat like a right-angled triangle with a curved hypotenuse. Exterior a little concave. Interior convex, with a blunt, but conspicuous sigma-edge from the columellar angle via the nucleus to the upper angle.

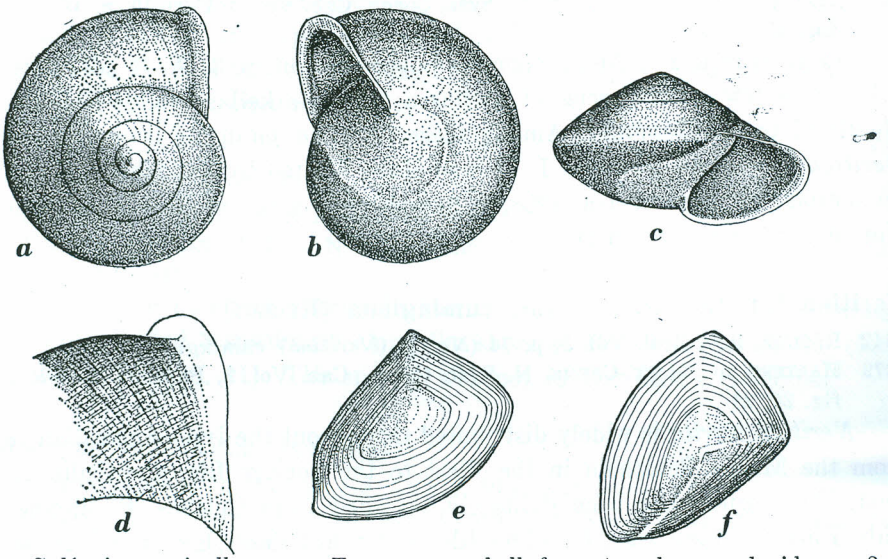


Fig. 1. *Sulfurina cerinella* n. sp. Type. a - c shell from top, base and side, × 3; d last whorl, just before aperture, showing oblique structure, × 6; e - f operculum, × 6; e exterior; f interior side.

Measurements of the 10 largest specimens from Mount Doeata in mm:

Max. diam.	12	12	11½	11½	11½	11½	11½	11½	11	11
Min. diam.	9	9	9	9	9	9	9	9	9	9
Height	7½	7	7½	7½	7½	7	7	7	7	7

The framed specimen is the type

The species is related to *Sulfurina citrina* (GRATELOUP) from the Philippine Islands Luzon, Cebu and Mindanao (WAGNER, Helicinidae, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 1, Part 18 N.S. 1911, p. 19, pl. 2, fig. 15, pl. 3, fig. 1, 2, 3 and FAUSTINO, Philipp. Journ. of Sci. Vol. 42, 1930, p. 175), but more depressed dorsoventrally. The aperture is more expanded in lateral direction and the carination is more striking.

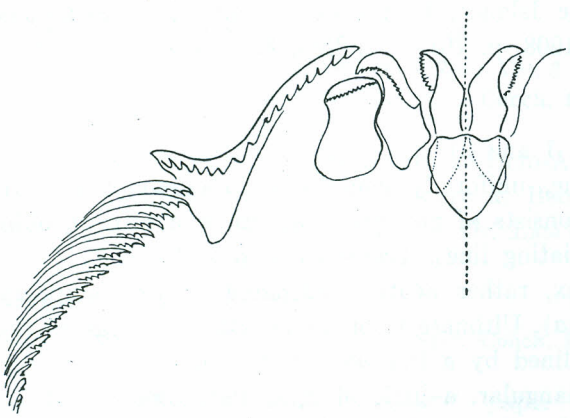


Fig. 2. *Sulfurina cerinella* n. sp. Type. Half a row of teeth from radula.

The radula (fig. 2) is composed of an undivided triangular central tooth, 3

laterals with fine cusps along the cutting edges, one large marginal with an S-shaped active part on a more or less triangular basal plate. The outer marginals are numerous, uniform, curved spicules, closely arranged like the fan-shaped teeth of the Rhipidoglossa.

Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 7 sp.
Mount Doeata, Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 46 sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. Lam ..... 1 sp.
Merampi, Nenoesa Ids., Talaud Arch., 1926, leg. H. J. Lam ..... 2 sp.

All the specimens were taken alive. The type is preserved in the Amsterdam Zoological Museum.

Leptopoma concinnum (Sowerby)

1843 Sowerby, Thes. Conch. Vol. 1, p. 134, pl. 29, fig. 223 - 224 (*Cyclostoma*)
1902 Kobelt, Cyclophoridae, in: Tierreich, Part 16, p. 7

Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 44 sp.
Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 46 sp.
Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 11 sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. Lam ..... several sp.
Merampi, Nenoesa Ids., Talaud Arch., 1926, leg. H. J. Lam ..... 6 sp.

Each sample contains shells with extremely divergent colour-patterns, plain ones, striped and blotted ones, shells with hyaline spiral bands and still other designs occurring side by side. This diversity, however, has no further taxonomic value, and does not imply local races or subspecies.

The species possesses many affinities to *L. cinctellum* Pfr. from the Moluccas.

Leptopoma concinnum was originally described from the Philippines. Its occurrence in the Talaud Archipelago gives an interesting extension to its area of distribution.

Leptopoma vitreum (Lesson)

1830 Lesson, Voy. Coq. Zool. Vol. 2, p. 346, pl. 13, fig. 6 (*Cyclostoma*)
1902 Kobelt, Cyclophoridae, in: Tierreich, Part 16, p. 15.

A variety of this common *Leptopoma* was found in the Talaud Ids. by Doherty and recorded by Fulton (Proc. Malac. Soc. London, Vol. 3, 1899, p. 214). The species was not in Dr. Lam's collection.

Platyraphe parvula (Martens)

1863 Martens, Malak. Blätt. Vol. 10, p. 85 (*Cyclotus ? parvulus*)
1867 Martens, Ostas. Landschn. p. 126, pl. 2, fig. 12 (*Cyclotus*)
1902 Kobelt, Cyclophoridae, in: Tierreich, Part 16, p. 185

In 20 m high landslide along the Koeala Tatamboeë, ± 50 m above sea, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 8 sp.

The species was known from Ternate and Tidore (Moluccas). The Talaud Archipelago forms a new record.

Cyclotus politus politus (SOWERBY)

1843 SOWERBY, Thes. Conch. Vol. 1, p. 97, pl. 23, fig. 17 (*Cyclostoma*)
1902 KOBELT, Cyclophoridae, in: Tierreich, Part 16, p. 193
1931 RENSCH, Zool. Jahrb. (Syst.) Vol. 61, p. 371 - 373

Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. LAM ..... 2 sp.
In 20 m high landslide along the Koeala Tatamboeë, ± 50 m above sea, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 3 sp.

It is the form commonly assigned to *Cyclotus reticulatus* MARTENS (Ostas. Landschn. 1867, p. 120, pl. 2, fig. 3). By his combination of about half a dozen or more "species" and "varieties" into a "Rassenkreis", RENSCH has certainly brought the species problem on to a broader base, demonstrating that *C. politus* and allied forms occupy a large part of the eastern moiety of the Malay Archipelago: viz. S.E. Borneo, Miang, Celebes, Boeton, Boeroe, Ceram, Ambon, Saparoea, Haroekoe, Lombok, Soembawa, Flores, Adonare, Solor, Poera, Wetar, Soemba, Timor, probably also Saleyer, Kalao and Kalao Toea and the Soeloe Archipelago. Tagoelandang is another site where the species has been collected (PILSBRY, The Nautilus, Vol. 22, 1908, p. 46). The Talaud Archipelago forms a new record.

Cyclotus pruinosus MARTENS

1863 MARTENS, Malak. Blätt, Vol. 10, p. 83
1867 MARTENS, Ostas. Landschn. p. 117, pl. 1, fig. 2
1902 KOBELT, Cyclophoridae, in: Tierreich, Part 16, p. 201

Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.
In 20 m high landslide along the Koeala Tatamboeë, ± 50 m above sea, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.

The species was known from Halmahera, Ternate, Tidore and Moti (MARTENS, ll.cc.). The Talaud-group is a new record.

Callianella wallacei (PFEIFFER)

1862 PFEIFFER, Proc. Zool. Soc. London, p. 117, pl. 12, fig. 1 (*Callia*)
1902 KOBELT, Cyclophoridae, in: Tierreich, Part 16, p. 335

The species has been recorded from the Talaud Islands by FULTON (Proc. Malac. Soc. London, Vol. 3, 1899, p. 214), brought home by DOHERTY. It was not represented in Dr. LAM's collection.

Arinia (Leucarinia) talautana (FULTON)

1899 FULTON, Proc. Malac. Soc. London. Vol. 3, p. 217, pl. 11, fig. 13 [*Diplommatina (Arinia)*]
1902 KOBELT, Cyclophoridae, in: Tierreich, Part 16, p. 393

In 20 m high landslide along the Koeala Tatamboeë, ± 50 m above sea, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 1 sp.

Doherty was the first to discover this species in the Talaud-group (Fulton, l.c.).

Omphalotropis radiatus (Pfeiffer)

1854 Pfeiffer, Proc. Zool. Soc. London, p. 308 (*Hydrocena*)
1867 Martens, Ostas. Landschn. p. 162

Merampi, Nenoesa Ids., Talaud Arch., leg. G. F. Schröder ..... 5 sp.
Merampi, Nenoesa Ids., Talaud Arch., 1926, leg. H. J. Lam ..... 3 sp.

The specimens collected by Mr. G. F. Schröder, missionary in Nenoesa, form part of the Schepman Collection, now in the Amsterdam Zoological Museum, and have not been recorded before.

Beyond the Talaud Archipelago *Omphalotropis radiatus* is known from Borneo.

Thiara (Tiaropsis) setosa (Swainson)

1824 Swainson, Qua. Journ. Sci. No. 33, p. 13 (*Melania*)
1874 Brot, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. 1, Part 24, p. 297, pl. 30, fig. 5, 6, pl. 31, fig. 1, 1a (*Melania*)

Thiara setosa is a common species in the Indo-Australian region. It was found in a brook near Beo, Karakelong, by the Siboga Expedition (Schepman, Monogr. 49-1-b, 1909 p. 192). Not in Dr. Lam's collection.

Thiara (Melanoides) salibabuensis (Schepman)

1909 Schepman, Siboga Exped. Monogr. 49-1-b, p. 191, p. 12, fig. 8 (*Melania*)

The Siboga Expedition collected 24 specimens in Lake Telaga Bindoe, near Liroeng, Salebaboe Id. Not in Dr. Lam's collection.

Thiara (Stenomelania) arctecava (Mousson)

1857 Mousson, Journ. de Conch. Vol. 6, p. 161 (*Melania*)
1874 Brot, in: Mart.-Chemn. N. Syst. Conch. Vol. 1, Part 24, p. 165, pl. 20, fig. 1 (*Melania*)

Specimens were collected by the Siboga Expedition (Schepman, Monogr. 49-1-b, 1909, p. 189 - 190) in a brook near Beo, Karakelong Island. It is sometimes regarded as a synonym of *Th. punctata* (Riech, Arch. Naturgesch. (N.S.) Vol. 6, 1937, p. 60), and, if so, falls within the distribution area of that species (q.v.). Not in Dr. Lam's collection.

Thiara (Stenomelania) funiculus (Quoy & Gaimard)

1834 Quoy & Gaimard, Voy. Astrolabe, Zool. Vol. 3, p. 158, pl. 56, fig. 43, 44 (*Melania*)
1874 Brot, in: Mart.-Chemn. N. Syst. Conch. Cab. Vol. 1, Part 24, p. 136, pl. 17, fig. 1 (*Melania*)

Thiara funiculus is a common inhabitant of several islands in the Malay Archipelago. The Siboga Expedition (Schepman, Monogr. 49-1-b, 1909, p. 189)

collected a couple of shells in a brook near Beo, Karakelong Id. Not in Dr. LAM's collection.

Thiara (Stenomelania) punctata (LAMARCK)

1822 LAMARCK, Hist. Anim. s. Vert. Vol. 6, p. 165 (*Melania*)
1874 BROT, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 1, Part 24, p. 168, pl. 20, fig. 4 (*Melania*)

Distributed in a great many islands of the Malay Archipelago and beyond it. From the Talaud Islands it has been recorded by A. B. M(EYER) in an appendix to MÖLLENDORFF's paper (Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden, 1896, No. 4, p. 3) from Karkellang (sic!) and by SCHEPMAN (Siboga Expedition, Monogr. 49-1-b, 1909, p. 190) from a brook near Beo, Karakelong Id. and from a brook near Liroeng, Salebaboe Island. Not in Dr. LAM's collection.

Thiara (Stenomelania) turris (BROT)

1874 BROT, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 1, Part 24, p. 146, pl. 18, fig. 5 (*Melania*)

The Siboga Expedition collected a single shell in a brook near Beo, Karakelong Id. (SCHEPMAN, Monogr. 49-1-b, 1909, p. 189). The species is recorded from Malaya, Sumatra, Borneo, Bali, Flores. Not in Dr. LAM's collection.

Pythia pantherina (A. ADAMS)

1850 A. ADAMS, Proc. Zool. Soc. London, p. 152 (*Scarabus*)
1897 MARTENS, in: WEBER, Erg. Reise Nied. Ost-Indien, Vol. 4, p. 136 - 138

Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.
From cut forest E. of Beo, Karakelang Id., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. LAM ..... 4 sp.

As an appendix to MÖLLENDORFF's paper (loc. cit. p. 3), A. B. M(EYER) produced a list of a few other species of mollusca from Karkellang (sic!) Talaud Arch., identified by O. BOETTGER. Among these *Pythia pantherina* is recorded s. n. *Scarabus pantherinus* A. ADS. The species is very common in the entire Malay Archipelago.

Pythia semisulcata (A. ADAMS)

1850 A. ADAMS, Proc. Zool. Soc. London, p. 151 (*Scarabus*)

Mount Doeata, Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.

Compared with specimens from Aboro, Haroekoe (SCHEPMAN, Notes Leyden Mus. Vol. 15, 1893, p. 153) and from Banda Neira, now in the SCHEPMAN Collection in the Amsterdam Zoological Museum. The Talaud Archipelago forms a new record in the distribution of the species.

Pythia undata (Lesson)

1830 Lesson, Voy. Coq. Vol. 2, p. 336, pl. 10, fig. 6 (*Scarabus*)
1897 Martens, in: Weber, Erg. Reise Nied. Ost-Indien, Vol. 4, p. 139 - 140

The species is very common in the entire Indo-Australian Archipelago. It was recorded by Schepman (Siboga Expedition, Monogr. 49-1-f, 1913, p. 458) from Beo, Karakelong Id. It was not in Dr. Lam's collection.

Phaedusa (Euphaedusa) cumingiana (Pfeiffer)

1845 Pfeiffer, Zeitschr. f. Malak. Vol. 2, p. 158 (*Clausilia*)

Phaedusa cumingiana and allied forms have a wide distribution in the Philippines (whence it was described for the first time), the Moluccas, Celebes with a few satellite islands, Halmahera and some of the Lesser Sunda Islands. This gave rise to the establishing of various "species", "varieties" and "forms" which are the expression of either an actual tendency to local modification, or of insufficient acquaintance of authors with work already done.

At present the following varieties are known:

moluccensis Martens (Monatsber. Akad. Wiss. Berlin, 1864, p. 270.-Halmahera)
moluccensis majuscula Tapparone Canefri (Ann. Mus. Civ. St. Nat. Genova, Vol. 20, 1883, p. 31.-Celebes)
recondita Sykes (Journ. of Malac. Vol. 3, 1894, p. 48 - 49.-Soembawa)
celebensis Boettger (in: Kobelt, Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden, 1896, No. 5, p. 3.-Celebes)
balantensis Sykes (Journ. of Malac. Vol. 6, 1897, p. 24.-Celebes)
simillima Smith (Proc. Malac. Soc. London, Vol. 2, 1896, p. 99, pl. 7, fig. 25.-Celebes)
simillima laevior Smith (Ann. Mag. Nat. Hist. (6) Vol. 18, 1896, p. 149.-Saleyer)
simillima kabaënae Haas (Ann. Mag. Nat. Hist. (8) Vol. 10, 1912, p. 415.-Kabaëna)

Arranged according to their occurrence in the various islands we arrive at the following survey:

H a l m a h e r a. — Martens 1864 (Monatsber. Akad. Wiss. Berlin, p. 270) *Clausilia Moluccensis*
Martens 1867 (Ostas. Landschn. p. 382) *Clausilia Moluccensis*
Boettger 1891 (Ber. Senckenb. naturf. Ges. p. 271) *Clausilia* (*Euphaedusa*) *cumingiana* var. *moluccana*
Smith 1896 (Proc. Malac. Soc. London, Vol. 2, p. 121) *Clausilia Cumingiana* var. *Moluccensis*
Kobelt 1897 (Abh. Senckenb. naturf. Ges. Vol. 24, p. 80) *Clausilia* (*Phaedusa*) *moluccensis*
Cooke 1915 (Proc. Malac. Soc. London, Vol. 11, p. 265) *Euphaedusa cuminginana* and *E. cumingiana* var. *moluccensis; Pseudonenia recondita*
Rensch 1932 (Zool. Jahrb. (Syst.) Vol. 63, p. 118) *Phaedusa cumingiana moluccensis* (= *simillima*)

Ternate. — MARTENS 1867 (Ostas. Landschn. p. 382) *Clausilia moluccensis*
BOETTGER 1891 (Ber. Senckenb. naturf. Ges. p. 271) *Clausilia* (*Euphaedusa*) *cumingiana* var. *moluccana*
SMITH 1896 (Proc. Malac. Soc. London, Vol. 2, p. 121) *Clausilia Cumingiana* var. *Moluccensis*
COOKE 1915 (Proc. Malac. Soc. London, Vol. 11, p. 265) *Euphaedusa cumingiana* and *E. cumingiana* var. *moluccensis*
RENSCH 1932 (Zool. Jahrb. (Syst.) Vol. 63, p. 118) *Phaedusa cumingiana moluccensis* (= *simillima*)

Sangihe Ids. — SYKES 1894 (Journ. of Malac. Vol. 3, p. 48) *Clausilia moluccensis* (probably) var. *majuscula*

Talaud Ids. — FULTON 1899 (Proc. Malac. Soc. London, Vol. 3, p. 214) *Clausilia Moluccensis?*

Celebes. — MARTENS 1867 (Ostas. Landschn. p. 382) *Clausilia Moluccensis*
TAPPARONE CANEFRI 1883 (Ann. Mus. Civ. St. Nat. Genova, Vol. 20, p. 31) *Clausilia* (*Euphaedusa*) *Moluccensis* var. *majuscula*
BOETTGER 1891 (Ber. Senckenb. naturf. Ges. p. 271) *Clausilia* (*Euphaedusa*) *cumingiana* var. *moluccana*
MARTENS 1892 (in: WEBER, Erg. Reise Nied. Ost-Indien, Vol. 2, p. 245) *Clausilia moluccensis*
SYKES 1894 (Journ. of Malac. Vol. 3, p. 48) *Clausilia moluccensis* (probably) var. *majuscula*
SMITH 1896 (Proc. Malac. Soc. London, Vol. 2, p. 99, pl. 7, fig. 25) *Clausilia simillima*
MÖLLENDORFF 1896 (Nachr. Blatt, Vol. 28, p. 148) *Clausilia* (*Euphaedusa*) *simillima*
BOETTGER 1896 (in: KOBELT, Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden No. 5, p. 3) *Clausilia celebensis*
SYKES 1897 (Journ. of Malac. Vol. 6, p. 24) *Clausilia cumingiana* var. *moluccensis, Cl. balantensis* (= *celebensis* BTTGR., non SMITH)
BOETTGER 1899 (Nachr. Blatt, Vol. 31, p. 58 - 59) *Clausilia cumingiana* with local races *moluccensis* and *simillima*
SARASIN 1899 (Landmoll. Celebes, p. 217) *Clausilia moluccensis* with vars. *majuscula* and *simillima*
SYKES 1899 (Nautilus, Vol. 13, p. 87) *Clausilia cumingiana* and vars. *moluccensis* (= *celebensis* SMITH = *balantensis* SYKES) and *simillima*
COOKE 1915 (Proc. Malac. Soc. London, Vol. 11, p. 265) *Euphaedusa cumingiana, E. cumingiana* var. *moluccensis, E. cumingiana* var. *majuscula, E. cumingiana* var. *simillima, E. cumingiana* var. *kabaënae* [1]), *E. balantensis*

[1]) This record probably denotes the occurrence in the satellite island Kabaëna. No records from Celebes proper are known.

Bollinger 1918 (Rev. Suisse Zool. Vol. 26, p. 335) *Clausilia* (*Euphaedusa*) *cumingiana* var. *moluccana* fa. *simillima*

Saleyer. — Smith 1896 (Ann. Mag. Nat. Hist. (6) Vol. 18, p. 149) *Clausilia simillima* var. *laevior*

Rensch 1932 (Zool. Jahrb. (Syst.) Vol. 63, p. 118) *Phaedusa cumingiana laevior*

Kabaëna. — Haas 1912 (Ann. Mag. Nat. Hist. (8) Vol. 10, p. 415) *Clausilia* (*Pseudonenia*) *simillima kabaënae*

Rensch 1932 (Zool. Jahrb. (Syst.) Vol. 63, p. 118) *Phaedusa cumingiana kabaënae*

Timor. — Rensch 1935 (Sitz. Ber. Ges. naturf. Freunde Berlin, p. 320) *Phaedusa cumingiana* aff. *recondita*

Soembawa. — Sykes 1894 (Journ. of Malac. Vol. 3, p. 48-49) *Clausilia* (*Pseudonenia*) *recondita*

Cooke 1915 (Proc. Malac. Soc. London, Vol. 11, p. 265) *Pseudonenia recondita*

Rensch 1932 (Zool. Jahrb. (Syst.) Vol. 63, p. 116-118, fig. 48, 49) *Phaedusa cumingiana recondita*

Flores. — Rensch 1932 (Zool. Jahrb. (Syst.) Vol. 63, p. 116-118, fig. 48, 49) *Phaedusa cumingiana recondita*

On comparing the diagnoses of varieties and forms enumerated in the beginning of this paragraph, it is remarkable to observe how rashly a slight modification was promoted to specific or varietal rank. Thus Tapparone Canefri (l.c.) introduced a variety *majuscula* of *Clausilia moluccensis* on account of the size being larger than of *moluccensis*. The exact dimensions, however, are not mentioned, and we can only conclude that they must be more than 17 mm high, this being the height of *C. moluccensis* as given by Martens. The variety *laevior* Smith of *C. simillima* was also based on insufficient characters and, as in the preceding case, exact dimensions were omitted.

Clausilia celebensis Bttgr. (= *balantensis* Sykes) was founded on a single shell. In most of the other descriptions the number of specimens investigated is not mentioned, so we cannot ascertain whether the measurements were taken from the longest shell in the sample, or whether they stand for the average of several dimensions.

Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 39 sp.

Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 1 sp.

Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 1 sp.

Among the collections made by Dr. Lam there is a population of 39 adult specimens (and a few immature ones), the dimensions of which are:

high	broad	high	broad	high	broad	high	broad
20.7	3.5	19.—	3.7	18.7	3.6	18.—	3.6
20.5	3.8	19.—	3.6	18.6	3.5	18.—	3.5
20.5	3.7	19.—	3.6	18.5	3.6	18.—	3.5
20.2	3.5	19.—	3.5	18.5	3.6	17.8	3.7
19.8	3.6	19.—	3.5	18.5	3.5	17.8	3.6
19.6	3.8	18.9	3.6	18.5	3.5	17.8	3.4
19.2	3.7	18.8	3.7	18.5	3.5	17.3	3.5
19.1	3.7	18.8	3.6	18.3	3.5	17.3	3.3
19.1	3.5	18.7	3.7	18.2	3.7	17.—	3.3
19.—	3.7	18.7	3.6	18.1	3.6		

The two specimens from the other localities measure: 20.6 × 3.7 mm (Lobo) and 17.2 × 3.5 mm (Koeala Bahewa &c) respectively.

This table gives an idea of the variability of the species, ranging between 17 and 20.7 mm in altitude and 3.3 and 3.8 mm in breadth. Furthermore I have dilute-brown and rich-brown shells before me, shells with strongly puckered suture and others with only few and obsolete dentations along this line, coarsely and finely striated ones. As to the last characteristic, the condition of the striation depends largely on whether the ribs are all of equal strength, or whether there occur strong ones alternating with faint ones. If the latter become almost obsolete the coarse ones predominate in such a manner that one might notice these only. The ribs are often anastomosed, causing unexpected alterations in the number of ribs on certain parts of the spire.

The species has been recorded from Talaud before by FULTON (Proc. Malac. Soc. London, Vol. 3, 1899, p. 214, s.n. *Clausilia Moluccensis* MARTS?) out of the DOHERTY collection.

Considering all these trivial modifications I can only agree with SARASIN, BOETTGER and BOLLINGER who regarded *C. simillima* as an unimportant "Spiel-art" of *Clausilia* (*Euphaedusa*) *cumingiana* var. *moluccensis*. I would even go a step further and include *moluccensis, majuscula, simillima, laevior, kabaënae, balantensis* and *recondita* all in the "Rassenkreis" of *cumingiana* PFEIFFER.

For a shell like *Clausilia celebensis* BOETTGER (= *C. balantensis* SYKES) of the unusual altitude of 27.5 mm the name *majuscula* TAPP. CAN. could be reserved.

Opeas javanicum (REEVE)

1849 REEVE, Conch. Icon. Vol. 5, pl. 17, fig. 79 (*Achatina*)
1867 MARTENS, Ostas. Landschn. p. 30, 377, pl. 22, fig. 11 (*Stenogyra*)
1906 PILSBRY, Man. of Conch. (2) Vol. 18, p. 138 - 139, pl. 12, fig. 14, 16; pl. 16, fig. 81, 88; pl. 22, fig. 9; pl. 23, fig. 18

In 20 m high landslide along the Koeala Tatamboeë, ± 50 m above sea, Karákelong Id., Talaud Arch., 1926, leg. H. J. LAM 3 sp. (2 adults, high resp. 11.2 and 11 mm, and 1 juv.)

Opeas javanicum is a cosmopolitan, tropical, Old World colonizing species. In the Dutch East Indies specimens are recorded from Sumatra, Java, Bali, Lombok, Soemba, Flores, Adonare, Amboina and Ternate, and the species will certainly prove to be an inhabitant of several other islands. The record from Karakelong Id. forms another link in this chain.

Trochomorpha lardea Martens

1864 Martens Monatsber. Akad. Wiss. Berlin, p. 267
1867 Martens, Ostas. Landschn. p. 251, pl. 13, fig. 5

Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 1 sp.
Mount Doeata, Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 1 sp.

Both specimens are immature. The species has been recorded from Java, Ceram, Boeroe, Amboina, Halmahera. The Talaud Islands form a new record.

Obba marginata meyeri (Möllendorff)

1896 Möllendorff, Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden, 1896 - 1897, No. 4, p. 1 (*Obbina meyeri*)

Merampi, Nenoesa Ids., Talaud Arch. ..... 1 sp.
Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 7 sp.
Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 9 sp.
Mount Doeata, Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. Lam ..... 14 sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. Lam ..... 5 sp.

The distribution of *Obba marginata* s.l. covers a great part of the South Philippine Islands, the Moluccas and Celebes, giving rise to various local modifications and subspecies.

The Philippine forms have been revised by Bartsch (Journ. Wash. Acad. Sci. Vol. 8, 1918, p. 60). For the Moluccan and Celebes species B. Rensch (Mitt. Zool. Mus. Berlin, Vol. 19, 1933, p. 105 - 106) ventured a critical revision, which seems acceptable, but for one point: the fusion of *O. meyeri* and *kobeltiana*. This cannot be maintained: *kobeltiana* is a darker, nearly unicolorous brown form with very flat whorls, acutely compressedly carinate, and with relatively wide umbilical opening, while *meyeri* is higher, clearly showing the brown bands, in spite of the fact that the ground colour between the bands is somewhat darker than in *marginata marginata;* moreover the whorls are more rounded and the umbilicus is narrower.

With the aid of some samples from the Berlin Zoological Museum (the same which have served Rensch for his paper), the Rijksmuseum van Natuurlijke Historie at Leiden and our own collection I have drawn up the following list of subspecies and their distribution in the Dutch colonies:

marginata. — Tagoelandang, [Soeloe Ids.]
marginata marginata. — [Philippines], Nenoesa Ids., Soela Ids.

marginata devincta. — Celebes, Sangihe Ids., Nenoesa Ids.
marginata kobeltiana. — Ceram
marginata meyeri. — Talaud Ids., Nenoesa Ids., Sangihe Ids., Ceram
(The islands in square brackets are lying beyond the Dutch possessions.)

Planispira zonalis (FÉRUSSAC)

1821 FÉRUSSAC, Tabl. Syst. Anim. Moll. Limaçons, p. 43, No. 175 (*Helix*)
1850 FÉRUSSAC, Hist. Nat. génér. et partic. Moll. Vol. 1, p. 50 - 51, pl. 70, fig. 3 (*Helix*)
1867 MARTENS, Ostas. Landschn. p. 299 - 300 (*Helix*)

Merampi, Nenoesa Ids., Talaud Arch., 1926, leg. H. J. LAM 2 sp. semiadult

Other specimens were taken by Dr. LAM in Morotai Id. (see that paragraph). The species occurs in Halmahera, Ternate, Batjan and New Guinea. The Talaud Archipelago is a new record.

Helicostyla (Corasia) najas (PFEIFFER)

1846 PFEIFFER, Symb. Vol. 3, p. 71 (*Helix*)
1867 MARTENS, Ostas. Landschn. p. 330 - 331, pl. 18, fig. 4 (*Helix*)
1871 PFEIFFER, Malak. Blätt. Vol. 18, p. 123 (*Helix physalis*)

Merampi, Nenoesa Ids., Talaud Arch., leg. G. F. SCHRÖDER ..... 1 sp.
Merampi, Nenoesa Ids., Talaud Arch., 1926, leg. H. J. LAM ..... several sp., mostly juv.
Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 17 sp.
Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 25 sp.
Mount Doeata, Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... several sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. LAM ..... 62 sp.

I do not see sufficient reason to separate *Helicostyla najas* and *H. physalis* (PFR.). Especially among the specimens of Dr. LAM's second and fifth sets a considerable variation exists, which enables one to arrange an uninterrupted series from the *najas*-form to the *physalis*-form. MÖLLENDORFF (Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden, 1896, No. 4, p. 2) recorded it as *Cochlostyla* (*Corasia*) *physalis* from Talaud. It was equally collected by the Siboga Expedition at Liroeng, Salebaboe Id. (SCHEPMAN, Siboga Exp. Monogr. 49-1-f, 1913, p. 457).

On the shells before me I could not detect a minute puncticulation. Their surface was invariably ornamented with very fine wavy spiral lines, crossing the coarser growth lines.

Helicostyla (Corasia) puella (BRODERIP)

1841 BRODERIP, Proc. Zool. Soc. London, p. 45 (*Carocolla*)
1891 PILSBRY, Man. of Conch. (2) Vol. 7, p. 120, pl. 24, fig. 22, 23, 25, pl. 25, fig. 39 [*Cochlostyla* (*Corasia*)].

Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 3 sp.

Dr. LAM collected a fairly large series of *Helicostyla puella* var. *subpuella*

in Karakelong and Salebaboe Ids. (see next paragraph). Among these there are 1 adult and 2 immature shells of a form which is a little different from the bulk of the material (3 stations combined). They are not so fragile, more sharply carinated, not globose, depressed, plain and resemble exactly fig. 39 on pl. 25 in PILSBRY's Manual, a form said to occur in Mindanao, and other islands of the Philippines.

I take them to belong to the main form, *Helicostyla puella*. Our adult shell is not especially large, measuring max. diam. 33.7, min. diam. 26.5, height 20 mm. The main form as such is a new record for the Talaud Archipelago; the var. *subpuella* has been known for a considerable time.

Helicostyla (Corasia) puella (BROD.) var. **subpuella** PILSBRY

1891 PILSBRY, Man. of Conch. (2) Vol. 7. p. 121, pl. 24, fig. 26, 19, 20, 21, 24
1870 - 76 PFEIFFER, Novit. Conch. Vol. 4, p. 114, pl. 126, fig. 6, 7 (*lais* var.)
1899 FULTON, Proc. Malac. Soc. London, Vol. 3, p. 214 [*Corasia* (*Crystallopsis*) *lais*]

Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 33 sp.
Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 10 sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. LAM ..... 64 sp.

The species was recorded by FULTON (l.c.) from DOHERTY's collections, from Talaud, s.n. *Cochlostyla* (*Corasia*) *lais*, and by SCHEPMAN on the strength of material from the Siboga Expedition from Liroeng, Salebaboe Id. (Monogr. 49-1-f, 1913, p. 457). Besides it is known from the Philippines and from the Toekang Besi Islands.

Helicostyla (Calocochleas) talautana GUDE

1903 GUDE, Journ. of Malac. Vol. 10, p. 49, pl. 3, fig. 3

Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.
Mount Doeata, Koeala Bahewa and K. Tatamboeë, above Lobo, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 75 sp.

The specimens agree in all respects with GUDE's diagnosis, only they donot attain the size as presented by him: max. diam. 37, min. diam. 30, alt. 31 - 34 mm. Here follows a list of the measurements of a score of shells:

max. diam.	min. diam.	height	max. diam.	min. diam.	height
32.5	26.—	22.—	31.—	25.—	22.—
32.3	25.8	23.—	30.7	23.5	20.—
32.—	25.—	21.6	30.3	24.3	23.—
32.—	25.—	21.—	30.—	24.5	23.3
31.8	25.—	22.5	30.—	24.—	21.4
31.7	25.—	21.5	30.—	23.5	22.—
31.5	25.—	24.—	30.—	23.5	21.5
31.4	25.5	22.5	28.7	24.—	21.5
31.4	24.8	21.5	28.5	22.5	20.—
31.3	26.—	23.—	28.3	23.—	20.—

GUDE did not mention a dark zone of about 2 - 3 mm breadth (not exactly demarcated) in the umbilical area. It is possible that his shells did not possess it. It is absent in some of Dr. LAM's specimens, although the majority shows it.

Helicostyla tukanensis (PFEIFFER)

1871 PFEIFFER, Malak. Blätt. Vol. 18, p. 122 (*Helix*)

1891 PILSBRY, Man. of Conch. (2) Vol. 7, p. 132, pl. 29, fig. 7, 8, 9, 12 (*Cochlostyla*)

Merampi, Nenoesa Ids., Talaud Arch., 1926, leg. H. J. LAM ..... 1 sp.
Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 18 sp.
Poeloetan and Piapi, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 7 sp.
Liroeng, Salebaboe Id., Talaud Arch., 1926, leg. H. J. LAM ..... 2 sp.

The species is a common inhabitant of the Talaud Archipelago and has been repeatedly recorded thence (FULTON, Proc. Malac. Soc. London, Vol. 3, 1899, p. 214; MÖLLENDORFF, Abh. & Ber. Kgl. Zool. Anthropol.Ethnogr. Mus. Dresden, 1896, No. 4, p. 2). Whether it really occurs in the Toekang Besi Islands whence it was originally described, needs confirmation, as already suggested by MÖLLENDORFF (l.c.).

Gulella (Diaphora) quadrasi (MÖLLENDORFF) (Fig. 3)

1887 MÖLLENDORFF, Jahrb. D. Malak. Ges. Vol. 14, p. 259 - 260, pl. 8, fig. 1, 1-b [*Ennea* (*Diaphora*)]

1890 MÖLLENDORFF, Ber. Senckenb. naturf. Ges. p. 193 [*Ennea* (*Diaphora*)]

In 20 m high landslide along the Koeala Tatamboeë, ± 50 m above sea, Karakelong Id., Talaud Arch., 1926, leg. H. J. LAM ..... 2 sp. (high resp. 4.8 and 4.5 mm, broad resp. 1.3 and 1.3 mm).

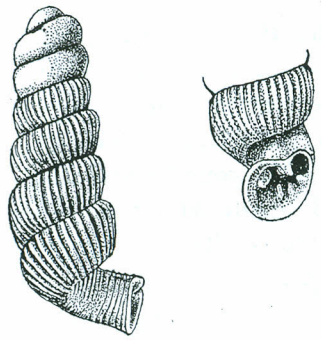


Fig. 3.
Gulella quadrasi (Mlldff.)
Shell, 10 times enlarged.

The record of a *Diaphora* in this part of the Malay Archipelago means a very welcome addition to our knowledge. The species was originally described from Mount Licos, Id. of Cebu, P.I., and recorded three years later from the same island and from Siquijor and Leyte. Dr. LAM's shells extend the area of distribution far beyond the original habitat.

With the exception of *Gulella* (*Indoennea*) *bicolor* (HUTTON) which is very common in several islands of the Malay Archipelago, species of *Gulella*, so abundant in the Philippines, are rare in the Malay region. The Malay Peninsula has yielded a few: *perakensis* GODW. AUSTEN & NEVILL (Proc. Zool. Soc. London, 1879, p. 735 - 736, pl. 59, fig. 2), *hungerfordiana* MÖLLENDORFF (Proc. As. Soc. Bengal, Vol. 55, 1886, p. 301), *subcylindrica* MÖLLENDORFF (Proc. Zool. Soc. London, 1891, p. 331, pl. 30, fig. 3, compare also PEILE, Proc. Malac. Soc. London, Vol. 18, 1929, p. 270), *ridleyi* PEILE (Proc. Malac. Soc. London, Vol. 17, 1926, p. 116), *butleri* PEILE (Proc. Malac. Soc. London, Vol.

18, 1929, p. 153), *siputana* Tomlin (Journ. of Conch. Vol. 21, 1938, p. 75, pl. 11, fig. 6) and from Borneo *G. porrecta* Martens (Sitz. Ber. Ges. naturf. Freunde Berlin, 1884, p. 198). *Pupa moreleti* A. D. Brown (Journ. de Conch. Vol. 18, 1870, p. 392) which was regarded by Martens (Mitt. Zool. Mus. Berlin, Vol. 4, 1908, p. 263) as a *Gulella* proved to be a *Nesopupa* (Pilsbry, Proc. Ac. Nat. Sci. Philad. 1900 (1901), p. 433; Steenberg, Vidensk. Medd. Dansk naturhist. For. Vol. 80, 1925, p. 90-91).

Polymesoda (Geloina) expansa (Mousson)

1849 Mousson, Land & Süssw. Moll. Java, p. 89, pl. 14 (*Cyrena*)
1932 Prashad, Siboga Exped. Monogr. 53-c, p. 176 (*Geloina*)

The Siboga Expedition collected 2 shells in the anchorage off Beo, Karakelong Id., Talaud Archipelago. Not in Dr. Lam's collection.

Batissa violacea (Lamarck)

1806 Lamarck, Ann. Mus. Hist. Nat. Paris, Vol. 7, p. 421 (*Cyclas*)
1932 Prashad, Siboga Exped. Monogr. 53-c, p. 176

Like the preceding species *Batissa violacea* was not represented in Dr. Lam's collection. The Siboga Expedition brought home some shells from the anchorage off Beo, Karakelong Id., Talaud Archipelago.

Batissa sp. peraff. **compressa** Prime (an var.?)
Batissa sp. peraff. **childreni** Gray (an var.?)

1896 Möllendorff, Abh. & Ber. Kgl. Zool. Anthropol.-Ethnogr. Mus. Dresden, 1896-1897, No. 4, p. 2.

The identifications are doubtful.

Here follows a complete list of the Mollusca of the Talaud Archipelago, together with their distribution and a short discussion of their faunistic affinities:

Theodoxus bicolor (Récluz)	Talaud and Philippines
Neritodryas cornea (Linné)	Talaud and several other islands in the Malay Archipelago
Neritodryas dubia (Gmelin)	Talaud and several other islands in the Malay Archipelago
Neritodryas subsulcata (Sowerby)	Talaud and several other islands in the Malay Archipelago
Neritina communis (Quoy & Gaimard)	Talaud and several other islands in the Malay Archipelago
Neritina conglobata Martens	Talaud and Celebes
Neritina pulligera (Linné)	Talaud and several other islands in the Malay Archipelago
Neritina turrita var. *cumingiana* (Récluz)	Talaud and several other islands in the Malay Archipelago
Neritina variegata Lesson	Talaud and several other islands in the Malay Archipelago

* *Sulfurina cerinella* v. B. JUTTING	Talaud
* *Leptopoma concinnum* (SOWERBY)	Talaud and Philippines
Leptopoma vitreum (LESSON)	Talaud and several other islands in the Malay Archipelago
* *Platyraphe parvula* (MARTENS)	Talaud, Ternate, Tidore
* *Cyclotus politus politus* (SOWERBY)	Talaud, Celebes, Borneo, Lesser Sunda Islands, Moluccas
* *Cyclotus pruinosus* MARTENS	Talaud, Halmahera, Ternate, Tidore, Moti
Callianella wallacei (PFEIFFER)	Talaud, Ceram, Amboina
Arinia talautana (FULTON)	Talaud
* *Omphalotropis radiatus* (PFEIFFER)	Talaud, Borneo
Thiara setosa (SWAINSON)	Talaud and several other islands in the Malay Archipelago
Thiara salibabuensis (SCHEPMAN)	Talaud
Thiara arctecava (MOUSSON)	Talaud and several other islands in the Malay Archipelago
Thiara funiculus (QUOY & GAIMARD)	Talaud and several other islands in the Malay Archipelago
Thiara punctata (LAMARCK)	Talaud and several other islands in the Malay Archipelago
Thiara turris (BROT)	Talaud and several other islands in the Malay Archipelago
Pythia pantherina (A. ADAMS)	Talaud and several other islands in the Malay Archipelago
* *Pythia semisulcata* (A. ADAMS)	Talaud and several Moluccan islands
Pythia undata (LESSON)	Talaud and several other islands in the Malay Archipelago
Phaedusa cumingiana (PFEIFFER)	Talaud, Philippines, Sangihe Ids., Celebes, Ternate, Halmahera, Lesser Sunda Islands
* *Opeas javanicum* (REEVE)	Talaud and several other islands in the Malay Archipelago
* *Trochomorpha lardea* MARTENS	Talaud, Halmahera, Ceram, Boeroe, Amboina,Java
Obba marginata meyeri (MÖLLENDORFF)	Talaud, Sangihe Ids., Ceram
* *Planispira zonalis* (FÉRUSSAC)	Talaud, Morotai, Halmahera, Ternate, Batjan, New Guinea
Helicostyla najas (PFEIFFER)	Talaud and several Moluccan islands
* *Helicostyla puella* (BRODERIP)	Talaud, Philippines
Helicostyla puella var. *subpuella* PILSBRY	Talaud, Philippines, Toekang Besi Ids
Helicostyla talautana GUDE	Talaud

Helicostyla tukanensis (Pfeiffer)	Talaud, Toekang Besi Islands
* *Gulella quadrasi* (Möllendorff)	Talaud, Philippines
Polymesoda expansa (Mousson)	Talaud and several other islands in the Malay Archipelago
Batissa violacea (Lamarck)	Talaud and several other islands in the Malay Archipelago
Batissa sp. peraff. *compressa* Prime	?
Batissa sp. peraff. *childreni* Gray	?

In the foregoing survey we have to do with a total of 40 species (including varieties), not counting the two unidentified *Batissa* at the end of the list. Seventeen of these are freshwater species and 23 landsnails.

Of this sum Dr. Lam collected 22 species, mostly land shells (20 species). Among these 22 species there are 12 (including 1 new species) which are recorded here for the first time from the Talaud Archipelago [1]).

It is not hazardous to predict that the total number of species could easily be doubled if collectors would only pay more attention to small forms like *Lagochilus, Diplommatina, Pupina, Kaliella, Durgellina, Lamprocystis, Microcystina* etc.

The following zoogeographical conclusions are, therefore, provisional, and will certainly have to be revised when future spoils furnish material for a more complete judgment.

From a zoogeographical point of view we can only register 4 species, which, so far, seem to be confined to the Talaud Archipelago (*Sulfurina cerinella, Arinia talautana, Thiara salibabuensis,* and *Helicostyla talautana*) and which are probably endemic. All other species occur in one or more islands in the vicinity, some attaining even a considerable area of distribution. Of these about one half is ubiquitous in the Indo-Australian region, viz. nearly all the freshwater molluscs, *Leptopoma vitreum,* the two *Pythia*'s and *Opeas javanicum,* together 18 species. This number is valueless for our purpose of analysing the origin of the fauna.

Thus, after substracting 4 and 18 species from the total number of 40 there remain 18 others to be considered. The constellation of the Talaud Archipelago involves a dispersal in N-S direction, and not a migration along parallels of latitude.

Four species are obviously derived from the Philippine fauna, reaching their extreme south in the Talaud Archipelago (*Theodoxus bicolor, Leptopoma concinnum, Helicostyla puella* and *Gulella quadrasi*). In a total number of 40 species (or of 18, if we take into account the restricted number) this means only a very low percentage. Two others are recorded from the Philippines, the Talaud Archipelago and the Moluccas: *Phaedusa cumingiana* and *Helicostyla puella* var. *subpuella.*

[1]) These new records for the Talaud Archipelago are marked with a * in the list.

With the exception of one species which is also known from Borneo (*Omphalotropis radiatus*), the majority of the species (13 out of 18) possesses affinities to Celebes and the Moluccas. Only two of these, the above-mentioned *Phaedusa cumingiana* and *Helicostyla puella* var. *subpuella*, have spread northward beyond the Talaud Ids. to the Philippines, all others (11 species) reach their northern limit in the Talaud Archipelago.

This is fundamentally a similar distribution in the N-S direction, like that of *Theodoxus bicolor, Leptopoma concinnum, Helicostyla puella* and *Gulella quadrasi*, this time the now northbound migration having stopped at the Talaud Islands. In this dispersal two courses are discernible: a western one from North Celebes, eventually from Central and South Celebes, Borneo and the Lesser Sunda Islands, and an eastern one, either via Halmahera or across the smaller Moluccan islands, eventually from New Guinea.

It is interesting to observe that there is in fact only one species which exclusively chose the western route: *Neritina conglobata*. Two others, *Cyclotus politus politus* and *Phaedusa cumingiana*, travel both ways without apparent predilection, although local races are known to occur.

Ten others, on the contrary, have positively voted for the eastern way, avoiding Celebes (*Platyraphe parvula, Cyclotus pruinosus, Callianella wallacei, Pythia semisulcata, Trochomorpha lardea, Obba marginata meyeri, Planispira zonalis, Helicostyla najas, Helicostyla puella* var. *subpuella* and *Helicostyla tukanensis*). This state of affairs suggests a more intimate connection between the Talaud Archipelago and the Moluccas than with any faunal region in the neighbourhood.

One minor point still deserves our attention, namely that among the ten species of our last paragraph, only 4 are recorded from Halmahera. The others, on their way from the Moluccas to the Talaud group, preferred to make a détour, leaving Halmahera to the left.

MOROTAI ISLAND

Theodoxus subpunctatus (RÉCLUZ)

1843 RÉCLUZ, Proc. Zool. Soc. London, p. 199 (*Nerita*)

1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 179 - 181, pl. 18, fig. 19, 20, 22 - 24 (*Neritina*)

Goegoeti, Morotai Island, 1926, leg. H. J. LAM ..... 1 sp.

The species is known from several islands in the Malay Archipelago and from the Philippine Islands and Formosa. Morotai is a new record.

Neritina pulligera (LINNÉ)

1767 LINNÉ, Syst. Nat. Ed. XII, p. 1253, no. 726 (*Nerita*)

1879 MARTENS, in: MART.-CHEMN. N. Syst. Conch. Cab. Vol. 2, Part 10, p. 49 - 52, pl. 1, fig. 4, 5

Goegoeti, Morotai Island, 1926, leg. H. J. LAM ..... 24 sp.

The species is known from various islands in the Malay Archipelago, and beyond it from New Caledonia and the Fiji Islands. Morotai is a new record.

Leptopoma crenilabre Strubell

1892 Strubell, Nachr. Blatt, Vol. 24, p. 49 - 50
1897 Kobelt, Abh. Senckenb. naturf. Ges. Vol. 24, p. 23-25, pl. 4, fig. 7, pl. 5, fig. 16 - 20
1902 Kobelt, Cyclophoridae, in: Tierreich, Lief. 16, p. 7

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 5 sp. (3 adult, 2 semiadult)

Morotai is a new record in the distribution of this species which hitherto was only known from Halmahera.

Cyclotus (Pseudocyclophorus) dohrni Kobelt

1902 Kobelt, Cyclophoridae, in: Tierreich, Lief. 16, p. 191
1897 Kobelt, Nachr. Blatt, Vol. 29, p. 27 [*Cyctotus* (*Pseudocyclophorus*) *euryomphalus*]
1897 Kobelt, Abh. Senck. naturf. Ges. Vol. 24, p. 32, pl. 4, fig. 3 (*Cyclotus* (*Pseudocyclophorus euryomphalus*)

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 2 sp.

The species was originally described from Halmahera and is recorded here for the first time from Morotai.

Trochomorpha hartmanni (Pfeiffer)

1845 Pfeiffer, Proc. Zool. Soc. London, p. 125 (*Helix*)
1867 Martens, Ostas. Landschn. p. 248

The species seems to be confined to Morotai. The old record Java (Pfeiffer, Reeve, etc.) is certainly erroneous, as was already pointed out by Martens (l.c.). Not in Dr. Lam's collection.

Eurybasis conicoides (Metcalfe)

1851 Metcalfe, Proc. Zool. Soc. London, p. 71 (*Helix*)
1863 Pfeiffer, Proc. Zool. Soc. London, p. 523 (*Helix Labuanensis*)
1867 Martens, Ostas. Landschn. p. 256 - 257 (*Helix*)

The species was mentioned for Morotai by G. K. Gude (Journ. Malac. Vol. 10, 1903, p. 90) as *Dendrotrochus labuanensis*. If the identification is correct, the locality does not seem very trustworthy, as the snail is indigenous in North and West Borneo. Not in Dr. Lam's collection.

Xesta citrina (Linné) var. **columellaris** (Beck)

1837 Beck, Ind. Moll. p. 3 (*Nanina*)
1867 Martens, Ostas. Landschn. p. 194, pl. 7, fig. 2, 6, 8 (*Nanina*)

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 1 sp., juv.

The species is distributed in several islands of the Moluccas. Morotai is a new record.

Planispira agnina n. sp. (Fig. 4)

Shell very much depressed, almost lens-shaped, carinated. Plain dilute-yellow, with white peristome. There are no colour bands. Hyaline, with high glassy lustre. No special structure. First 1¼ whorl smooth, the following ones with fine lines of growth, alternating at more or less regular intervals with broader ones, so as to represent a sculpture of flat riblets, especially on the last whorl towards the aperture.

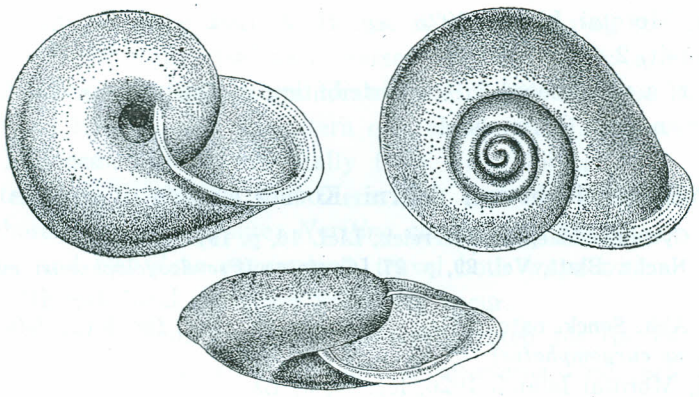


Fig. 4. *Planispira agnina* n. sp. Type. Shell from base, and side, 2 times enlarged.

Spiral sculpture obsolete, irregular, only visible on the last whorl. Over about ¾ of the ultimate whorl, at 1 mm distance below the periphery, there is a shallow groovelike constriction, running to the aperture and parallel to the carina. Although there is not the slightest trace of damage in that part of the shell where the groove originates, yet I have a suspicion that it is an abnormal feature, not of taxonomic value. Unfortunately I have no opportunity for checking this view, as there is only one specimen, the holotype.

Whorls 4¼, regularly increasing. First ones rounded, last one more flattened. Spire plane, not projecting.

The final quarter of the last whorl is descending. The final half is not so regularly curved in spiral direction, but takes an almost abrupt straight course, rendering this part of the shell a trumpet-shaped impression, an aspect which is even enlarged by a certain broadening towards the aperture.

Base rounded, swollen at a little distance from the aperture, then abruptly constricted just before the peristome, so as to produce a sort of rounded transverse keel, which fades away at one end to the peripheral carina and at the other towards the umbilicus.

Carina very conspicuous, but not sharp. Umbilicus open to the top, not very wide.

Aperture very oblique. The peripheral carina and the final widening of the shell render the aperture spout-shaped laterally, as in some other *Planispira* and in numerous *Papuina*.

Peristome white, a little reflexed, especially at the basal and columellar sides. It does not cover the umbilicus. The two ends are converging, joined by a thin, almost imperceptible callus.

Dimensions: max. diam. 21 mm, min. diam. 15.5 mm, height 7.5 mm. The specimen is the holotype, and was caught alive. It is now preserved in the Amsterdam Zoological Museum.

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 1 sp.

The species is related to *Planispira scheepmakeri* (Pfeiffer), but this has the carina — a very sharp one — quite at the base of the shell or nearly so. Besides *Pl. scheepmakeri* is ornamented with 3 - 4 brown spiral bands.

Planispira endoptycha (Martens)

1864 Martens, Monatsber. Akad. Wiss. Berlin, p. 268 (*Helix*)
1867 Martens, Ostas. Landschn. p. 301 - 302, pl. 14, fig. 2 (*Helix*)

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 2 sp.

The species is known from Halmahera and from several smaller islands surrounding it: Ternate, Mareh, Batjan, Obi and Waigeoe. Morotai is a new record.

Planispira exceptiuncula (Férussac)

1821 Férussac, Tabl. Syst. Anim. Moll. Limaçons, p. 43, no. 176 (*Helix*)
1837 Beck, Ind. Moll. p. 29 (*Helix*)
1850 Férussac, Hist. Nat. génér. et partic. Moll. Vol. 1, p. 155, pl. 70, fig. 1, pl. 73-A, fig. 1 (*Helix*)
1867 Martens, Ostas. Landschn. p. 296 - 299, fig. 3, 3-b (*Helix*)

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 5 sp. (4 adult, 1 juv.)

measurements of the adult shells:

max. diam.	29	28	26½	26
min. diam.	21	21	19	20
height	15½	15	14	14

The species is known from Halmahera, Ternate and Batjan. Morotai is a new record.

Planispira loxotropis (Pfeiffer) var. **bernsteinii** (Martens)

1867 Martens, Ostas. Landschn. p. 304 - 305 (*Helix*)

Goegoeti, Morotai Island, 1926, leg. H. J. Lam ..... 2 sp.

measurements: max. diam. resp. 24 and 23 mm, height resp. 14 and 12 mm.

Halmahera and Morotai were the original localities of this variety (Martens, l.c.). The specimens in Dr. Lam's collection prove that it is still thriving in the latter station.

Planispira loxotropis (Pfeiffer) var. **pluricincta** (Martens)

1867 Martens, Ostas. Landschn. p. 304 - 305 (*Helix*)

Together with the preceding variety *Pl. loxotropis* var. *pluricincta* was described by Martens from Halmahera and Morotai. I have not seen any records since that time. It was not in Dr. Lam's collection.

Planispira zonalis (FÉRUSSAC)

1821 FÉRUSSAC, Tabl. Syst. Anim. Moll. Limaçons, p. 43, no. 175 (*Helix*)
1850 FÉRUSSAC, Hist. Nat. génér. et partic. Moll. Vol. 1, p. 50 - 51, pl. 70, fig. 3 (*Helix*)
1867 MARTENS, Ostas. Landschn. p. 299 - 300 (*Helix*)

Goegoeti, Morotai Island, 1926, leg. H. J. LAM ..... 4 sp. (3 adult, 1 semiadult)

measurements of the adult shells:

max. diam.	32	32	31
height	18	17½	17

The specimens are large and pale, the four bands are narrow and more or less dilute-brown. The umbilical opening is of the normal size, but largely covered by the reflexed peristome, more so than in specimens from Tidore and Halmahera in our Museum collection.

In the paragraph on the Talaud Islands in this paper the species is also recorded.

It was already known from Halmahera, Ternate, Batjan and New Guinea. Morotai and the Talaud Archipelago are new records in its distribution.

Albersia pubicepa (MARTENS)

1863 MARTENS, Malak. Blätt. Vol. 10, p. 73 and 77 (*Helicostyla* sp.) and p. 117 (*Helix*)
1864 MARTENS, Monatsber. Akad. Wiss. Berlin, p. 269 (*Cochlostyla*)
1867 MARTENS, Ostas. Landschn. p. 329 - 330, pl. 18, fig. 2 (*Helix*)

Goegoeti, Morotai Island, 1926, leg. H. J. LAM ..... 8 sp.

The species has been mentioned on various occasions from the islands of Halmahera, Batjan and Obi. Morotai is a new record.

Here follows a list of all the species of mollusca of Morotai Island, together with their distribution and a short discussion of their faunistic affinities:

* *Theodoxus subpunctatus* (RÉCLUZ)	Morotai and several other islands in the Malay Archipelago, Philippines, Formosa
* *Neritina pulligera* (LINNÉ)	Morotai and several other islands in the Malay Archipelago, New Caledonia, Fiji Is.
* *Leptopoma crenilabre* STRUBELL	Morotai and Halmahera
* *Cyclotus dohrni* KOBELT	Morotai and Halmahera
Trochomorpha hartmanni (PFEIFFER)	Morotai
Eurybasis conicoides (METCALFE)	Morotai, North and West Borneo
* *Xesta citrina* (L.). var. *columellaris* (BECK)	Morotai and several islands in the Moluccas
* *Planispira agnina* v. B. JUTTING	Morotai
* *Planispira endoptycha* (MARTENS)	Morotai, Halmahera, Ternate, Mareh, Batjan, Obi, Waigeoe
* *Planispira exceptiuncula* (FÉRUSSAC)	Morotai, Halmahera, Ternate, Batjan

Planispira loxotropis (PFR.) var. *bernsteinii* (MARTENS)	Morotai and Halmahera
Planispira loxotropis (PFR.) var. *pluricincta* (MARTENS)	Morotai and Halmahera
* *Planispira zonalis* (FÉRUSSAC)	Morotai, Halmahera, Ternate, Batja Talaud Is., New Guinea
* *Albersia pubicepa* (MARTENS)	Morotai, Halmahera, Batjan, Obi.

Until recently only four species (resp. varieties) of mollusca were kno from Morotai: *Trochomorpha hartmanni, Eurybasis conicoides, Planispira lox tropis* var. *bernsteinii* and *Pl. loxotropis* var. *pluricincta*. Dr. LAM collected or one of these (*Pl. loxotropis* var. *bernsteinii*) and succeeded in bringing ho others, all new records for the island [1]). Of these ten 1 species, *Planispira agni* is new to science.

Among the total number of 14 forms (species and varieties) there is o *Eurybasis conicoides,* which suggests affinities to Borneo. As such a relati seems hardly probable I expressed some doubt as to the correctness of the ide tification or to the locality. Of the others the two Neritinids are ubiquito in the Malay Archipelago and even beyond it. Therefore they do not of any proof as to the affinities of the fauna of Morotai with other islands.

Thus there remain 11 landsnails to be examined critically for their a of dispersion. One of them is a new species, *Planispira agnina,* standing ratl apart, and one, *Trochomorpha hartmanni* is obviously an endemic species. T other 9 are all inhabitants of Halmahera and the surrounding islands and seems not too hazardous to assume that the fauna of Morotai was derived fr this group of islands in the Moluccas, especially from Halmahera.

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[1]) These new records for Morotai are marked with a * in the list.