

# A COLLECTION OF DECAPOD CRUSTACEA FROM SUMBA, LESSER SUNDA ISLANDS, INDONESIA

by

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With 14 text-figures and 1 plate

The Sumba-Expedition undertaken by Dr. E. Sutter of the Naturhistorisches Museum of Basle and Dr. A. Bühler of the Museum für Völkerkunde of the same town, visited the Lesser Sunda Islands, Indonesia, in 1949. Dr. Sutter, the zoologist, stayed in the islands from 19 May to 26 November; most of the time was spent by him in Sumba (21 May-31 October), and extensive collections were made there, among which a most interesting material of Decapod Crustacea, which forms the subject of the present paper. A few Crustacea were collected on the islands of Sumbawa (on 19 May) and Flores (19 and 21 November). The animals taken at Flores belong to species also obtained in Sumba and will be treated here with those; at Sumbawa two hermit crabs belonging to the species *Clibanarius longitarsus* (De Haan) were collected in the mangroves near Sumbawa Besar, these specimens inhabited the shells of *Melanoides tuberculatus* (Müller) and *Melanoides plicaria* (Born) (identif. W. S. S. van Benthem Jutting), they are not further considered here.

## HISTORICAL REMARKS

The island of Sumba is zoologically one of the least known of the Lesser Sunda Islands. Because of its eccentric situation it was visited by fewer zoological collectors than, e.g., Flores or Timor. And, if the island was visited at all, it was usually only for a very short period of time. Only as late as 1925 a zoological expedition was organized with the special purpose to explore Sumba.

The first carcinological collection from Sumba that was reported upon in the scientific literature, consisted of a few specimens obtained there by H. F. C. ten Kate in 1891.

Herman Frederik Carel ten Kate (born Amsterdam, 21 July 1858, died Carthage, Tunisia, 4 February 1931) was an ethnologist and anthropologist. After having studied at the universities of Leiden, Paris, Berlin and Heidelberg, he obtained his doctor's degree at Heidelberg in 1882. Being of independent means, Ten Kate spent most of the rest of his life travelling and making his ethnological studies in the field. He visited the south-

western United States and Mexico (1883, 1887, 1888), Lapland (1884), Suriname and Venezuela (1885-1886), Algeria (1886-1887), the Lesser Sunda Islands (1891), Polynesia (1892), South America (1892-1893, 1895-1897), Japan (1898-1909, 1913-1919), and made several smaller study trips. In his South American time he was curator of the anthropological-ethnographic department of the museum of La Plata, Argentina (1895-1897), while in Japan he practiced as a physician. He married a Japanese wife in 1906, who died in 1919. He returned to Europe, lived some time in the Netherlands and Italy and finally settled in Carthage, Tunisia, where he died in 1931.

During his exploration of the Lesser Sunda Islands Ten Kate visited Flores and the neighbouring islands of Solor and Adonara (27-30 January, 13 April-20 May, 5 June), Timor and the neighbouring islands of Semau and Roti (1 February-9 April, 22 May-3 June, 22 August-23 September), Savu (4 June, 21 August), and Sumba (6 June-19 August). Of Sumba the entire northern coastal area (from Laura east) was explored, as well as the southwestern coastal area and a transect from Waingapu to the south coast; furthermore several trips were made into the interior of southwestern Sumba, starting from Waingapu. Ten Kate (1894) published an extensive account of his travels through the Lesser Sunda Islands and Polynesia, the third chapter of which (pp. 541-638) is devoted to Sumba, it is accompanied by a map showing the route followed there.

The Crustacea (Decapoda and Stomatopoda) collected by Ten Kate in the Lesser Sunda Islands were studied by J. G. de Man and a report on them was published (De Man, 1893). In this collection only two species (*Varuna litterata* and *Macrobrachium lar*) originated from Sumba; both these species are represented in Dr. Sutter's collection dealt with below.

In 1899-1900 the Dutch "Siboga" expedition explored the seas of eastern Indonesia and of the 323 stations made, a single one, viz., sta. 53 (21 and 22 April 1899), was near Sumba, namely in the Bay of Nangamessi, near Waingapu on the north coast. Here trawling was done at a depth of up to 36 m, on a bottom of coral sand, closer to the shore mud; also the reef was explored at low tide (vid. Weber-van Bosse, 1904: 51-52, fig.). The following marine Decapoda have been reported from this station (part of the Decapoda collected by the "Siboga", however, have not yet been studied, so that the list probably still is incomplete):

Alpheidae:

*Alpheus frontalis* H. Milne Edwards, 1837; see De Man, 1911a: 370.

Penaeidae:

*Metapenaeopsis stridulans* (Alcock, 1905); see De Man, 1911: 66 (as *Penaeopsis stridulans*).

Stenopodidae:

*Stenopus hispidus* (Olivier, 1811); see Holthuis, 1946: 14.

Callianassidae:

*Callianassa jocularis* De Man, 1905; see De Man, 1905: 610; De Man, 1928: 130.

*Upogebia ceratophora* De Man, 1905; see De Man, 1905: 602; De Man, 1928: 70.

## Dromiidae:

*Cryptodromia tumida* Stimpson, 1859; see Ihle, 1913: 37.

*Cryptodromia hilgendorfi* De Man, 1887; see Ihle, 1913: 45.

## Xanthidae:

*Carpilodes bellus* (Dana, 1852); see Buitendijk, 1960: 258.

*Carpilius convexus* (Forskål, 1775); see Buitendijk, 1960: 264.

## Goneplacidae:

*Litocheira setosa* (A. Milne Edwards, 1873); see Tesch, 1918: 165.

*Litocheira quadrispinosa* Zehntner, 1894; see Tesch, 1918: 168.

*Typhlocarcinus villosus* Stimpson, 1858; see Tesch, 1918: 209.

## Pinnotheridae:

*Pinnotheres latus* Bürger, 1895; see Tesch, 1918: 259.

Only one of these marine species (*Carpilius convexus*) is represented in the collections brought together by Dr. Sutter. This is not surprising as most of the above "Siboga" material was obtained by trawling in deeper water.

At this same "Siboga" station a shore party collected in a river near Waingapu and the following species were taken: *Sesarma impressum*, *Macrobrachium australe*, *M. bariense*, and *M. latidactylus*. All four species form also part of Dr. Sutter's collection.

Between 1900 and 1925 two private persons contributed Sumba Decapoda to the Zoological Museum in Amsterdam, viz., Mr. H. J. M. Laureense and the Rev. R. J. Lambooy.

Henri Joseph Marie Laureense was born in Rotterdam, 3 December 1878 (son of Andreas Laureense and Maria Ponjee). He studied medicine, and on 1 July 1908 became medical officer (2nd class) with the Netherlands Navy, he was promoted to first class on 1 July 1912, to chief medical officer (2nd class) on 16 July 1927, and first class on 1 Januari 1931. In July 1909 he left the Netherlands to serve with the navy in the Netherlands East Indies and was stationed on H.M.S. "Van Doorn". In October 1911 he was transferred to the guard-ship "Koning der Nederlanden" in Surabaya, Java. He returned to the Netherlands in August 1912, and served there on various ships and ashore. He married 21 November 1913 Louisa Catharina Willemse. In July 1922 he went back to the East Indies and was stationed at the naval hospital at Ujung, Surabaya. From August 1924 to June 1927 he was back in Holland, stationed ashore in Vlissingen. His third term in the East Indies lasted from July 1927 to July 1930, when he was stationed in Weltevreden, Batavia and Buitenzorg, connected with the Medical Department of the Navy. For reasons of health he repatriated to the Netherlands in July 1930 and retired from active duty on 1 Januari 1931.

Laureense was one of the naval medical officers, who at the request of Professor Max Weber, director of the Zoological Museum at Amsterdam, started collecting marine animals for that museum. Laureense evidently was most active soon after his arrival in Indonesia, as shown by the Sumba material, which he collected in December 1909, when he had been only a few months in the Indies, serving on the "Van Doorn".

The Reverend P. J. Lambooy, at the suggestion of Prof. Dr. L. F. de Beaufort, director of the Zoological Museum at Amsterdam (1922-1949),

collected Crustacea in fresh water near the mission post of the Dutch Reformed Church at Pajeti, Sumba. I am most thankful to the Rev. Lambooy for his kindness to provide me with his biographical data:

Pieter Johannes Lambooy (born 31 October 1896, The Hague, Netherlands), after passing the primary and secondary school in The Hague, studied Theology at the Free University of Amsterdam and obtained a special training for missionary work in Indonesia. He was ordained on 24 October 1923 and together with his wife, Anna Magdalena Verhoef, he left the Netherlands for Sumba, where he was stationed at Pajeti. Mr. Lambooy stayed in Pajeti from 1923 to 1950, this stay only being interrupted by home leaves, which were given about every 7 years; during one of these leaves, which started in March 1940, the German occupation of the Netherlands prevented Mr. Lambooy's return to Sumba, and after a forced stay in Holland of about 5 years, he saw the island back in November 1945. Due to reasons of health the Rev. and Mrs. Lambooy returned permanently to the Netherlands in 1950. Here for ten more years Mr. Lambooy was a minister in various towns and after that was still active in pastoral work until 1975, when at the age of 78 he retired because of failing eyesight. The Rev. and Mrs. Lambooy at present live in Zoetermeer a town near The Hague. They have 8 children all born in Sumba.

The Rev. Lambooy made his Crustacea collections around July 1924 in fresh water in the area of Pajeti, his mission post. Not having a special interest in natural history, this collecting was done more as a service to Prof. de Beaufort. It is therefore the more appreciated that Mr. Lambooy went to all the trouble and effort of collecting, preserving and shipping these specimens and in this way he materially contributed to a better knowledge of Sumbanese carcinology, which until then had been badly neglected. J. Roux (1928: 216-222) mentioned no less than 8 species collected by the Rev. Lambooy (*Caridina weberi*, *C. brevicarpalis*, *Atya spinipes* (as *A. moluccensis*), *Macrobrachium rosenbergii* (as *Palaemon carcinus*), *M. australe* (as *P. dispar*), *M. placidulum* (as *P. placidulus*), *M. bariense* (as *P. bariensis*), and *M. latidactylus* (as *P. latidactylus*)), all of which are also represented in Dr. Sutter's collections.

In 1925 for the first time an expedition was sent to Sumba with as main object the study of the fauna of the island. The expedition, organized by the Zoological Museum of Buitenzorg (= Bogor), Java, visited the island from 14 March to the last days of May or the first of June 1925. Dr. K. W. Dammerman, at that time curator of the Zoological Museum, was in charge and was assisted by the taxidermist Mr. P. F. Franck and a number of Javanese preparators.

Karel Willem Dammerman (born Arnhem, Netherlands, 4 July 1885, died Leiden, 19 November 1951) studied biology at the University of Utrecht (1905-1910), obtaining his Ph.D. in 1910 on a thesis dealing with the anatomy of fishes. He was assistant of Prof. Dr. A. A. W. Hubrecht at the Zoology Laboratory of Utrecht from September 1907 to May 1908, and assistant curator (first for the Mollusca, later in the Entomology section) at the Rijksmuseum van Natuurlijke Historie at Leiden from May 1908 to May

1910. In 1910 Dammerman left for the Netherlands East Indies and became assistant entomologist of the Division of Plant Diseases of the Department of Agriculture, Industry and Commerce (later Laboratory for Plant Diseases). In 1917 he went to the Netherlands on home leave and in July 1919 rather shortly after his return in Java, he accepted the post of curator at the Zoological Museum in Buitenzorg. In 1932 Dammerman was appointed director of the famous Botanical Gardens of Buitenzorg, of which the Zoological Museum formed part. He stayed in this capacity until his retirement in February 1939, upon which he returned to the Netherlands and settled in Leiden. In January 1943 he became honorary research associate of the Rijksmuseum van Natuurlijke Historie. Dammerman was a many-sided zoologist. He published a well known handbook on the agricultural zoology of Indonesia, a monograph on the fauna of Krakatau Island, and many papers on entomology (basic and applied), Indonesian mammals, soil and cave fauna's, nature protection, and zoological nomenclature. Obituary notices were published by Lieftinck (1952) and Doctors van Leeuwen (1952).

P. F. Franck (birth data and place (in North Germany) unknown, died in a prisoner of war camp in India during World War II) was appointed taxidermist at the Zoological Museum in Buitenzorg in November 1922 and held that position until May 1940 when he, because of his German nationality, was interned and sent to a P.O.W.-camp in India, where he died before the end of the war. Franck's main interest was in big game and he published several papers on that subject. A photograph of him with a rhinoceros that he had shot can be found in a paper by Appelman (1934: 74, fig. 1).

The 1925 Sumba expedition explored the northern and central parts of both eastern and western Sumba. An extensive itinerary with many illustrations and a map of the island showing the route followed, was published by Dammerman (1926). Although the main emphasis during the expedition was on Vertebrata, also many insects, molluscs and crustaceans were collected. The freshwater Decapod Crustacea were studied by Roux (1928: 216-222), who reported on 16 species and subspecies; all species are also represented in the collections made by Dr. Sutter.

The 1929-1930 "Snellius" expedition, an oceanographic expedition sent out by the Dutch government to explore the waters of the eastern Malay Archipelago, made an intensive survey of these waters from the southern Philippines south to the Indian Ocean, and from the east coast of Borneo east to western New Guinea. In all, 382 marine stations were made and more than a hundred shore localities were visited. Only one of the stations was in Sumbanese waters: on 22 November 1929 the "Snellius" anchored off Waingapu on the north coast of Sumba and occupied almost the same position as Sta. 53 of the "Siboga" expedition. The biologist of the "Snellius" expedition, Dr. H. Boschma, was not on board then (he had remained ashore in Timor making extensive shore collections there), but one of the officers, the physician P. C. Broekhoff, was charged with taking plankton samples at the various stations. It is not likely that any shore collecting was done in Sumba, and the only Decapod so far reported from the "Snellius" collections made off Waingapu is the swimming crab *Podophthalmus vigil* (Fabricius, 1798), which probably was taken in a plankton net lowered from the ship (see Leene, 1940: 79).

The Amsterdam Zoological Museum possesses a specimen of *Macrobrachium lar* said to be collected in West Sumba on 18 October 1932, the collector is unknown (see Holthuis, 1950: 181); we do not know of any expedition or any person collecting in Sumba at that time, and it seems possible that the date on the label is incorrect. Another specimen of the same species in the Amsterdam Museum is labelled "Lahalura Island off S. E. Sumba, 2 May 1909", no collector is known, and it cannot be Mr. Laurens, as at that time he was still in the Netherlands. Finally, Banerjee (1960: 150) mentioned a male specimen of the grapsoid crab *Grapsus albolineatus* Lamarck, 1818, present in the collection of the Amsterdam Museum and labelled "Sumba or Sandalwood Island" the date of collecting and the collector are unknown. *Macrobrachium lar* is represented in Dr. Sutter's collection, *Grapsus albolineatus* is not.

#### THE 1949 SUMBA EXPEDITION

The 1949 expedition by Drs. Sutter and Bühler explored the eastern, central and western part of the island. An extensive and well illustrated narrative of this expedition was published in 1951 (Bühler & Sutter, 1951).

The number of Decapod Crustacea collected during the expedition amounts to 50 species (16 Brachyura, 2 Anomura and 32 Macrura). So far only 33 species (14 Brachyura and 19 Macrura) had been reported from Sumba. The total number now known is 64 (25 Brachyura, 2 Anomura and 37 Macrura), so that no less than 31 species (11 Brachyura, 2 Anomura, 18 Macrura) are now for the first time reported from Sumba; one of these species is even new to science.

Apart from providing an important addition to our knowledge of the Decapoda inhabiting Sumbanese waters, the present collection is also important for the detailed information about many of the habitats in which the specimens were found. In the following list of localities at which the 1949 expedition obtained Decapod Crustacea, the extensive ecological data provided by Dr. Sutter are given in full; they will not be repeated under each species. These localities, as well as most other Sumbanese localities mentioned in the text are entered on the map of fig. 1.

Localities in Sumba (and Flores) in which Decapod Crustacea were obtained by the 1949 Sumba Expedition

#### East Sumba

Sta. 5 and 6. Melolo; near the sea coast, at night on the highway; 26 May 1949. — *Coenobita rugosus*, *C. cavipes*.

Sta. 15. Small valley south of Melolo; under stone in the dry bed of a brook; 29 May 1949. — *Sesarma weberi*.



Sta. 24. Laiwuhi Brook south of Melolo, about 1 km above an area of rice fields; small fresh water brook, about 1 to 2 m wide with clear water, which lower down is used for irrigating the rice fields; 31 May 1949. — *Caridina typus*, *C. longirostris*, *C. celebensis*, *Macrobrachium* lar.

Sta. 31. Laiwuhi Brook south of Melolo, slightly above previous locality; 2 June 1949. — *Caridina typus*, *C. longirostris*, *Macrobrachium* lar.

Sta. 40. Melolo River, about 2 km above the mouth near Melolo; fresh water, depth 0.1 to 0.5 m, rarely more, gradient of the river slight; 8 June 1949. — *Varuna litterata*, *Sesarma impressum*, *Atya pilipes*, *Caridina weberi*, *C. gracilirostris*, *C. brevicarpalis*, *C. serratirostris*, *Macrobrachium australe*, *M. lar*, *M. latidactylus*, *M. lepidactyloides*, *M. placidulum*.

Sta. 42. Sea shore near Melolo; low tide, from submerged marine algae in shallow water, and from stones in tide pools; 8 June 1949. — *Percnon planissimum*, *Periclimenes seychellensis*, *P. grandis*, *Gnathophyllum americanum*, *Alpheus* spec., *Saron marmoratus*, *Hippolyte ventricosa*, *Latreutes pygmaeus*, *Lysmata vittata*.

Sta. 43. Sea shore near Melolo; low tide; 8 June 1949. — *Carpilius convexus*, *Mictyris longicarpus*.

Sta. 71. Matawai Kenor, near Prai Jawang; a small spring among trees, giving rise to a small brook, which after a short run disappears in marshes and rice fields; 10 June 1949. — *Caridina weberi*.

Sta. 89-96. Rende River 10 minutes above Prai Jawang; a river of about 10 m wide and 1.5 m deep, gradient slight; collections were made mostly in the water among overhanging plants and near the banks; 13 June 1949. — *Varuna litterata*, *Sesarma impressum*, *S. trapezoideum*, *Atya spinipes*, *A. pilipes*, *Caridina typus*, *C. weberi*, *C. gracilirostris*, *C. brevicarpalis*, *Macrobrachium rosenbergii*, *M. australe*, *M. lar*, *M. latidactylus*, *M. lepidactyloides*, *M. cowlesi*.

Sta. 247. Waidjelo River near Laluku, and a small tributary near its confluence with the river; the river has a rather strong current, its tributary is a small forest brook; 7 July 1949. — *Varuna litterata*, *Sesarma trapezoideum*, *Caridina typus*, *C. weberi*, *C. longirostris*, *C. brevicarpalis*, *Macrobrachium australe*, *M. lar*, *M. latidactylus*.

Sta. 296. Melolo River near Mau Marru; this part of the river has a slight gradient, its bottom consist of sand, fine gravel and rock; 21 July 1949. — *Atya pilipes*, *Caridina weberi*, *Macrobrachium* lar.

Sta. 297. Melolo River and tributaries near Mau Marru, one specimen from a tributary of Rende River; 21 July 1949. — *Macrobrachium* lar, *M. latimanus*.

Sta. 312. Mbana Brook near Laau, tributary of Rende River, near Mau Marru; medium sized brook with rather steep gradient, with many limestone deposits; rather few Crustacea, these were restricted to the few quieter places (under overhanging rocks or among shore vegetation) without limestone deposits; no animals were found under grass or in small cataracts; 22 July 1949. — *Caridina weberi*.

### West Sumba

Sta. 335. Bondokodi River, about 20 minutes above the bridge near Kodi; about 1 km above the limit of the tidal influence, fresh water, 0.2 to 0.4 m deep, gradient slight; Crustacea from among submerged *Elodea*-like aquatic plants; 30 July 1949. — *Caridina longirostris*, *C. brevicarpalis*, *C. serratirostris*, *C. celebensis*, *Macrobrachium latidactylus*.

Sta. 340. Mouth of the Bondokodi River at Pero near Kodi; marine, in sand of the mangrove zone; 31 July 1949. — *Ocyropsis cordimana*, *Uca vocans*, *Coenobita rugosus*.

Sta. 342. Bondokodi River at the bridge at Kodi; within tidal influence, water slightly brackish, from *Elodea*-like aquatic vegetation; 31 July 1949. — *Caridina gracilirostris*, *C. longirostris*, *Palaemon concinnus*.

Sta. 348. Bondoki River, about 20 minutes above the bridge near Kodi (same locality as Sta. 335); from among denuded tree roots, from dead leaves and on and among stones

in the water; 1 August 1949. — *Caridina gracilirostris*, *C. longirostris*, *C. serratirostris*, *C. celebensis*, *Macrobrachium equidens*, *M. lar*, *M. latidactylus*.

Sta. 349. Bondokodi River, 1 to 2 km above bridge at Kodi; under overhanging bank with denuded roots hanging in the water, among aquatic vegetation and under dead leaves; 2 August 1949. — *Atya spinipes*, *Caridina gracilirostris*, *C. longirostris*, *C. serratirostris*, *Palaemon concinnus*, *Macrobrachium equidens*, *M. latidactylus*.

Sta. 436. Bondokodi River, 2 to 3 km above the bridge near Kodi; under stones in river; 10 August 1949. — *Ptychognathus riedelii pilosus*, *Pyxidognathus granulosus*, *Varuna litterata*, *Utica gracilipes*, *Sesarma impressum*, *S. maculatum*.

Sta. 437. Bondokodi River, 2 to 3 km above the bridge near Kodi; under stone on dry ground, at about 100 m from the river on a hill slope; 10 August 1949. — *Sesarma weberi*.

Sta. 438. Bondokodi River, 2 to 3 km above the bridge near Kodi; 10 August 1949. — *Atya spinipes*, *Caridina typus*, *C. longirostris*, *C. brevicarpalis*, *C. serratirostris*, *C. celebensis*, *Palaemon concinnus*, *Macrobrachium australe*, *M. equidens*, *M. bariense*, *M. latidactylus*, *M. placidulum*.

Sta. 440. Waitombo River near Rara; 10 August 1949; leg. A. Wegner. — *Caridina weberi*, *Macrobrachium latimamus*.

Sta. 450. Waikamburu Brook, 4 km north of Waimangura; altitude about 250 m above sea level; a spring in a small forest surrounded by grass land, from which arises a small brook; this brook contains clear water, slightly below the spring it is used to irrigate cultivated land and it finally disappears in rice fields; the specimens were collected (a) in the spring basin, which is shallow and has the bottom with flat, moss covered stones and (b) in the brook about 100 m downstream from the spring, its bed there being narrow, with stones, its sides consisting of dirt; most specimens are coloured white with blue dots, in the spring some specimens were somewhat reddish; 19 August 1949. — *Atya pilipes*, *Caridina typus*, *C. weberi*, *C. sundanella*.

Sta. 469. Small forest brook about 6 km southwest of Waimangura, tributary of Matakori Brook; water clear, bottom with stones and dead leaves, brook with overhanging rattan growth, etc.; 21 August 1949. — *Caridina typus*.

Sta. 547. Takoka Brook about 1.5 km above the mouth near Rua; a medium large brook with a slight gradient, flowing through grassland, shrubbery and fruit gardens, depth 0.05 to 0.20 m; 31 August 1949. — *Varuna litterata*, *Utica gracilipes*, *Atya spinipes*, *Caridina typus*, *C. weberi*, *C. longirostris*, *C. brevicarpalis*, *C. serratirostris*, *C. celebensis*, *Macrobrachium australe*, *M. lar*, *M. latidactylus*, *M. placidulum*.

Sta. 550. Kadoko Spring 3 km west of Rua; a spring in hilly country about 1 km from the sea shore; the water in the spring basin is clear and shows aquatic vegetation; the spring is enclosed by larger and smaller flat stones; below the spring there are, at various levels, additional rather large basins, 1 to 2 m deep with murky water and many green filamentous algae; here great masses of juvenile shrimps were found, and a few larger ones; below these basins the brook gradually disappears in its bed which is covered by well-sized rounded stones; 31 August 1949. — *Caridina typus*, *C. weberi*, *C. longirostris*, *Macrobrachium lar*.

Sta. 551. Sea shore near Rua; sandy beach; 31 August 1949. — *Ocypode ceratophthalmus*, *Coenobita rugosus*.

Sta. 563. Reef near Rua; among algae and eel grass at low tide; 1 September 1949. — *Athanas djiboutensis*, *Synalpheus amboinae*, *Hippolyte ventricosa*, *Latreutes* sp.

Sta. 568. Sea shore area near Rua; dug out of the mud, bought from fishermen. — *Scylla serrata*.

Sta. 579. Kadengar River at Sodan near Waikarudi; a wide and shallow river bed with little water, gradient slight, bottom consisting partly of sand, partly of gravel; as favourable habitats for Crustacea (shores with dense overhanging vegetation) are lacking, the crustacean population is small; 7 September 1949. — *Caridina gracilirostris*, *C. brevicarpalis*, *Macrobrachium lar*.

Sta. 583. Spring near Waikarudi; a large and rather deep basin enclosed by a stone wall, used by humans and cattle for bathing and washing; 7 September 1949. — *Macrobrachium lar*.

Sta. 584. Kadengar River at Sodan near Waikarudi; 7 September 1949. — *Varuna litterata*.

### Central Sumba

Sta. 612. Jengo Brook near Lokojengo; a large brook, coming from a rather strongly sloping forested valley, and entering an open valley bottom with a light growth of shrubs; the brook bottom consists of large boulders, gravel and coarse sand; below Lokojengo the brook gradually disappears in the soil of its own bed, although the width of the bed remains the same, evidently carrying water throughout its course in the rainy season; 24 September 1949. — *Pseudograpsus crassus*.

Sta. 613. Jengo Brook near Lokojengo; same locality as previous station; few favourable spots for collecting shrimp, as the vegetation rarely reaches the water and also denuded roots are seldom seen in the water; 24 September 1949. — *Atya pilipes*, *Caridina weberi*, *Macrobrachium latimanus*.

Sta. 639. Lindiwatju Brook near Lindiwatju; a brook with a slight gradient, meandering through a valley with a great variety of habitats: grass land, cultivated grounds, shrubbery, forest and reeds; the banks of the brook show a rich and varied vegetation; the bed is sandy or with gravel, here and there with rocks, in a few places muddy; the brook looked very favourable for Crustacea but proved to be surprisingly poor in them; 10 October 1949. — *Atya spinipes*, *Caridina weberi*.

Sta. 641. Maharang River (called Kadassa in its lower reaches) near Langgaliru; a river with many cataracts carrying much water; the depth is 1 to 2 m on an average; no favourable collecting spots could be located; 10 October 1949. — *Caridina weberi*, *Macrobrachium latimanus*.

### Flores

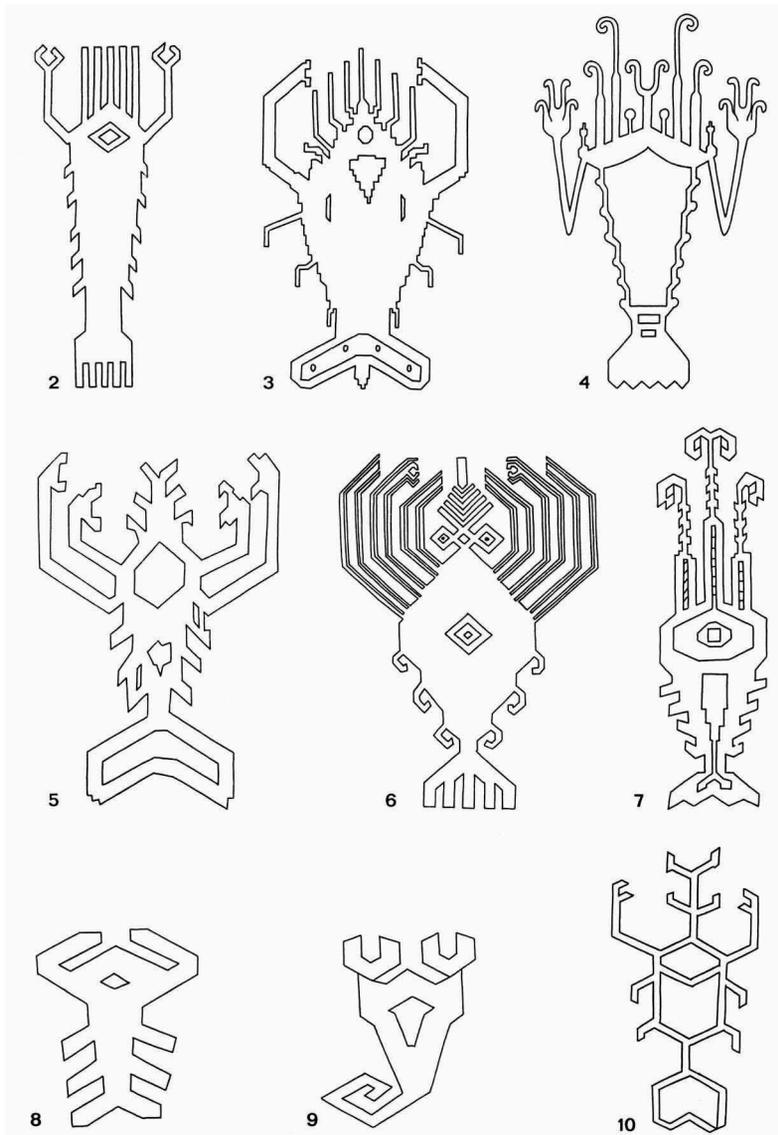
Sta. 703. Brook near Lerang, West Flores; altitude 1300 m above sea level; the brook is 0.7 to 2 m wide, with clear fast flowing water, in the deep shade of a forested valley with a rich vegetation of herbs and ferns; the brook bed contains stones, the crustaceans were mostly found under the stones, less among denuded roots in the water; 19 November 1949. — *Atya pilipes*, *Macrobrachium latimanus*.

Sta. 704. Two brooks north of Lerang, one of these an effluent of the crater lake Rana Mese; gradient steep, the bed in places deeply cut, with stones and boulders; crustaceans were found mostly under the larger stones, where dead leaves had accumulated, also in the dense clusters of roots hanging in the water; 21 November 1949. — *Atya pilipes*, *Caridina weberi*, *Macrobrachium latimanus*.

Most of the stations are in fresh water, only no. 5, 6, 42, 43, 340, 551, 563 and 568 are marine.

### CRUSTACEA IN SUMBA ART

It is interesting to notice how frequently crustacean motives are found in Sumbanese objects of art. The well known Sumbanese textiles, are decorated with designs of animals, man, plants and objects. The animal figures, primitive as they are, are very charming and show horses (the sandalwood horses



Figs. 2-9. Designs mostly inspired by Crustacea found in Sumba textiles. 2, figure representing *Macrobrachium* species in dorsal view, cloth from East Sumba, after Langewis & Wagner (1964, fig. 119, pl. 9); 3, figure probably representing *Macrobrachium* in dorsal view, after Langewis & Wagner (1964, p. 20); 4, crustacean design from a Sumba cloth, probably representing *Macrobrachium*, freely embellished by the artist, after Dammerman (1926, p. 30, fig. 5a); 5, shrimp design, "kurangu", probably *Macrobrachium*, from warp ikat cloth, Kambera district, Sumba, coll. Museum voor Land- en Volkenkunde, Rotterdam, after Adams (1965, p. 31, fig.); 6, shrimp design, dorsal view, with 3 pairs of large legs, one with claws, on supplementary warp ikat cloth from East Sumba, after Langewis & Wagner (1964, fig. 135, pl. 12); 7, strongly stylized figure of macrurous crustacean, without large chelipeds, ikat cloth, from Sumba, coll. L. B. Holthuis; 8, simplified shrimp design in border of supplementary warp ikat cloth, East Sumba, after Langewis & Wagner (1964, pl. 122, 123); 9, simplified scorpion design, alternating with shrimp design of fig. 8 in the border of the cloth referred to in fig. 8, after Langewis & Wagner (1964, pl. 122, 123).

Fig. 10. Shrimp design in woven basket from Tawai, East Sumba, after Witkamp (1913, p. 24, fig. 14).

for which the island is famous), deer, birds (chicken, roosters, ducks), snakes, but also shrimps. The shrimps are highly stylized and some figures are hardly recognizable as such. A few of these figures are reproduced here, taken from various sources (figs. 2-9, pl. 1). Not being an ethnologist myself, my choice is rather random, and only serves to give a general impression. Most of the figures show the animal in dorsal view. In some the design clearly is that of a *Macrobrachium*, like fig. 2, which distinctly shows the slender body with 2 long chelipeds, the long abdomen with pleopods and a tail fan, and anteriorly the antennae and antennulae. Fig. 3 shows the same type, but the animal has the body much wider. In fig. 4 the chelipeds are adapted to the fancy of the artist and quite unnatural but the figure still can be recognized as that of a shrimp. The only Sumbanese macrurans which are large, conspicuous and have 2 large chelipeds are some species of *Macrobrachium*. Also fig. 5 can still be recognized as *Macrobrachium*; here the smaller, first, pair of chelipeds is also shown. Fig. 6 shows even 3 pairs of large legs, the second might be considered chelate, the identification with *Macrobrachium* is less certain here. In fig. 7 the chelipeds are entirely missing and only by reference to the other figures this can be recognized as a macrurous Decapod, possibly *Macrobrachium*. Figs. 8 and 9 are both border designs from the same cloth. Fig. 8 is strongly simplified, but still recognizable as a crustacean and different from the scorpion that is shown immediately next to it in fig. 9. A most interesting design is that shown in pl. 1 in which the middle band shows *Macrobrachium* in side view: The large chelipeds (with spinules?) are strong and chelate; the smaller pereopods are shown far too short; the pleopods are too numerous, the space between them is of a pale blue colour that strongly contrasts with the almost black background and may indicate the eggs; the rostrum is visible as are several cephalic appendages (antennae and eyes) and what might be the maxillipeds; also the tailfan is distinct.

It is possible that some of the designs are based on spiny lobsters (*Panulirus* sp.) but indications to that end are rather vague, while many designs can definitely be identified as *Macrobrachium*.

Also in Sumbanese objects other than textiles the shrimp design is found. Witkamp (1913: 24, fig. 14) showed two baskets from Tawui, East Sumba, one with a shrimp design (fig. 10), the other showing a scorpion. The shrimp figure shows some resemblance to those found on the ikat cloths.

The design is also used in tattooing. Dammerman (1926: 49; 25 in reprint) observed this in Pajeti; he remarked (in translation) "The girls that served us were tattooed on arms and hands with designs like the ones that are found on the well known Sumba-cloths; lobsters, fishes, etc."

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## SYSTEMATIC PART

## Brachyura

## PORTUNIDAE

***Scylla serrata*** (Forskål, 1775)

Rua, West Sumba; bought from natives, 2 September 1949; no. 568. — 1 ♂.

I follow Stephenson (1972: 44) in treating *Scylla* as a monotypic genus. Estampador (1949) and Serène (1951) recognized 3 species and a subspecies: *Scylla serrata* (Forskål, 1775), *Scylla serrata paramamosain* Estampador, 1949, *Scylla tranquebarica* (Fabricius, 1798) and *Scylla oceanica* Dana, 1852. The "species" are characterized best by the colour, although that still seems to be somewhat variable. As the colour disappears by preservation in alcohol, this character is of little help with preserved material. Most of the morphological characters cited by Estampador (1949) as distinguishing the 4 forms are considered by Serène (1951) to be non-existent in his material or highly variable. Serène added some morphological differences that he found among the four forms of his material, but also those are quite variable and not easy to interpret.

The present male specimen (carapace length 75 mm, carapace width 112 mm), according to the characters given by Serène (1951) is about intermediate between *S. serrata* and *S. tranquebarica*. The frontal teeth are slightly more triangular than in Serène's pl. 2 fig. 3, but somewhat less than in his pl. 2 fig. 2. The second anterolateral tooth is wider than in Serène's *S. tranquebarica*, more like that in *S. serrata*. The cheliped resembles that of *S. serrata* most. These differences, however, are so vague and the characters evidently so variable, that it seems safest to accept, for the time being at least, a single species of *Scylla*.

Neither Estampador nor Serène gave their reasons for using the epithets *serrata*, *tranquebarica* and *oceanica* for the forms that they indicated with these. The original descriptions of these three species are very brief and the types, as far as I know, have not been examined by either author, so that the validity of these names seems uncertain.

*Scylla serrata* s.l. has a wide distribution throughout the Indo-West Pacific area. So far as I know it has not been reported from Sumba before. Leene (1938: 14) mentioned a specimen from the Bay of Bima, Sumbawa.

#### XANTHIDAE

##### **Carpilius convexus** (Forskål, 1775)

Melolo, East Sumba; shore at low tide; 8 June 1949; no. 43. — 1 ♂.

An adult male of this well known marine species, which has a wide distribution throughout the Indo-West Pacific area. It had already been reported from Sumba by Buitendijk (1960: 264). Buitendijk's material (1 ♂, 2 ♀♀) was collected by the Siboga Expedition at Waingapu (Sta. 53), probably on the reef.

#### OCYPODIDAE

##### **Ocypode cordimana** Latreille, 1818

Kodi, West Sumba, near the mouth of the Bondokodi River near Pero; from sand in the mangrove zone; 31 July 1949; no. 340. — 1 ♀.

A well developed female, showing no trace of the stridulating organ on the chelipeds.

The species is widely distributed in the Indo-West Pacific region, and although it has been reported before from the Lesser Sunda Islands, I know of no previous record from Sumba.

##### **Ocypode ceratophthalmus** (Pallas, 1772)

Rua, West Sumba; sandy beach; 31 August 1949; no. 551. — 1 juvenile.

The specimen is very young, but already shows stridulating ridges on the cheliped. Dr. K. Sakai, who at present revises the genus *Ocypode*, was so kind as to examine it. He identified it with *O. ceratophthalmus*, one of the most common species of the Indo-West Pacific region (ranging from E. Africa to Polynesia). Although the species has been mentioned from the Lesser Sunda Islands, it is now reported for the first time from Sumba.

##### **Uca vocans** (Linnaeus, 1758)

Kodi, West Sumba, near the mouth of the Bondokodi River near Pero; from sand in the mangrove zone; 31 July 1949; no. 340. — 6 ♂♂, 2 ♀♀.

A common Indo-West Pacific species, which also is known under the name *Uca* (or *Gelasimus*) *marionis* (Desmarest, 1823). It is now reported for the first time from Sumba.

## MICTYRIDAE

**Mictyris longicarpus** Latreille, 1806

Melolo, East Sumba; shore at low tide, marine; 8 June 1949; no. 43. — 1 ♂.

The sample containing the present specimen heavily suffered in shipping and most of the material was lost or severely damaged. Although the above male is incomplete, its identity could be ascertained without difficulty.

The species is quite widely distributed in the Indo-West Pacific region, but has so far as I know not been reported before from Sumba.

## GRAPSIDAE

## Varuninae

**Ptychognathus riedelii pilosus** De Man, 1892

Bondokodi River, 2 to 3 km above the bridge near Kodi, West Sumba; under stones; 10 August 1949; no. 436. — 4 ♂ ♂, 1 ♀.

The specimens agree well with De Man's (1892: 323) description. All the males have a distinct area of long hair on the proximal part of the outer surface of the fingers, and furthermore a small tuft of shorter hairs on the lower margin of the fixed finger just before the tip. The chela of the female lacks the long hairs, but shows the short tuft; it is more coarsely granulated than the chela of the male and shows a longitudinal row of larger tubercles in the lower part of the outer surface, extending from the tip of the fixed finger to the base of the palm. Thus the female of the present form in all respects resembles the female of the typical *P. r. riedelii* as described by De Man (1892: 322).

*Ptychognathus riedelii* A. Milne Edwards, 1868, was originally described from Celebes and this typical form was later also reported from Flores, Sumatra and the Andaman Islands. The type locality of *Ptychognathus riedelii pilosus* is a freshwater river near Reo, Flores. Tesch (1918: 92) reported on material of this form from two other Indonesian localities: Lombok (Lesser Sunda Islands), and Karakelong (Talaud Islands). The material from the latter locality is said to be obtained from a reef, but as pointed out under *Pseudograpsus crassus* (p. 19), many of the species that during the Siboga Expedition were supposedly collected from a reef at Karakelong Island are otherwise only known from fresh water (e.g. *Utica gracilipes*, *Macrobrachium placidulum*, q.v.), so that the indication "reef" here should be regarded with much reserve.

De Man's (1892) type material of *Ptychognathus riedelii pilosus* consisted of 11 male specimens. These were found in a single sample together with 11 juveniles of *Ptychognathus riedelii riedelii*. It seems more logical to

assume that these juveniles also belong to De Man's "subspecies". The status of the latter seems highly dubious as the females and juveniles evidently cannot be distinguished from those of the typical form, while both forms occur together in a restricted geographical area, like the island of Flores.

It would be interesting to find out whether the presence or absence of hairs on the basis of the fingers of the chelipeds in males of this species is influenced by factors apart from those of age and sex.

For the time being I use the epithet *pilosus* more for convenience (to indicate the hairiness of the chela) than in the sense of a subspecific name.

### **Pyxidognathus granulatus** A. Milne Edwards, 1878

Bondokodi River 2 to 3 km above the bridge near Kodi, West Sumba; under stones; 10 August 1949; no. 436. — 1 ♂.

The specimen, found together with *Ptychognathus riedelii*, agrees well with the various descriptions of the species. As Serène & Moosa (1971: 9, pl. 3C, D, 4 A-D) pointed out, *Hypsilograpsus deldeni* De Man, 1879 and *Pyxidognathus subglobosus* Tesch, 1918, are synonyms.

The species has a wide distribution in the Indo-West Pacific region (Indonesia and Polynesia), although it has been relatively rarely reported upon. De Man (1892: 317) mentioned it from Flores, but so far it was not known from Sumba.

### **Varuna litterata** (Fabricius, 1798)

Melolo River near Melolo, East Sumba, at about 2 km above the mouth; 8 June 1949; no. 40. — 25 specimens, 1 with bopyrid.

Rende River about 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 96. — 8 specimens.

Waidjelu River near Laluku, East Sumba; 7 July 1949; no. 247. — 5 juveniles.

Bondokodi River, 2 to 3 km above bridge near Kodi, West Sumba; 10 August 1949; no. 436. — 6 specimens.

Takoda Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 2 males.

Kadengara River near Sodan, Waikarudi, West Sumba; 7 September 1949; no. 584. — 4 specimens.

None of the specimens is very large, the largest having the carapace 28 mm long and 30 mm wide.

The species is a well known form from fresh, brackish and marine habitats and has a wide distribution in the Indo-West Pacific region (E. Africa to Japan and Polynesia). It has repeatedly been reported from the Lesser Sunda Islands, but only once from Sumba (De Man, 1893: 286; Ten Kate, 1894: 633). This Sumba specimen was taken in the western part of the island during a trip, which Ten Kate made along the northcoast, from Waingapu to the Laura District.

***Pseudograpsus crassus*** A. Milne Edwards, 1868

Jengo Brook near Lokojengo, Central Sumba; 24 September 1949; no. 612. — 6 ♂ ♂.

The specimens agree very well with the published descriptions. The species was originally described from Celebes, probably northern Celebes, as the collector of the types, J. G. F. Riedel (1832-1911), was District Officer in the Minahassa (1853-1864) and Assistant Resident of Gorontalo (1864-1875), both stations in N. Celebes.

The species has subsequently been reported from several other localities in Indonesia: Karakelong (Talaud Islands), Halmaheira (Moluccas), Flores (Lesser Sunda Islands), while Roux (1928: 221) reported it for the first time from Sumba (Mau Marru).

*Pseudograpsus crassus* is a species from fresh water and has at several instances been collected far from the sea coast. So, De Man (1902: 506) reported a specimen from Halmaheira collected at an altitude of 2500 feet (= 800 m). Tesch (1918: 98) reported 5 males and 5 females of this species from "Karakelang, Talaut Islands" and remarked "The specimens of the "Siboga" apparently lived on the reef and are consequently marine". As the Siboga stayed at least two days at Beo, Karakelong, and as the natives there helped the naturalists in obtaining specimens ("la population nous pręta son concours avec empressement", Weber, 1902: 57), it is more likely that these specimens came from the interior and lived in freshwater, than that they were actually collected on the reef, especially so as other freshwater species occurred in the Beo material (see *Ptychognathus riedelii*, p. 17; *Utica gracilipes*, p. 19; and *Macrobrachium placidulum*, p. 47).

The 5 specimens supposed to be from Japan, which Tesch (1918: 99) also reported upon, are still in the dried collection of the Rijksmuseum van Natuurlijke Historie. Although they are labelled "Japan v. Siebold", it seems unlikely that they actually originate from there. The species has never been found in Japan, notwithstanding the intensive study made in recent years of the carcinological fauna of that area. Also the fact that De Haan (1833-1850) did not mention this material in his Crustacean volume which is based on P. F. von Siebold's collection, makes it likely that a mislabelling took place subsequently, and that the specimens actually originate from the Malay Archipelago, of which area the Rijksmuseum van Natuurlijke Historie received important material at about the same time that Von Siebold's Japanese collections came in, and later.

***Utica gracilipes*** White, 1847

*Utica gracilipes* White, 1847 (after April 12): 43 (nom.nud.); White, 1847a (July 20): 86; White, 1847b (September): 207; Adams & White, 1849: 53, pl. 13 fig. 6; H. Milne

Edwards, 1853: 177, pl. 7 fig. 4; Kingsley, 1880: 206; De Man, 1892: 316; Ortmann, 1894: 713; Tesch, 1918: 96; Balss, 1934: 234, fig. 12; Estampador, 1937: 539; Minei, 1972: 50, 53, figs. 3-5.

*Pseudograpsus barbatus* Schmeltz, 1874: 75.

*Utica nausithoe* De Man, 1895: 113; De Man, 1898: 702, pl. 28 fig. 24; Rathbun, 1910: 308, pl. 2 figs. 2, 3; Tesch, 1918: 96.

*Utica* Estampador, 1959: 10.

Bondokodi River, 2 to 3 km above bridge near Kodi, West Sumba; under stones; 10 August 1949; no. 436. — 1 ♂, 1 ♀.

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 1 ♂.

*Utica gracilipes* and *Utica nausithoe* have generally been considered distinct species, although the differences were not very clear. Tesch (1918: 96) in a key to the species of *Utica* stated that the former species had the carapace without prominent ridges and the cheliped of the ♂ with a longitudinal ridge near the lower border of the palm, while in *U. nausithoe* the carapace should show a distinct cup-shaped ridge in the mesogastric region and a transverse ridge across the cardiac and branchial regions, and the chelipeds of the male be without ridges. Examination of Adams & White's (1849, pl. 13 fig. 6) illustration of one of the types of *Utica gracilipes* shows very clearly the cup-shaped and transverse ridges thought characteristic for *U. nausithoe* by Tesch. De Man (1895: 113) in the original description of *U. nausithoe* pointed to the close resemblance of the two species in "den äussern Habitus des Cephalothorax". In none of the descriptions of *U. gracilipes* published before 1918 anything is said about the presence or absence of ridges on the chela. De Man (1895: 117) made the remark: "Die erhabene Längsleiste, welche bei andern Arten auf der Aussenseite der Scheere vorkommt, fehlt bei *U. nausithoe* durchaus", but did not say that this carina occurs in all "andern Arten", so that this remark cannot be construed as meaning that the ridge is present in *U. gracilipes*. Tesch himself did not see any material of *U. gracilipes*, and Balss (1934) emphatically stated that no carina was present on the cheliped of the male specimen that he assigned to *U. gracilipes*. The characters given in Tesch's (1918) key, therefore, do not seem to hold.

De Man (1895) in the original description of *U. nausithoe* pointed to the close resemblance of that species to *U. gracilipes*, "sie unterscheidet sich aber sogleich durch die Scheerenfüsse". Now in the original description of *U. gracilipes* (which is almost word for word the same as that published by White, 1847b, and Adams & White, 1849) the only remark made about the chelipeds is found in the diagnosis of the genus: "Fore-legs small". Adams & White's (1849, pl. 13 fig. 6) figure shows a female with the normal small female chelipeds, very little details of the surface of the chelipeds is shown and certainly no ridge is visible in the figure. H. Milne Edwards (1853) did

not say anything about the chelipeds either. The specimens that De Man (1892: 316) himself brought to *U. gracilipes* were "ein junges Männchen" and "ein erwachsenes Weibchen". It is likely that in both the chelipeds were small. The types of De Man's *Utica nausithoe* were an adult male and an ovigerous female. The former, as shown in De Man's figures and as is described by him, has the chelipeds well developed and indeed strongly different from that of the female type of *Utica gracilipes* figured by Adams & White. The female type of *U. nausithoe* unfortunately "hat sämtliche Füsse verloren". It is highly likely therefore that the differences in "die Scheerenfüsse" of *U. gracilipes* and *U. nausithoe* found by De Man (1895) are nothing but differences due to sex. Unfortunately De Man in his original description of *U. nausithoe* nowhere goes deeper into the exact nature of the differences that he supposed to be between the two species. He indicated (: 115, 116) a few characters in which his *U. nausithoe* types differed from H. Milne Edwards' (1853, pl. 7 figs. 4) figures of the lower anterior part of the cephalothorax; but these differences are of a minor nature ("die Nasalplatte ist spitzer", "die Höhlen der innern Fühler reichen etwas mehr nach vorn", the inner margin of the third and fourth segment of the maxilliped are "etwas mehr nach innen gebogen", "die Unterrand der Augenhöhlen und dessen Innenlappen sind fein gekörnt, und schliesslich haben die zweiten und dritten Seitenzähne eine andere Form") and probably due to either individual variation or to slight inaccuracies of the artist of H. Milne Edwards' figure.

Comparison of my material, which includes an adult female (cl. 18 mm, cb. 19 mm) and two adult males (cl. 21.5 and 23.5 mm, cb. 23.5 and 25.5 mm), with the original and later descriptions of the two species convinced me that it is impossible to treat *U. gracilipes* and *U. nausithoe* as distinct species, they agree in all respects, and the so-called differences are only due to difference in sex or small individual variations. Minei (1972: 50, 53) already indicated that the two species are synonymous.

The carapace in my specimens very clearly shows the anterior "cup-shaped" ridge and the posterior transverse ridge which are so clearly shown in Adams & White's (1849) and De Man's (1898) illustrations. These ridges become especially conspicuous because the short dark brown hairs which cover the carapace are placed closer together on these ridges than in the rest of the carapace and thereby accentuate the ridges by making them stand out as dark lines. In my specimens there is a very noticeable short longitudinal median ridge behind the transverse ridge. This median ridge, which touches neither the transverse ridge nor the posterior margin, clearly shows in Balss's (1934) figure 12, it is vaguely visible in Adams & White's figure and not at all in De Man's.

The chelipeds of the adult male have been excellently described and figured by De Man (1895, 1898), his account holds very well for the present specimens. Balss (1934: 234, fig. 12) had a male, which is evidently not fullgrown (cl. 20.5 mm, cb. 22 mm) and in which the chelipeds are less well developed, but lack any ridge. In my female the chelae are very small, strongly resembling those of the female figured by Adams & White (1849, pl. 13 fig. 6). The chela is covered by very short dark brown hairs, and upon removal of those the palm shows to be entirely smooth, without a carina. The fingers are as long as the palm (measured dorsally) and have small rounded teeth regularly distributed over the cutting edge; the tips of the fingers are somewhat spoon-shaped, but end in a sharp curved tooth. The chela of the female is about three times as long as high and carries no large tufts of hairs as in the male. The only long hairs on the cheliped are a fringe along the inner margin of the merus and ischium, and one along the basal part of the outer margin of the merus. The walking legs are slightly less slender in the female than in the male: the merus of pereopods 3 and 4 are about 4 times as long as high in the males, about 3 times in the female. Soft bushy hairs are present on the posterior margin of the merus of the second to fourth pereopod in the male where they are quite conspicuous; in the female these hairs are absent. In both male the propodus and dactylus of the fourth and fifth pereopods have fringes of long hairs on the posterior margin.

The species has been reported from: Philippines (H. Milne Edwards, 1853), Negros Island, Philippines (White, 1847, 1847a, 1847b; Adams & White, 1849), near Samboangan, Mindanao, Philippines (White, 1847a, 1847b; Adams & White, 1849), Karakelong, Talaud Islands, Indonesia (Tesch, 1918), Atjeh (= Atchin), N. Sumatra (De Man, 1895), Buleleng, Bali, Lesser Sunda Islands (Rathbun, 1910), Mbawa River and Dona River near Ende, both localities on Flores (De Man, 1892), Mbura, West Flores, Lesser Sunda Islands, Indonesia (Balss, 1934), Ishigaki-jima, Ryukyu Islands, Japan (Minei, 1972), Fiji (Schmeltz, 1874; Ortmann, 1894). The Leiden Museum possesses a dry male specimen (cl. 26 mm, cb. 28 mm) from Sinabang, Simalur Island, off W. Sumatra, Indonesia and two small specimens labelled "South Seas no. 7403" bought from the Godeffroy Museum in January 1887. The number 7403 is that of the Godeffroy Museum Catalogue and this lot has been published in vol. 5 of the Catalogue (Schmeltz, 1874: 75) as follows: "7403. *Pseudograpsus barbatus* M. E. Viti-Inseln", it probably formed part of the same lot as Ortmann's specimens, which likewise came from Fiji and were bought from the Godeffroy Museum. There seems to be no good reason to doubt the correctness of the locality indication Fiji as Balss (1934) did, but a more thorough exploration of the

Fiji fresh and brackish waters will have to show whether or not the species actually does occur there.

The species has been found in fresh water: "fresh-water rivulet among the mountains" and "deep still muddy fresh-water rivers" (White, 1847a, b; Adams & White, 1849, who cite the last word as "rivulets"), "Fluss Mbawa, nahe dem Meere" and "aus süssem Wasser" (De Man, 1892). Tesch (1918) reported the species from Siboga Expedition Sta. 131 which is said to consist of "reef exploration"; as with *Ptychognathus riedelii* (see p. 17), *Pseudographus crassus* (see p. 19 above) and *Macrobrachium placidulum* (see p. 47 below), it seems more likely that the specimens were obtained from the interior of Karakelong Island. Minei (1972: 53) reported the species from "under the stones of the brackish water region". White (1847, 1847a, b) and Adams & White (1849) mentioned that the animals were "hiding under weeds and rotten wood", and, "when caught this singular crustacean feigns death, contracting its limbs and rendering them rigid, as if it were in catalepsy".

#### Plagusiinae

##### **Percnon planissimum** (Herbst, 1804)

Melolo, East Sumba; shore at low tide; 8 June 1949; no. 42. — 1 specimen.

The specimen is young (cl. 6 mm). No hairy groove is visible on the upper surface of the chela.

The species is widely distributed in the Indo-West Pacific area and has been reported from the Lesser Sunda Islands, but the present record is, so far as I know, the first from Sumba.

#### Sesarminae

Both the taxonomy and nomenclature of the Indo-West Pacific species of the genus *Sesarma* Say, 1817, s.l., are quite confused. The taxonomy of the group is now being studied by Dr. R. Serène, and a preliminary paper has been published (Serène & Soh, 1970) in which the old genus *Sesarma* was split up in a number of genera and subgenera; the typical genus *Sesarma* s.s. being restricted to the Atlantic and East Pacific areas. It is to be hoped that the definite revision of the Indo-West Pacific Sesarminae will soon be published, as the preliminary paper leaves several questions unanswered, and shows discrepancies between the generic diagnoses and the characters of the species assigned to these genera.

Also nomenclatural problems, some quite important, exist. Serène & Soh (1970: 345) erected a new genus *Neopisesarma* of which they remarked "The new genus generally corresponds to the Indo-Pacific species of *Sesar-*

*ma* which were included . . . in *Episesarma* by De Man (1895-97) [recte 1895: 165-181]. Because of the "unsufficient definition of *Episesarma* by De Man", the facts that "De Man (1897) failed to designate a type species", that "the designation of *tetragonum* as type for *Episesarma* by Rathbun (1918, p. 284) cannot be accepted", that "not all the species referred to *Episesarma* by De Man (1895) belong to *Neoepisesarma*", *Neoepisesarma* is established by Serène & Soh as a new genus as "such a confusion indicates that our concept of *Neoepisesarma* differs from that of De Man (1895) for *Episesarma*". Serène & Soh are correct in stating that Rathbun's (1918: 284) designation of *S. tetragonum* (Fabricius) "(= *Cancer tetragonus* Fabricius, 1798: 341) is wrong, as that species was not one of those included by De Man (1895: 165-181) in the original description of *Episesarma*. No other typedesignation for *Episesarma* is known to me (not even Serène & Soh did solve their problem that way) and I therefore select here as such "*Sesarma* (*Episesarma*) *taeniolata* White", the first species dealt with by De Man in his new genus. This name should be corrected to *Sesarma taeniolatum* Miers (1877: 137), White's (1847: 38) name being a nomen nudum, which was first made available by Miers. The valid name for this type species is *Sesarma mederi* H. Milne Edwards (1853), as H. Milne Edwards's name, although being junior to the nomen nudum *S. taeniolatum* White, 1847, antedates *S. taeniolata* Miers, 1877. As Serène & Soh (1970: 395) indicated *S. mederi* H. Milne Edwards, 1853, as the type of their *Neoepisesarma*, the latter name becomes a junior synonym of *Episesarma* De Man, 1895, which name thus should be used for the genus.

Another, more complicated problem is that offered by the name *Chiromantes* Gistel, 1848 (not *Chiromanthes* as written by Serène & Soh). *Chiromantes* was proposed by Gistel (1848: x) as a replacement name for *Pachysoma* De Haan, 1833 in the following sentence: "*Pachysoma* (Haan Crust.): *Chiromantes*, N." in his "Ergebnisse" zur "Synonymik der zoologischen und botanischen Arten- und Gattungsnamen". *Chiromantes*, as a replacement name, thus is an objective synonym of *Pachysoma* De Haan, 1833, which indeed is preoccupied (by *Pachysoma* MacLeay, 1821, Coleoptera). Rathbun (1918: 284) indicated as the type species of *Pachysoma* De Haan: *Pachysoma bidens* De Haan. This however is incorrect, as *P. bidens* was not an included species when the generic name *Pachysoma* was first published. The name *Pachysoma* was originally published by De Haan (1833: 5) in the first fascicle (or decade) of the Crustacea volume in the series Fauna Japonica. This first fascicle contained pp. ix-xvi of the first introduction, pp. 1-24 of the main text, pls. A, B, 1-8 and circ. pl. 2. The name *Pachysoma* appears on p. 5 in the key to the subgenera of *Grapsus* and is an available name, being

provided with a diagnosis. No species are named in the text of the first fascicle (the subgenus is defined and species are listed on p. 33 of the second fascicle, while the full treatment of the species is on pp. 60-62 also in the second fascicle, which was published in 1835). As to the plates of fascicle 1, the circular pl. 2 mentions the generic name without any species, but on pl. 7 fig. 4 "*Graps.[us]* (*Pachysoma*) *haematocheir* n.sp." is excellently illustrated, and on pl. 8 fig. 3 "*Graps.[us]* (*Pachysoma*) *quadratus*, Fabr." From these two species therefore the lectotype must be selected, and Rathbun's (1918: 284) selection thus is incorrect. A complication is that the species described and figured by De Haan as *Grapsus* (*Pachysoma*) *quadratus* Fabr. is generally considered to be different from both *Cancer quadratus* Fabricius (1798: 341, = *Sesarma* (*Parasesarma*) *plicata* (Latreille, 1806)) and from *Cancer quadratus* Fabricius (1787: 315, = *Ocypode quadrata* (Fabr.)), and it has therefore been renamed *Sesarma dehaani* H. Milne Edwards, 1853. It seems most sensible to select *Sesarma haematocheir* De Haan as the type species of *Pachysoma* De Haan, 1833. Hereby this species becomes also the type species of *Chiromantes* Gistel, 1848. *Sesarma haematocheir* is likewise the type species (by monotypy) of the genus *Holometopus* H. Milne Edwards (1853: 187). *Chiromantes* and *Holometopus* thus become objective synonyms and Gistel's name, being the older, should be retained. *S. dehaani* belongs to the same (sub)genus and its selection as the lectotype, would have the same nomenclatural consequences.

### ***Sesarma impressum* H. Milne Edwards, 1837**

Melolo River about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 1 juvenile female.

Rende River about 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 96. — 1 juvenile female.

Bondokodi River, 2 to 3 km above the bridge near Kodi, West Sumba; under rocks; 10 August 1949; no. 436. — 3 ♂♂, 3 ♀♀.

The adult specimens from Bondokodi River agree rather well with the descriptions published of the present species and with specimens in the collection of the Leiden Museum, especially the depressed area on the palm at the base of the fixed finger being quite distinct. The two largest males (both with cl. 23 mm, cb. 22 mm) were directly compared with a larger male (cl. 26 mm, cb. 24 mm) from Sumalata, N. Celebes, identified by J. J. Tesch, 1917: 159). In the Sumba specimens the epibranchial tooth does not reach farther sideways than the anterolateral angle of the carapace, while it does clearly so in the Celebes male. In the Sumba males the last segment of the abdomen is less deeply sunk into the penultimate segment, the anterolateral angles of which thereby are less broadly rounded. The gonopods in the Sumba

and Celebes specimens are similar in that both bear a long horn-coloured projection at the tip, which projection is directed obliquely outwards. This projection also is shown in Crosnier's (1965: 69, fig. 104) illustration of the species. In the Sumba specimens the projection is slightly wider and, in comparison to the rest of the pleopod, somewhat longer than shown in Crosnier's figure. Tesch (1917: 159) and Tweedie (1940: 102) already indicated that the species is very variable, and therefore these differences may fall within the range of variation of the species. The Sumba specimens strongly resemble the specimens from Flores described and figured by De Man (1892: 334, pl. 19 fig. 13) as *Sesarma frontalis* A. Milne Edwards, which Tesch (1917) regarded as having been founded on not yet fullgrown specimens of *S. impressum*.

The two female specimens from stations 40 and 96 are so young that their identity with the present species is far from certain.

*Sesarma impressum* ranges from E. Africa to Japan and Polynesia. At several instances the species has been mentioned from the Lesser Sunda Islands. Tesch (1918: 113) reported upon a juvenile ♂ collected in a river near Waingapu, Bay of Nangamesi, Sumba (Siboga Sta. 53).

Crosnier (1965) reported the species from mangroves. De Man's (1892: 330) material of "*S. impressa*" and "*S. frontalis*" came from rivers at Flores and Timor, probably from their lower reaches.

Serène & Soh (1970: 400, 401) placed *Sesarma impressum* in their new genus *Sesarmops*, of which they even indicated it as the type species. In their key, however, in order to distinguish this genus (and *Pseudosesarma* Serène & Soh) from *Bresedium* Serène & Soh, the authors (Serène & Soh, 1970: 391) stated that in *Bresedium* the male pleopod has "its distal part as an elongated slim process", while in *Sesarmops* and *Pseudosesarma* it has a "short chitinous apical process as habitual in Sesarminae". In *S. impressum*, however, the process is elongate.

#### ***Sesarma weberi* De Man, 1892**

Small valley S. of Melolo, East Sumba; under stones in fully dried out creek bed; 29 May 1949; no. 15. — 1 juvenile.

Kodi, West Sumba; under stone in dry soil on hill slope, about 100 m from river, 2-3 km above bridge; 10 August 1949; no. 437. — 1 ♂.

The adult male agrees very well with De Man's (1892: 538, pl. 20 fig. 15) extensive description and excellent figures of the type material of this species from Flores. Also the characteristic colour pattern is shown by the Sumba specimens, be it that the oblique lines going forward and inward on the carapace from the base of the last pereopods are far more distinct than the central part of the M-shaped figure.

The male gonopod is stubby and the distal horny process is short, not projecting beyond the hairs that are present on the distal part of the gonopod. In this feature the species differs strongly from *S. impressum*.

*Sesarma weberi* has been reported from Indonesia (the Lesser Sunda Islands and the Moluccas), the Philippines and the Territory of New Guinea; the species is now reported for the first time from Sumba. De Man (1892) mentioned it from 4 rivers at the island of Flores (Lesser Sunda Islands), one of the localities being below a waterfall. Bürger (1893: 624) stated that his specimens were collected "aus der Ebene und den Vorhügeln von Marineles" (probably Mariveles, Bataan Province, Luzon, Philippines, 700 m above sea level is meant), and that the species "lebt auf dem Lande". Bürger's record that the species is terrestrial agrees well with what is known of the Sumba specimens.

Serène & Soh (1970) placed this species with *S. impressum* in their genus *Sesarmops*. The shape of the male gonopod, however, is so different in the two species that these authors are correct that "if priority is given to the shape of the male pleopod" the two species "can hardly be considered as congeneric".

#### ***Sesarma trapezoideum* H. Milne Edwards, 1837**

Rende River, 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 96. — 4 specimens.

Waidjelu River near Laluku, East Sumba; 7 July 1949; no. 247. — 1 ♀.

These specimens agree quite well with De Man's (1887: 678) description and De Man's (1889: pl. 9 fig. 7) figure of this species. Also the colour pattern of the legs is quite characteristic.

The meri of the walking legs differ from those of other species of *Sesarma*, like *S. weberi*, in that the distal part of the posterior margin is not evenly and widely rounded, but shows an angle in the fifth leg, and two angles or an angle and a tooth in the second to fourth legs. These angles are shown in De Man's (1889) figure, but their presence is not mentioned in the (1887) description.

Serène & Soh (1970: 401) placed *Sesarma trapezoideum* in their new genus *Labuanium*, and listed the differences between *Labuanium* (with *S. trapezoideum*) and *Sesarmops* (in which they placed *S. weberi*) in 7 points under the latter genus. In the first three points my specimens of *S. trapezoideum* and *S. weberi* do not show any appreciable difference at all: (1) in both species the basal segment of the antennula is not remarkably swollen, if anything, it is more swollen in *S. weberi*; (2) the lateral border of the carapace is divergent posteriorly in both; (3) the relative width of the ischium

is about the same. As no males of *S. trapezoideum* are at my disposal I cannot judge points 4 and 5. The meri of *S. weberi* are more slender than those of *S. trapezoideum*, in contradistinction to what is said by Serène & Soh. Only their last point that in *Sesarmops* (and thus *S. weberi*) the dactyli of the walking legs are longer relative to the propodus than in *Labuanium* (and thus in *S. trapezoideum*) agrees with the present material.

*Sesarma trapezoideum* has a wide distribution, being reported from Indonesia and the Philippines to Polynesia. It has been reported before from the Lesser Sunda Islands (Flores, by De Man, 1892: 338) and was first recorded from Sumba by Roux (1928: 222) who reported on 6 specimens from Mau Marru. The species often has been reported from rivers (e.g. Sereinu River, Mentawai Islands, Sumatra (Nobili, 1899: 510), Lolak River, Celebes (Schenkel, 1902: 545), Fatana River, Tahiti (Rathbun, 1907: 33)), and sometimes from great altitudes: 2500 feet (= 800 m) on Halmaheira, Moluccas (De Man, 1902: 532), 500 m on Tahiti (Forest & Guinot, 1961: 157).

#### ***Sesarma maculatum* De Man, 1892**

Bondokodi River, 2-3 km above bridge near Kodi, West Sumba; under stones; 10 August 1949; no. 436. — 6 ♂♂, 2 ♀♀.

The specimens agree well with the original description and figures given by De Man (1892: 347, pl. 21 fig. 19) and with the additional details provided by Gordon (1937: 150, figs. 1, 2c, d, 3a-c). The characteristic spots on the chela are present in all my specimens.

The species is known from Indonesia (Lesser Sunda Islands, Moluccas) and the Solomon Islands. It was originally reported from Flores, but has, so far as I know, not been mentioned for Sumba. The habitats of the type specimens are rather diverse: "aus einem Walde", "aus süssem Wasser" and "dicht am Meere".

Serène & Soh (1970: 402) placed this species in the genus *Geosesarma* De Man, 1892. De Man, when he described *Geosesarma* as a subgenus of *Sesarma*, already assigned *S. maculatum* to this subgenus.

### Anomura

#### COENOBITIDAE

#### ***Coenobita rugosus* H. Milne Edwards, 1837**

Melolo, East Sumba; at night on road near the coast; 26 May 1949; no. 5. — 1 specimen.

Mouth of the Bondokodi River at Pero, near Kodi, West Sumba; from sand in the mangrove zone, marine; 31 July 1949; no. 340. — 3 specimens.

This species has wide range throughout the Indo-West Pacific region (E. Africa to Polynesia). It has been reported before from the Lesser Sunda Islands, but I know of no record from Sumba.

**Coenobita cavipes** Stimpson, 1859

Melolo, East Sumba; at night on road near the coast; 26 May 1949; no. 6. — 1 specimen.

*Coenobita cavipes* also has a wide range in the Indo-West Pacific region, and has several times been reported from the Lesser Sunda Islands. This, as far as I know, is the first record from Sumba.

Macrura

ATYIDAE

**Atya spinipes** Newport, 1847

Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 91 and 93. — 5 specimens (1 ovigerous ♀).

Bondokodi River 1 to 2 km above bridge near Kodi, West Sumba; 2 August 1949; no. 349. — 2 specimens.

Bondokodi River 2 to 3 km above bridge near Kodi, West Sumba; 10 August 1949; no. 438. — 14 specimens.

Takoka Brook about 1.5 km above mouth near Rua, West Sumba; 31 August 1949; no. 547. — 3 specimens.

Lindiwatju Brook near Lindiwatju, Central Sumba; 10 October 1949; no. 639. — 6 specimens.

*Atya spinipes* (formerly better known as *A. moluccensis* De Haan) has a wide distribution throughout the Indo-West Pacific region. It has been found in fresh waters from Madagascar to Polynesia. It is common in the Indonesian Archipelago and was first reported from Sumba by Roux (1928: 218), who mentioned several specimens from Pajeti, Mau Marru and from the Melolo River.

**Atya pilipes** Newport, 1847

Melolo River about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 2 juveniles.

Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; nos. 89 and 91. — 2 juveniles.

Melolo River near Mau Marru, East Sumba; 21 July 1949; no. 296. — 2 juveniles.

Waikamburu Brook, 4 km N. of Waimangura, West Sumba; 19 August 1949; no. 450. — 18 specimens.

Jengo Brook near Lokojengo, Central Sumba; 24 September 1949; no. 613. — 4 specimens.

Brook at Lerang near Rana Mese Lake, West Flores; 19 November 1949; no. 703. — 26 specimens (8 ovigerous ♀♀).

Two brooks north of Lerang, West Flores; altitude 1300 m; 21 November 1949; no. 704. — 30 specimens (including ovigerous females).

*Atya pilipes* is a well known fresh water shrimp, widely distributed throughout the Indo-West Pacific (Madagascar and the Seychelles to Polynesia); juveniles are sometimes found in brackish or salt water.

Roux (1928: 218) reported the species from Sumba (Melolo River near Mau Marru, alt. 450 m), while it has also been mentioned from Flores (e.g., De Man, 1892: 360, as *Atya brevirostris* De Man).

### **Caridina typus** H. Milne Edwards, 1837

Laiwuhi Brook south of Melolo, East Sumba; 31 May 1949; no. 24. — 13 specimens.  
Laiwuhi Brook slightly above previous locality; 2 June 1949; no. 31. — 17 specimens.  
Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 91. — 1 specimen.

Waidjelu River near Laluku, East Sumba; 7 July 1949; no. 247. — 6 specimens.

Bondokodi River, 2-3 km above bridge near Kodi, West Sumba; 10 August 1949; no. 438. — 1 ovigerous female.

Waikamburu Brook, 4 km N. of Waimangura, West Sumba; altitude about 250 m above sea level; 19 August 1949; no. 450. — 3 specimens.

Small forest brook, branch of the Matakori Brook, about 6 km southwest of Waimangura, West Sumba; 31 August 1949; no. 469. — 26 specimens (none ovigerous).

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 24 specimens.

Kadoko Spring, 3 km west of Rua, West Sumba; 31 August 1949; no. 550. — many juveniles.

*Caridina typus* is a species with a wide distribution in the Indo-West Pacific region; it is known from fresh waters, from East Africa and Madagascar to Japan and Polynesia. There are several records from the Lesser Sunda Islands, but as far as I know, the species has not been reported before from Sumba.

### **Caridina weberi** De Man, 1892

Melolo River, about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 8 very young specimens.

Small brook near the spring Matawai Kenor, near Prai Jawang, East Sumba; 10 June 1949; no. 71. — 4 specimens.

Rende River, 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 89, 90, 91. — 7 juveniles.

Waidjelu River near Laluku, East Sumba; 7 July 1949; no. 247. — 22 specimens.

Melolo River near Mau Marru, East Sumba; 21 July 1949; no. 296. — 44 specimens (including ovigerous females).

Mbana Brook at Laau near Mau Marru, East Sumba; 22 July 1949; no. 312. — 123 specimens (including ovigerous females).

Waitombo River near Rara, West Sumba; 10 August 1949; leg. A. Wegner; no. 440. — 2 specimens.

Waikamburu Brook, 4 km north of Waimangura, West Sumba; 19 August 1949; no. 450. — 31 specimens.

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 6 juveniles.

Kadoko Spring, 3 km west of Rua, West Sumba; 31 August 1949; no. 550. — 41 specimens.

Jengo Brook near Lokojengo, Central Sumba; 24 September 1949; no. 613. — 58 specimens.

Lindiwatju Brook near Lindiwatju, Central Sumba; 10 October 1949; no. 639. — 19 specimens.

Maharang River (called Kadassa River in its lower part) near Langgaliru, Central Sumba; 10 October 1949; no. 641. — 8 specimens.

Two brooks north of Lerang, Flores; altitude about 1000 m; one of these brooks is an effluent of Rana Mese Lake; 21 November 1949; no. 704. — 26 specimens (6 ovigerous females).

*Caridina weberi* is a species close to *C. typus*. Like that species it has a short rostrum, the antennal spine is placed on the lower orbital angle (not below it like in *C. longirostris*). The telson has a wide posterior margin with a median triangular point; between the larger of the two lateral pairs of spines of the posterior margin of the telson there are 2 to 4 pairs of still longer spine-like setae, which are divided into two parts by a chitin plug. The dorsal surface of the telson bears 5 pairs of spines. Epipods are present on the first four pairs of pereopods.

The endopod of the first pleopod of the male carries a distinct appendix on the inner margin just before the tip.

No spine is present on the pre-anal carina, which is bluntly angular.

The diarsis bears 18 to 22 spinules.

The eggs are numerous and measure 0.25-0.5 mm in diameter.

In some juvenile specimens of Station 550 the dorsal teeth on the rostrum are small and feeble, and in some the number of teeth is very small, in a few cases being just 2. Some of these specimens come close to De Man's (1892: 375, pl. 22 fig. 24) *Caridina parvirostris*, which is synonymized by Johnson (1963: 25, 26) with the present species.

Johnson (1964: 25, 26) recognized two subspecies of *Caridina weberi*, the nominate subspecies and *C. w. sumatrensis*. All the present material belongs to *C. w. weberi*, as the dorsal rostral teeth do not reach behind the orbit or hardly so.

The range of *Caridina w. weberi* extends from Java, Celebes, and the Lesser Sunda Islands to Polynesia, *C. w. sumatrensis* has been reported from Sumatra, Malaya, Hong Kong, India and the Comores. The exact range of the species and its forms is not yet known and comparative examination of more material is needed to solve this problem. Roux (1928: 217) reported the species from Sumba (without precise locality); he brought his material with some doubt to the subspecies *celebensis* Schenkel. The epithet *celebensis* Schenkel, 1902, cannot be used as it was proposed by Schenkel in the genus *Caridina* and thus is a primary junior homonym of the epithet *celebensis*

De Man, 1892 proposed in the combination *Caridina serratirostris celebensis*. No replacement name for Schenkel's subspecies is suggested here, as the validity of this taxon is doubtful and first should be well established.

***Caridina sundanella*** new species

Sta. 450. Waikamburu Brook, 4 km N. of Waimangura, West Sumba, altitude about 250 m above sea level; 19 August 1949; no. 450. — 11 specimens.

The rostrum is short, high, straight or slightly curved down. It reaches almost to the end of the second segment of the antennular peduncle or slightly beyond. The upper margin bears 19 to 26 closely placed denticles, 3 or 4 of which are placed behind the orbit. The distal teeth are rather irregularly spaced or separated from the tip by an unarmed portion. The lower margin is strongly convex, in contradistinction to the upper margin which is only slightly convex. On the lower margin there is a group of 6 to 8 teeth, separated from the tip by a short unarmed stretch. The midrib of the rostrum merges with the post-orbital margin; the rostrum is somewhat higher below the midrib than above.

The orbit ends ventrally in a blunt but distinct orbital angle, some distance below which there is a strong antennal spine. The pterygostomial angle is rounded and slightly forwards produced.

The fifth abdominal somite has the pleuron ending in an angular tip. The sixth somite is slightly shorter than the telson and slightly less than  $2/3$  as long as the carapace (without rostrum). The pleuron of the 6th somite is bluntly pointed, the posterolateral angle is triangular and bluntly pointed.

The telson is rather wide posteriorly. The upper surface bears 4 or 5 pairs of spines in the posterior half. The posterior margin of the telson is rather wide and bears a small median denticle. The outer posterior spines are quite short, the second lateral pair is much longer, about 4 times as long. The intermediate spines number six, are feathered and are as long as or slightly longer than the second lateral spine, they show a chitin plug. The anal carina is irregular, but bears no spine.

The eyes are well developed with the cornea large and globular.

The stylocerite reaches the base of the distal fourth of the basal antennular segment. The anterolateral angle of the basal segment is strongly produced and reaches almost the middle of the second segment. The second segment is about 1.5 times as long as the third, both are twice or slightly less than twice as long as wide.

The scaphocerite reaches somewhat beyond the antennular peduncle. It is 3.5 times as long as wide. The lamella reaches far beyond the final tooth. The outer margin is straight or slightly convex. The peduncle reaches to the

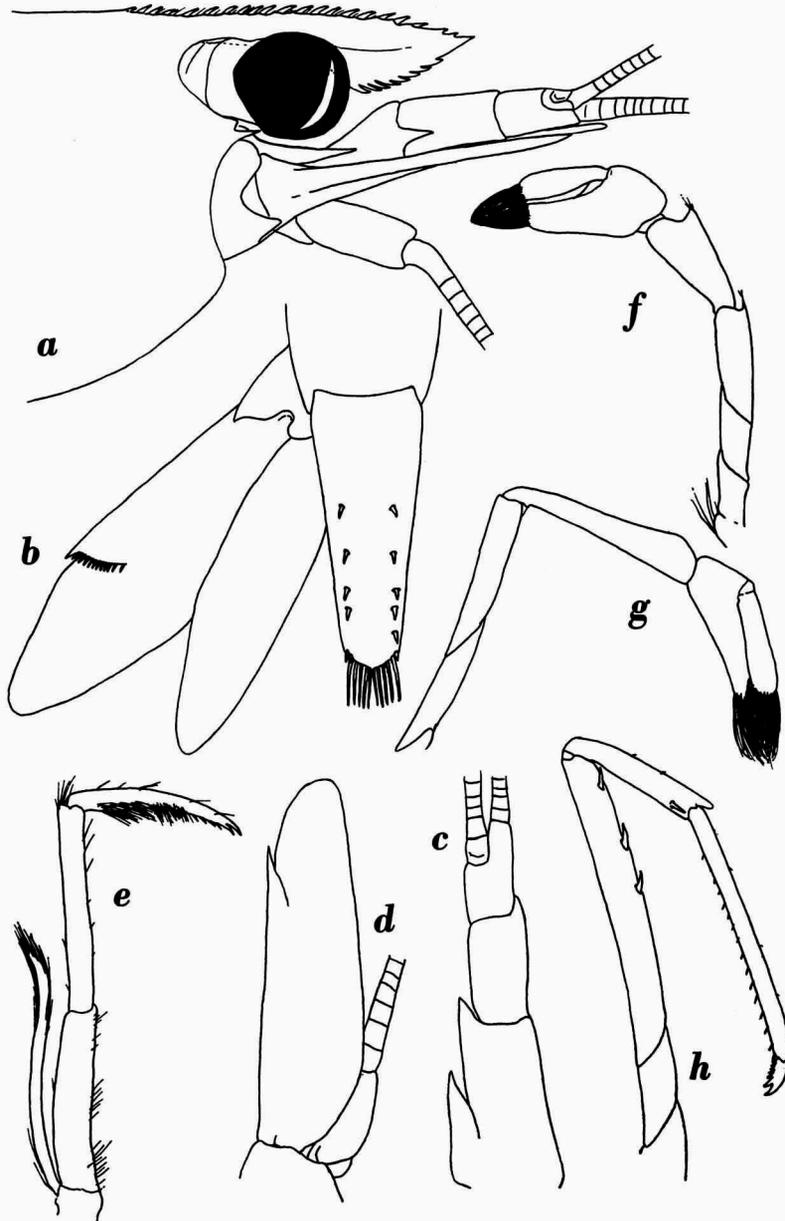


Fig. 11. *Caridina sundanella* new species, paratype. a, anterior part of body in lateral view; b, telson and left uropod in dorsal view; c, antennular peduncle; d, antennal peduncle and scaphocerite; e, third maxilliped; f, first pereiopod; g, second pereiopod; h, third pereiopod. a-h,  $\times 12$ .

middle of the scaphocerite and the end of the first antennular segment. A rather broad, but sharp tooth is placed on the outer part of the antennal peduncle near the base of the scaphocerite.

The branchial formula is normal, with epipodites on the first 4 pairs of pereopods.

The third maxilliped reaches almost the end of the antennal peduncle. The last segment, which is somewhat shorter than the penultimate, ends in two teeth and bears the usual spines and setae. The antepenultimate segment is about as long as the ultimate. The exopod is well developed.

The first pereopod reaches about to the end of the antennal peduncle. The fingers are short and blunt, the palm measures about 0.7 times the length of the fingers. The carpus is excavated anteriorly and is twice as long as high. It is longer than the merus and  $3/4$  as long as the chela. The second leg reaches about to the end of the final tooth of the scaphocerite, it is far more slender than the first. The fingers are about twice as long as the palm. The carpus is about 1.4 times as long as the chela and is more than 5 times as long as high, it is distinctly longer than the merus. The third leg reaches to or somewhat beyond the scaphocerite. The dactylus is short, measuring less than  $1/5$  of the length of the propodus. It ends in two distinct claws and bears about 5 spinules on the posterior margin. The propodus has the

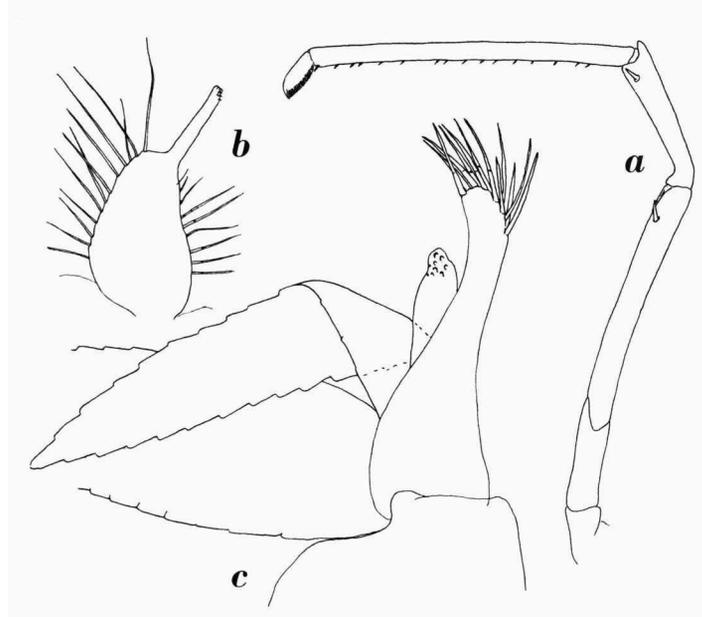


Fig. 12. *Caridina sundanella* new species, paratype. a, fifth pereopod; b, endopod of first pleopod of male; c, second pleopod of male. a, b,  $\times 12$ ; c,  $\times 50$ .

posterior margin with a row of short spinules, about 15 in number. The carpus is slightly more than half as long as the propodus and bears a movable spine in the distal part of the outer margin. The merus is strong, distinctly longer and broader than the propodus; it bears 3 strong movable spines in the distal half of the posterior margin. The fourth leg reaches the final tooth of the scaphocerite; it is similar to the third. The fifth leg reaches the end of the antennular peduncle. The dactylus measures about 1/7 of the length of the propodus. It ends in a curved claw-like tip and carries on the posterior margin a row of about 35 closely placed comb-like arranged spinules. The long propodus has a number of small spinules placed on the posterior margin. Both the carpus and the merus carry a strong movable spine in the distal part of the outer surface. The carpus is about half as long as the propodus. The merus is somewhat shorter than the propodus.

The first pleopod of the male bears a distinct appendix interna at the distal part of the inner margin of the triangular endopod. The appendix masculina of the second male pleopod is strong, longer than the appendix interna and bears a cluster of distal strong, almost spine-like, setae.

The protopod of the uropod has the outer distal lobe triangularly pointed, the inner rounded. There are about 12 spinules placed on the diaeresis of the exopod. The exopod and endopod are elongate oval and distinctly longer than the telson.

Size. The carapace length of the examined specimens ranges from 6.5 to 9 mm, the total length from 17 to 25 mm. No ovigerous females are present.

The species, by having an appendix interna (stylamblys) on the endopod of the first male pleopod, differs from *C. serratiostris* and *C. celebensis* and resembles the other species of the genus dealt with here. In the long intermediate setiform spines of the posterior margin of the telson, and in the short rostrum it resembles *C. typus* and *C. weberi*, and differs from the rest of the species (*C. longirostris*, *C. gracilirostris*, *C. brevicarpalis*). From *C. typus* it can immediately be distinguished by the dentate rostrum, and from *C. weberi* by the fact that the rostrum is much higher and has 3 or 4 dorsal teeth placed behind the orbit. From both *C. typus* and *C. weberi* it differs in that the antennal spine is not placed on, but below the lower angle of the orbit, the latter being quite conspicuous thereby.

### ***Caridina gracilirostris*** De Man, 1892

Melolo River about 2 km above its mouth, near Melolo, East Sumba; 8 June 1949; no. 40. — 2 specimens (1 ovigerous).

Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 90. — 5 specimens.

Bondokodi River at bridge near Kodi, West Sumba; 31 July 1949; no. 342. — 25 specimens (including ovigerous females).

Bondokodi River, about 20 minutes above the bridge at Kodi, West Sumba; 1 August 1949; no. 348. — 8 specimens (of which 4 ovigerous).

Bondokodi River 1 to 2 km above the bridge near Kodi; 2 August 1949; no. 349. — 5 specimens.

Kadengar River at Sodan near Waikarudi, West Sumba; 7 September 1949; no. 579. — 2 specimens.

The species is widely distributed throughout the Indo-West Pacific region (Madagascar to Palau and New Caledonia), it is often found in slightly brackish water. Although reported before from the Lesser Sunda Islands, it has not been mentioned before from Sumba.

### ***Caridina longirostris* H. Milne Edwards, 1837**

Laiwuhi Brook, S. of Melolo, East Sumba; 31 May 1949; no. 24. — 38 specimens (with ovigerous females).

Laiwuhi Brook, slightly above previous locality; 2 June 1949; no. 31. — 3 specimens (2 ovigerous).

Waidjelu River, Laluku, East Sumba; 7 July 1949; no. 247. — 36 specimens (including ovigerous females).

Bondokodi River about 20 minutes above bridge at Kodi, West Sumba; 30 July 1949; no. 335. — about 300 specimens (including ovigerous females).

Bondokodi River near bridge at Kodi; 31 July 1949; no. 342. — many specimens, including ovigerous females and many very early juveniles.

Bondokodi River near Kodi, same locality as no. 335 above; 1 August 1949; no. 348. — 52 specimens (including ovigerous females).

Bondokodi River, 1 to 2 km above bridge near Kodi; 2 August 1949; no. 349. — 47 specimens (including ovigerous females).

Bondokodi River, 2 to 3 km above bridge near Kodi; 10 August 1949; no. 438. — 13 specimens (including ovigerous females).

Takoka Brook about 1.5 km above its mouth at Rua, West Sumba; 31 August 1949; no. 547. — 140 specimens (including ovigerous females).

Kadoko Spring, 3 km west of Rua, West Sumba; 31 August 1949; no. 550. — 7 juveniles.

The specimens agree well with the description of this species given by Holthuis (1955: 20, fig. 6) based on specimens from Madagascar.

The eggs are numerous and small in the present material, measuring 0.25 × 0.40 mm. The ovigerous females have a length of 25 to 35 mm.

The variation in the relation of the length of the various segments of the legs is as in the above cited description. The carpus of the first leg is 2 to 3 times as long as high and the dactylus of the third leg is 1/5 to 1/6 as long as the propodus, the dactylus of the fifth leg being relatively longer.

The preanal carina has a distinct spine.

The juveniles from Sta. 550 have the rostrum relatively very short.

The species of the *Caridina nilotica*-complex have always provided problems to the zoologists studying them, and the situation at present is far from

clear. Bouvier (1925) recognized one species *C. nilotica* with many subspecies. He is followed by many later authors (e.g. J. Roux in his various publications), while others (e.g. Johnson, 1963) raised several of the subspecies to the status of good species. A study of more material, and especially of living samples, is needed before a satisfactory solution can be reached.

*Caridina longirostris* has a wide distribution (at least from Madagascar to New Caledonia), but its exact range is not known due to the confused state of our knowledge of it and related species.

It is possible that the specimens that Roux (1928: 216) reported under the name *Caridina nilotica brachydactyla* from Karoni, West Sumba, actually belong to the present species.

*Caridina longirostris*, although close to *C. brachydactyla* De Man, 1908, can immediately be distinguished from that species by that the distal spine on the posterior margin of the propodus of the third to fifth pereopods is not enlarged, but of about the same size as the other spines of that margin. It seems likely that many specimens reported upon in the literature as *C. brachydactyla* actually belong to the present species.

#### ***Caridina brevicarpalis* De Man, 1892**

Melolo River at about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 19 specimens (including 3 ovigerous females).

Rende River, 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 89-93. — 143 specimens (including ovigerous females).

Waidjelu River near Laluku, East Sumba; 1 July 1949; no. 247. — 66 specimens (including ovigerous females).

Bondokodi River, about 20 minutes above the bridge at Kodi, West Sumba; 30 July 1949; no. 335. — 41 specimens (including ovigerous females).

Bondokodi River, 2 to 3 km above the bridge at Kodi; 10 August 1949; no. 438. — 17 specimens (including ovigerous females).

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 20 specimens.

Kadengar River at Sodan near Waikarudi, West Sumba; 7 September 1949; no. 579. — 26 specimens (including ovigerous females).

The present specimens for the far greater part have the rostrum long, reaching beyond the end of the scaphocerite and thus belong to ssp. *endeheensis* De Man, 1892.

The elongate upturned rostrum makes that the present species superficially strongly resembles *Caridina longirostris*, but the short cup-shaped carpus of the first pereopod and the short dactylus of the fifth leg immediately distinguish it from that species. Another remarkably constant feature in the present species is the total absence of a subapical tooth on the dorsal margin of the rostrum, a character also easy to use to distinguish this species from related forms; it is rather unexpected to find that in the otherwise so variable rostrum, this character is so constant.

The species was well described by De Man (1892: 397-399, pl. 24 fig. 30) and Bouvier (1925: 178-181, figs. 372-374). It would be interesting to find out whether the differences between the Celebes and Lesser Sunda Islands populations justify the retention of two subspecies. The present material can unhesitatingly be brought to ssp. *endehensis*, although there are a few specimens in which the rostrum is shorter than figured by De Man for this form. Also Roux (1928) found this subspecies in his Sumba material.

Epipods are present on all first four pereopods.

The endopod of the first pleopod of the male, like in *C. longirostris*, has a distinct appendix interna.

The telson bears 5 pairs of dorsal spinules. Its posterior margin ends in a triangular median tooth. The outer spines of the posterior margin are short, the next pair is the longest and reaches somewhat beyond the 2 inner pairs, which are also slightly narrower. The diaeresis carries 8 to 10 spines.

The anal carina is provided with a distinct spine.

*Caridina b. brevicarpalis* so far was only known from the type locality: River near Palopo, Lawu District, Celebes (De Man, 1892: 397) and from Vunindawa, Vitilevu, Fiji Islands (Edmondson, 1953: 7). The subspecies *C. b. endehensis* De Man was originally reported from the rivers Ba near Endeh and Mbawa, both localities on the island of Flores, Lesser Sunda Islands (De Man, 1892: 399). Later it was also reported from Pajeti, Sumba, Lesser Sunda Islands (Roux, 1928: 218) and from the Pancipit River, Batangas Province, Luzon, Philippines (Blanco, 1935: 34, pl. 2 fig. 25). Roux (1928: 200) mentioned the species from the Waiko River, Waigeu, northern Moluccas, Indonesia; his specimens, judging by his description were somewhat intermediate between the nominal subspecies and *C. b. endehensis*. Edmondson (1935: 8) indicated that the species also has been reported from Amboina, southern Moluccas, but I cannot find any confirmation for this.

### ***Caridina serratirostris* De Man, 1892**

Melolo River about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 1 ovigerous ♀.

Bondokodi River, about 20 minutes above the bridge at Kodi, West Sumba; 30 July 1949; no. 335. — 150 specimens (including ovigerous females).

Bondokodi River, same locality as the previous station; 1 August 1949; no. 348. — 17 specimens (including ovigerous females).

Bondokodi River, 1-2 km above the bridge at Kodi, West Sumba; 2 August 1949; no. 349. — 1 ovigerous ♀.

Bondokodi River, 2-3 km above the bridge at Kodi, West Sumba; 10 August 1949; no. 438. — 9 specimens (including ovigerous females).

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 50 specimens (including ovigerous females).

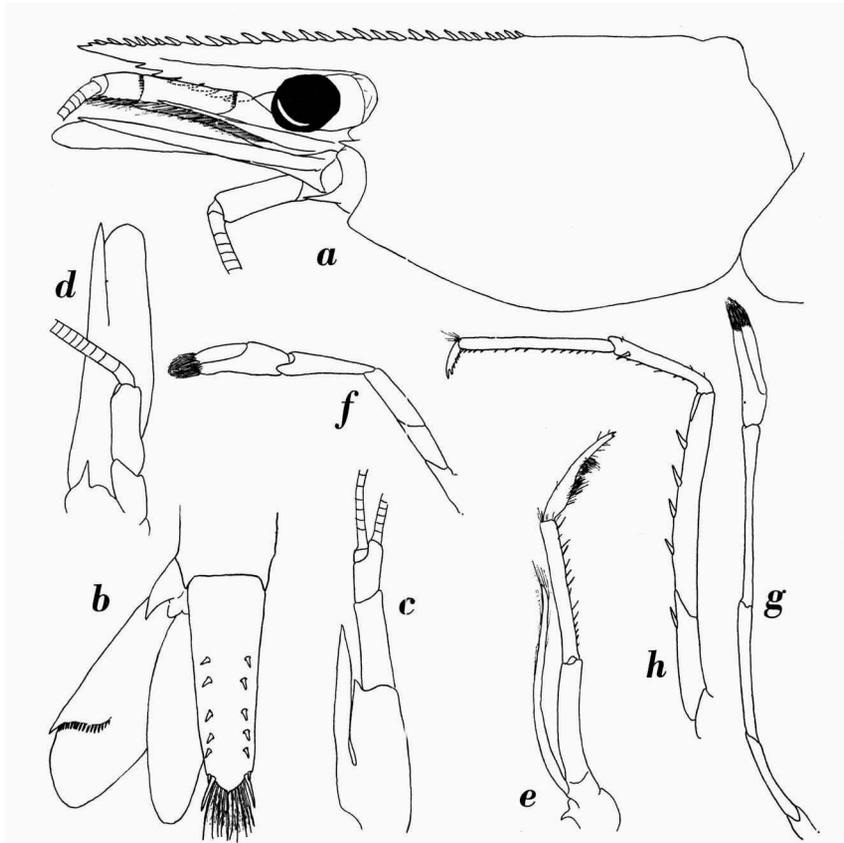


Fig. 13. *Caridina serratirostris* De Man, specimen from Sta. 348. a, anterior part of body in lateral view; b, telson and left uropod in dorsal view; c, antennular peduncle; d, antennal peduncle and scaphocerite; e, third maxilliped; f, first pereiopod; g, second pereiopod; h, third pereiopod. a-h,  $\times 12$ .

The relation between the present species and the next, will be discussed under the latter.

*Caridina serratirostris* differs from the *Caridina* species dealt with above by that the first pleopod of the male lacks the appendix interna on the endopod.

The species has a wide geographical distribution, ranging from Madagascar to Okinawa and New Caledonia. The type localities are "Saleyer" (= Salajar Island off S.W. Celebes) and Flores, Lesser Sunda Islands. The species has not been reported before from Sumba.

#### ***Caridina celebensis* De Man, 1892**

Laiwuki Brook south of Melolo, East Sumba; 31 May 1949; no. 24. — 10 specimens (2 ovigerous ♀♀).

Bondokodi River, about 20 minutes above the bridge at Kodi, West Sumba; 30 July 1949; no. 335. — 2 specimens (1 ovigerous).

Same locality as the previous station; 1 August 1949; no. 348. — several hundreds of specimens (including ovigerous females).

Bondokodi River, 2-3 km above the bridge at Kodi, West Sumba; 10 August 1949; no. 438. — 2 ovigerous females.

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — several hundreds of specimens.

De Man (1892: 385, pl. 23 fig. 28 f-h) described a variety *celebensis* of *Caridina serratirostris*, which he considered to be a subspecies of that species, characteristic for the island of Celebes.

Numerous specimens of this form are represented in the collection at hand from Sumba, and most were found in the same samples with *C. serratirostris* s.s. The differences between the two forms for the larger part are of a relative nature and, as intermediate forms are found, the status of the two forms offers quite a problem. Either *C. s. celebensis* is a good species, distinct from *C. serratirostris*, or it is just a form (normal or aberrant) of the latter species and then not even subspecifically distinct. A careful study of the biology of the two forms may reveal some interesting aspects, and may help to solve this taxonomic problem.

For the time being I treat here the two forms as good species. As a rule the adult specimens can readily be assigned to one species or to the other.

*Caridina celebensis* as a rule is smaller than *C. serratirostris*, ovigerous females have the carapace from 3.5 to 6.0 mm long, while in the present material of *C. serratirostris* ovigerous females have a carapace length of 6.5 to 8 mm.

The rostrum in *C. celebensis* is straight and reaches about to the base of the third segment of the antennular peduncle (in adult specimens it often reaches somewhat beyond that point, in juveniles less far). The upper margin of the rostrum bears 11 to 25 teeth, usually between 17 and 19; of these teeth 6 to 8 are placed on the carapace behind the orbit. On the upper margin of the carapace (the rostrum included) the posterior unarmed portion is about 0.7 to 1.0 times the length of the denticulated portion (in juveniles it usually is relatively longer than in the adults). The lower margin of the rostrum bears 2 to 8 teeth, the distal part being usually unarmed.

In *C. serratirostris* the rostrum as a rule reaches somewhat beyond the antennular peduncle. The upper margin bears 19 to 29 teeth (usually 23 to 26), of which 6 to 10 stand behind the orbit. The unarmed posterior portion of the dorsomedian line of the carapace is about 0.5 to 0.6 times the length of the distal denticulated part. The lower margin of the rostrum bears 3 to 9, usually 5 to 7, teeth. The rostrum in *C. serratirostris* thus is longer than in *C. celebensis* with more dorsal teeth, which start farther posteriorly.

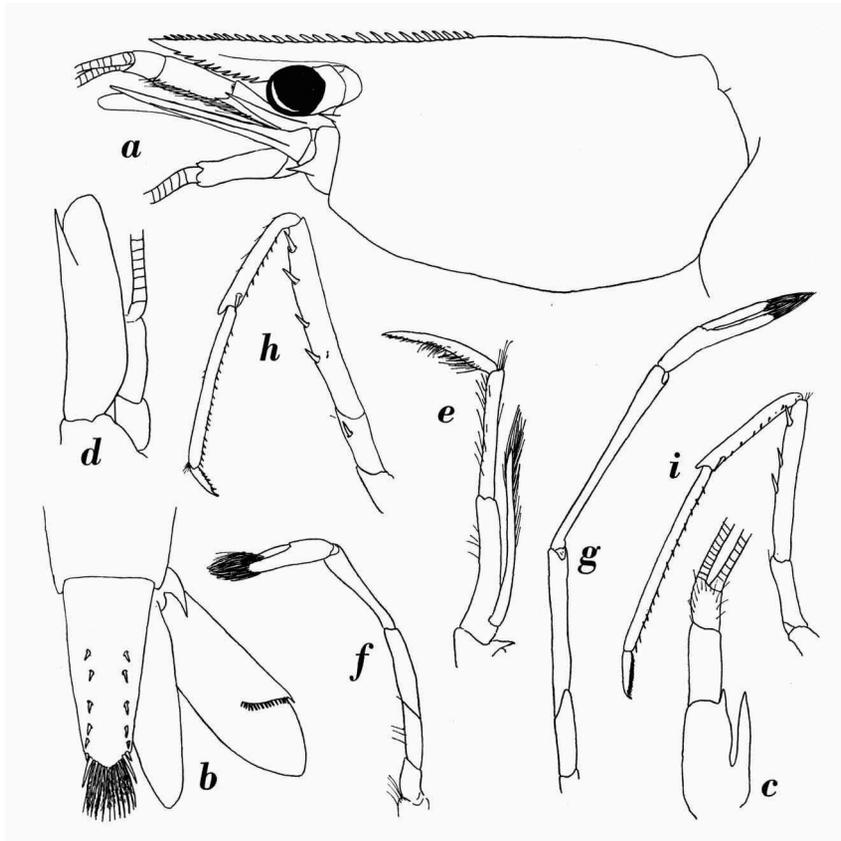


Fig. 14. *Caridina celebensis* De Man, specimen from Sta. 24. a, anterior part of body in lateral view; b, telson and right uropod in dorsal view; c, antennular peduncle; d, antennal peduncle and scaphocerite; e, third maxilliped; f, first pereopod; g, second pereopod; h, third pereopod; i, fifth pereopod. a-i,  $\times 12$ .

In the rest of the carapace and in the abdomen, including the tailfan, I could not find any difference between the two species. The telson has in both the same wide posterior margin with a median denticle and several long inner pairs of feathered hairs, which show a chitinous plug.

The antennula in *C. celebensis* has the stylocerite in adults reaching just beyond the end of the first segment of the peduncle, while in juveniles it fails to reach the end of the segment. *C. serratirostris* is characterized by that the stylocerite in adults reaches to or beyond the middle of the second segment of the antennular peduncle, but in the juveniles it may reach far less far forwards and then does not differ from that in *C. celebensis*. Also in *C. serratirostris* this second segment is more elongate and slender than in *C. celebensis*.

In *C. celebensis* the first pereopod reaches to the end of the second segment of the antennular peduncle. The fingers are about as long as the palm. The carpus is longer than the chela, while the merus is about as long as the chela, and the ischium shorter. In *C. serratirostris* the first pereopod is less slender, the fingers are usually longer than the palm, and the carpus is as long as or shorter than the chela. The second leg is very slender and reaches with the larger part of the chela beyond the scaphocerite. The palm is 0.7 to 0.8 times of the length of the fingers and is elongate. The carpus is slightly more than 1.5 times as long as the chela and is somewhat shorter than merus and ischium combined. In *C. serratirostris* the second leg reaches to or only slightly beyond the scaphocerite; the palm is shorter, being almost to quite half as long as the fingers, and not elongate as in *C. celebensis*.

The third to fifth legs of *C. celebensis* all reach about to the end of the second segment of the antennular peduncle. The spinulation of the third and fourth legs resembles that in *C. serratirostris*, the legs, however, are less slender in *C. celebensis*. In the fifth leg of *C. celebensis* the merus usually is about 1.2 to 1.4 times as long as the carpus; in *C. serratirostris* it is longer, being about 1.6 to 1.8 times as long as the carpus.

In the branchial formula, pleopods and uropods hardly any difference is noticeable between the two species.

Although adult specimens (e.g. ovigerous females) of the two species as a rule are readily separable, this is far more difficult with the juveniles as many of the characters change with age. This variation connected with age, plus the individual variation, which often is considerable, makes that it is not too easy to distinguish the 2 species the more so, as they occur in many instances together at the same locality. Also Holthuis (1969: 97, 98) expressed doubt as to the validity of the distinction of the two taxa.

*C. celebensis* was originally described from a river near Palopo, Luwu District, south central Celebes. It has also been reported from New Caledonia, while the form that Kamita (1951, Bull. Shimane University (Nat. Sci.), 1: 5, figs. A-J) described as *Caridina serratirostris koterai* from Shimokô, Iwami Province, S.E. Honshu, Japan, was later synonymized by its author (Kamita, 1961: 74) with *C. serratirostris celebensis*, and it was then reported from Kyushu, Shihoku and southern Honshu. Kamita (1961, fig. 32) also provided interesting figures of the colour pattern of the species.

#### PALAEMONIDAE

##### Palaemoninae

### **Palaemon concinnus** Dana, 1852

Bondokodi River at bridge near Kodi, West Sumba; 31 July 1940; no. 342. — 26 specimens.

Bondokodi River, 1-2 km above bridge near Kodi; 2 August 1949; no. 349. — 9 specimens.

Bondokodi River, 2-3 km above bridge near Kodi; 10 August 1949; no. 348. — 3 specimens.

*Palaemon concinnus* has a wide range in the Indo-West Pacific area, being found in fresh, brackish and salt water, from East Africa to Polynesia. It has been reported before from the Lesser Sunda Islands (Bali, Lombok, Flores), but is now reported for the first time from Sumba.

### **Macrobrachium rosenbergii** (De Man, 1879)

Rende River, 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 95. — 6 specimens.

The specimens are not fullgrown, the largest having a carapace length (rostrum excluded) of 30 mm.

The lot was accompanied by the following colour description made from the living animals: "Sehr schön gefärbt: Körper hell bräunlichweiss, Zeichnung dunkelrotbraun bis schwarzbraun, Rostrum zinnoberrot (der gesägte Rand farblos), auf den letzten Körpersegmenten seitlich braunrote Flecken, schwarzbraun eingefasst. Innenast der Antenne dunkelblau, Scherensegmente in der Mitte grünblau, Gelenke orange gelb".

The rostrum in all specimens reaches distinctly beyond the scaphocerite, the dorsal basal crest is rather distinct, the rostral formula is:  $\frac{2)10-14}{[5] 9-10} (2-4)$

Johnson (1958: 261, fig. 1) thought that 2 subspecies could be distinguished in the present species, an eastern (typical) subspecies, and a western. The present specimens, apart from the fact that the rostrum reaches distinctly beyond the scaphocerite, agree best with Johnson's eastern subspecies. The fact that none of the specimens is fullgrown makes it impossible to give a definite statement as to their subspecific status (if subspecies actually can be recognized).

*Macrobrachium rosenbergii* is known from a rather wide range: India to Palau, New Guinea and N. Australia. It inhabits fresh, brackish and salt water, and at present is the subject of many experiments for shrimp culture. It has been reported before from Sumba, viz. from Pajeti near Waingapu on the N.E. coast of the island (Roux, 1928: 219, as *Palaemon (Eupalaemon) carcinus*; Holthuis, 1950: 114).

### **Macrobrachium australe** (Guérin, 1838)

Melolo River, about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 1 specimen and 32 juveniles.

Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 89, 90, 92-94. — 23 specimens (including ovigerous ♀♀).

Waidjelu River near Laluku, East Sumba; 7 July 1949; no. 247. — 1 specimen.

Bondokodi River 2-3 km above bridge near Kodi, W. Sumba; 10 August 1949; no. 438. — 12 specimens.

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 7 specimens.

One of the specimens from Rende River (lot no. 93) carries a bopyrid parasite in one of the gill chambers.

The species is well known and widely distributed throughout the Indo-West Pacific region, its range extending from Madagascar to Polynesia. It lives in fresh water, but probably passes part of its juvenile life in brackish or salt water. It has been reported before from Sumba: Pajeti near Waingapu, N.E. Sumba (Roux, 1928: 219, as *Palaemon (Eupalaemon) dispar*; Holthuis, 1950: 126), Karoni, West Sumba (Roux, 1928: 219, as *Palaemon (Eupalaemon) dispar*), north coast of Sumba (Holthuis, 1950: 125), River near Waingapu, Bay of Nangamesi, Siboga Exped. Sta. 53 (Holthuis, 1950: 125). The one but last lot was collected by H. F. C. ten Kate during his stay at Sumba from 6 June-19 August 1891; as shown by his narrative, Ten Kate (1894: 541-638, 1 map) covered practically the entire north coast of the island, from Laura in the N.W. to Bender in the S.E.

### **Macrobrachium equidens** (Dana, 1852)

Bondokodi River, about 20 minutes above bridge at Kodi, West Sumba; 1 August 1949; no. 348. — 1 juvenile.

Bondokodi River, 1 to 2 km above bridge at Kodi; 2 August 1949; no. 349. — 1 juvenile.

Bondokodi River, 2 to 3 km above bridge at Kodi; 10 August 1949; no. 438. — 4 specimens.

There are no full grown specimens in this material so that the identification is not fully certain.

The species has a wide distribution in the Indo-West Pacific region (India to S. China, New Guinea, New Britain and New Caledonia). It is often found in brackish water. It has been reported from the Lesser Sunda Islands (Lombok, Flores) but so far was not known from Sumba.

### **Macrobrachium lar** (Fabricius, 1798)

Laiwuhi Brook, S. of Melolo, East Sumba; 31 May 1949; no. 24. — 5 juveniles.

Laiwuhi Brook, S. of Melolo, slightly above previous locality; 2 June 1949; no. 31. — 1 juvenile.

Melolo River, about 2 km above mouth at Melolo; 8 June 1949; no. 40. — 4 juveniles.

Rende River, 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 90, 91, 94. — 1 ovigerous female, 3 juveniles.

Waidjelu River and small forest brook near Laluku, East Sumba; 17 July 1949; no. 247. — 8 juveniles.

Melolo River near Mau Marru, East Sumba; 21 July 1949; no. 296. — 1 specimen.

Melolo River and tributaries and a tributary of the Rende River near Mau Marru; 21 July 1949; no. 297. — 2 specimens.

Bondokodi River about 20 minutes above the bridge near Kodi, West Sumba; 30 July 1949; no. 348. — 1 juvenile.

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 6 juveniles.

Kadoko Spring 3 km W. of Rua, West Sumba; 31 August 1949; no. 550. — 12 specimens.

Kadengar River at Sodan near Waikarudi, West Sumba; 7 September 1949; no. 579. — 1 specimen.

Spring at Waikarudi; 7 September 1949; no. 583. — 1 male.

One of the most common and widest ranging fresh water shrimps of the Indo-West Pacific region, this species is known from East Africa to the Ryukyu Islands and Polynesia. It inhabits fresh water, but in all probability spends part of its juvenile life in brackish or salt water.

The species was first reported from Sumba by De Man (1893: 305) and Ten Kate (1894: 633) under the name *Palaemon (Eupalaemon) lar*; the material, collected by H. F. C. ten Kate, was taken in western Sumba, somewhere along the north coast between Waingapu and Laura. Roux (1928: 210), under the same species name, listed the present species from Laura (West Sumba) and Mau Marru (East Sumba). Holthuis (1950: 179) reported on the material previously dealt with by De Man (1893) and Ten Kate (1894) and also (p. 181) mentioned a specimen from West Sumba (collected 18 October 1932) and from Lahalura Island (= Halura Id., = Hoog Id.), off S.E. Sumba (2 May 1909).

### **Macrobrachium latimanus** (Von Martens, 1868)

Melolo River and its tributaries and tributary of Rende River near Mau Marru, East Sumba; 21 July 1949; no. 297. — 1 specimen.

Waitombo River near Rara, West Sumba; 10 August 1949; leg. A. Wegner; no. 440. — 16 specimens.

Jengo Brook near Lokojengo, Central Sumba; 24 September 1949; no. 613. — 2 specimens.

Maharang River near Langgaliru, Central Sumba; 10 October 1949; no. 641. — 2 specimens.

Brook near Lerang, Rana Mese, West Flores; 19 November 1949; no. 703. — 1 juvenile.

Two brooks north of Lerang, Rana Mese; 21 November 1949; no. 704. — 1 ovigerous female.

*Macrobrachium latimanus* has a wide distribution in the fresh waters of the Indo-West Pacific region. It ranges from India and Ceylon to the Ryukyu Islands and Polynesia. The species has been frequently reported from the Lesser Sunda Islands and is mentioned from Sumba by Roux (1928: 220), viz. from Kananggar and Mau Marru.

Although very young specimens may be found in brackish water, the adults often are taken at great altitudes. The altitudinal records in the literature are: 800 m (= 2500 ft.) at Halmaheira (De Man, 1902: 780), 1250 m (= 4000 ft.) at Yule Id. (De Man, 1904: 296), 400 and 700 m at Sumba (Roux, 1928: 220), 500 m at Bali and 1200 m at Flores (Roux, 1929: 236), 375, 400, 530 and 550 m (= resp. 1200, 1270, 1700 and 1750 ft.) at the Marquesas Islands (Adamson, 1935: 17), 500 m at Sumatra; 500, 700 and 900 m at Timor; 544 m at Buru (Holthuis, 1950: 206), 762 and 915 m in India (Tiwari, 1961: 98). The altitude at which the present specimens from Sta. 703 (Flores) were collected is given as 1300 m, thus slightly higher than the highest record thusfar (1250 m).

**Macrobrachium bariense** (De Man, 1892)

Bondokodi River, 2-3 km above bridge at Kodi, West Sumba; 10 August 1949; no. 438. — 19 specimens.

The specimens agree quite well with the published descriptions of this species.

So far the species was only known from fresh waters in eastern Indonesia (N. Celebes, Waigeo, Aru Islands, Flores, and Sumba), the type locality is Bari in W. Flores. The previous records from Sumba are by Roux (1928: 219), who reported upon material from Pajeti and from Kambera River (collected by K. W. Dammerman in 1925) and by Holthuis (1950: 236) who re-examined Roux's material from Pajeti and moreover dealt with many specimens collected during the 1899-1900 Siboga Expedition in a river emptying in the Bay of Nangamesi on the northcoast of the island near Waingapu.

**Macrobrachium latidactylus** (Thalwitzer, 1891)

Melolo River about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 13 specimens.

Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 89-93. — 45 specimens.

Waidjelu River and small forest brook near Laluku, East Sumba; 7 July 1949; no. 247. — 3 juveniles.

Bondokodi River about 20 minutes above the bridge at Kodi, West Sumba; 30 July 1949; no. 335. — 3 juveniles.

Same locality; 1 August 1949; no. 348. — 1 juvenile.

Bondokodi River, 1 to 2 km above the bridge at Kodi; 2 August 1949; no. 349. — 3 specimens.

Bondokodi River, 2 to 3 km above the bridge at Kodi; 10 August 1949; no. 438. — 16 specimens (1 ovigerous).

Takoka Brook, about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 22 specimens (mostly juveniles).

One of the specimens from lot 93 carries a bopyrid isopod in the right branchial chamber.

The identity of the very young specimens is not fully certain.

*Macrobrachium latidactylus* so far is known only from the Malaysian area: the Siamese Malay States, Malaya, the Philippines and Indonesia. It has repeatedly been found in the Lesser Sunda Islands and the following records deal with material from Sumba: Pajeti and Mau Marru (Roux, 1928: 220 as *Palaemon (Macrobrachium) latidactylus*), Pajeti and river emptying into the Bay of Nangamesi near Waingapu (Holthuis, 1950: 239, 240).

The species inhabits fresh water, but it is likely that part of its juvenile life is spent in brackish or sea water.

#### **Macrobrachium lepidactyloides** (De Man, 1892)

Melolo River, about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 1 ♂, 1 ovigerous ♀.

Rende River 10 minutes above Prai Jawang, East Sumba; 13 June 1949; no. 92. — 1 ovigerous female.

The specimens, which are well developed, agree well with the definition of the present species as given by Holthuis (1952: 210, pl. 15 fig. 2).

This freshwater species is known from the Malay Archipelago (Philippines and Indonesia) and has also been reported from Fiji. There are several records from the Lesser Sunda Islands (Lombok, Flores, Sumba); the previous records from Sumba are from the Kambera River and from Mau Marru (Roux, 1928 as *Palaemon (Macrobrachium) lepidactylus lepidactyloides*), and a record stating just "Sumba" (Holthuis, 1950: 246 as *Macrobrachium hirtimanus*). The latter record is based on a ♀ collected by Rev. P. J. Lambooy and therefore probably originates from Pajeti.

#### **Macrobrachium placidulum** (De Man, 1892)

Melolo River, about 2 km above its mouth near Melolo, East Sumba; 8 June 1949; no. 40. — 1 ♂.

Bondokodi River, 2 to 3 km above bridge at Kodi, West Sumba; 10 August 1949; no. 438. — 2 specimens.

Takoka Brook about 1.5 km above its mouth near Rua, West Sumba; 31 August 1949; no. 547. — 2 specimens.

The specimen from Sta. 40 is an adult male and agrees well with the published descriptions of the species. The other specimens are not or not quite full grown, but can be confidently assigned to the present species: their very long first legs and other characteristics make their identity clear.

*Macrobrachium placidulum* is best known from eastern Indonesia (Talaud Islands, Celebes, Moluccas, Lesser Sunda Islands and New Guinea); from

outside this area there are records from Nias and New Hanover, which, however, need confirmation. The two previous records from Sumba are from Pajeti (Roux, 1928: 219 as *Palaemon (Macrobrachium) placidulus*; Holthuis, 1950: 254), both being based on the same material. The species inhabits fresh water. Holthuis (1950: 253) reported a specimen collected by the Siboga Expedition, supposedly during "reef exploration" at Beo, Talaud Islands. The fact that at the same station typical fresh water species, like *Ptychognathus riedelii* (see p. 17 above), *Pseudograpsus crassus* (see p. 19) and *Utica gracilipes* (see p. 19), were taken makes the accuracy of the indication "reef exploration" doubtful, as was also implied by Holthuis (1950: 256).

### **Macrobrachium cowlesi** Holthuis, 1950

Rende River 10 minutes above Prai Jawang, East Sumba, 13 June 1949; no. 89. — 7 specimens.

The specimens agree well with Cowles's (1915: 397, pl. 3 fig. 11) description and figures of the species.

In the present material the rostrum is straight and reaches to or just beyond the antennular peduncle. The rostral formula in the larger specimens (cl. 9-14 mm) is: 4-5) 13-16/2, only in the very small specimen (cl. 6.5 mm) it is 3) 10/0.

In Cowles's specimens which were fully adult males and much larger than the present ones (tl. 59.5 and 58 mm; cl. 20 and 19 mm) the rostral formula is 6-7) 14-15/2 with the rostrum relatively shorter (not reaching the end of the antennular peduncle).

In the largest of my specimen the greater part of the carpus of the large second leg and the chela of the smaller reach beyond the scaphocerite. In the larger leg the fingers are slightly less than  $\frac{2}{3}$  of the length of the palm, they gape and have the part of the cutting edge distally of the larger basal teeth provided with rather widely, but evenly, spaced small teeth. The basal tooth of the fixed finger is distinctly, that of the dactylus hardly, larger than the distal teeth. The palm is somewhat less than 2.5 times as long as high and widens slightly distally. It bears the two characteristic tufts of soft hairs in the basal part: one tuft, the larger, on the ventral surface, the other, smaller, dorsally. The carpus is about  $\frac{2}{3}$  as long as the palm and about as long as the merus; scattered soft hairs are present on carpus and merus. In Cowles's adult specimens the fingers of this larger leg are more slender and more gaping, being also relatively longer, but the dentition of the fingers and the pubescence of the segments is very similar.

In the smaller second leg of my largest specimens the fingers are about as

long as the palm but do not yet gape. The carpus is about as long as the merus and as long as the palm.

The differences between the present specimens and the types of *M. cowlesi* evidently are due only to difference in age and size.

*Macrobrachium cowlesi* was so far only known from the Philippines, the two type specimens were obtained "from the filter of the Bureau of Science, which receives its water from the Manila city water supply" (Cowles, 1915: 400).

#### Pontoniinae

##### **Periclimenes seychellensis** Borradaile, 1915

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 2 specimens.

The species is known from an extensive area (Red Sea to Papua), but, although it has been reported before from the Lesser Sunda Islands, it is now recorded for the first time from Sumba.

##### **Periclimenes grandis** (Stimpson, 1860)

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 2 specimens.

Like the previous species this is a widely distributed marine shrimp (Red Sea to the Malay Archipelago). The species had been reported before from the Lesser Sunda Islands, but not yet from Sumba.

#### GNATHOPHYLLIDAE

##### **Gnathophyllum americanum** Guérin, 1856

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 1 ovigerous female.

The species is known from the Indo-West Pacific region (East Africa to Polynesia), the West Atlantic (Bermuda, West Indies) and the East Atlantic (Canary Islands). So far it had not been reported from Sumba.

#### ALPHEIDAE

##### **Athanas djiboutensis** Coutière, 1897

Reef near Rua, West Sumba; 1 September 1949; no. 563. — 1 specimen.

A common and widely ranging Indo-West Pacific marine species, known from the Red Sea and E. Africa to Polynesia. It is now reported for the first time from Sumba.

**Synalpheus amboinae** (Zehntner, 1894)

Reef near Rua, West Sumba; 1 September 1949; no. 563. — 1 ovigerous female.

The specimen agrees well with the published descriptions. The merus of the fifth pereopod, like those of the third and fourth, is provided with a distinct distal spine.

The species has been reported from Singapore, Indonesia (Moluccas, Aru Islands, Lesser Sunda Islands), and the Gilbert Islands (Onotoa). Though it is known from Flores and Timor, it had not been reported before from Sumba.

**Alpheus** sp.

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 1 juvenile.

A juvenile of the *edwardsii* group, in which the smaller cheliped is missing, could not be identified as far as the species.

## HIPPOLYTIDAE

**Saron marmoratus** (Olivier, 1811)

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 1 specimen.

*Saron marmoratus* is one of the best known and most widely distributed of the Indo-West Pacific Hippolytidae. It is known from the Red Sea and East Africa to Japan, Australia and Polynesia. It has been reported before from Sumba, viz. by Holthuis (1947: 28) who reported upon a specimen in the Amsterdam Museum, collected on 29 December 1909 on the southcoast of Sumba by Mr. H. J. M. Laurens.

**Hippolyte ventricosa** H. Milne Edwards, 1837

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 36 specimens (including ovigerous females).

Reef near Rua, West Sumba; 1 September 1949; no. 563. — 12 specimens (1 ovigerous female).

The species is known from the Red Sea and East Africa to Australia. It has been reported before from the Lesser Sunda Islands (Flores, Timor) but not from Sumba.

**Latreutes pygmaeus** Nobili, 1904

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 2 specimens (1 ovigerous).

The specimens agree quite well with Kemp's (1914: 99, pl. 2 figs. 7, 8, pl. 3 figs. 1-7) excellent account of the species.

*Latreutes pygmaeus* inhabits an extensive region, ranging from the Red Sea and S.E. Africa to Australia. It is now reported for the first time from Indonesia.

**Latreutes** spec.

Reef near Rua, West Sumba, 1 September 1949; no. 563. — 1 specimen.

The specimen is young and in the shape of its rostrum somewhat resembles *L. mucronatus* (Stimpson, 1860). The antennulae are much shorter than in the previous species and lack the long outer distal spine of the basal segment.

The scaphocerite is most remarkable by not tapering towards the tip, but having the lamella well developed, broad anteriorly with the antero-internal angle produced forward almost as far as the final tooth.

The specimen is too young to permit its certain identification.

**Lysmata vittata** (Stimpson, 1860)

Seashore near Melolo, East Sumba; 8 June 1949; no. 42. — 20 specimens (1 ovigerous).

The species has been usually indicated with the name *Hippolysmata vittata*, but recent researches (Kubo, 1951: 278; Chace, 1972: 124) have shown that there is not sufficient reason to treat the genera *Lysmata* and *Hippolysmata* as distinct genera.

*H. vittata* is widely distributed through the Indo-West Pacific region. Its known range extends from the Western Indian Ocean to China, Japan, the Malay Archipelago and Western Australia. It was known from the Lesser Sunda Islands, but had not been reported before from Sumba.

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Plate of Sumba textile showing shrimps (*Macrobrachium*) in lateral view; lower band with the design of (Sandalwood) horses. Ikat cloth from Sumba, coll. L. B. Holthuis.