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TWO FRESHWATER PRAWNS OF THE GENUS *MACROBRACHIUM* (CRUSTACEA DECAPODA: PALAEMONIDAE) FROM NEW GUINEA

by

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Key words: Crustacea Decapoda; Palaemonidae; *Macrobrachium*; description; distribution; New Guinea.

Macrobrachium natulorum spec. nov. is described from the Wissel Lakes area, Irian Jaya (New Guinea), Indonesia. The species is closest to *M. lorentzi* (J. Roux, 1921). A map showing the localities where the two species were found is given.

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INTRODUCTION

On 21 December 1953 the Rijksmuseum van Natuurlijke Historie received six specimens of a species of *Macrobrachium* from Dr. K. W. J. Boelen, resident physician at Enarotali, Netherlands New Guinea. The specimens were collected in the Wissel Lakes, a complex of lakes in the central mountain range of western New Guinea (at that time Netherlands New Guinea, now called Irian Jaya and part of Indonesia), situated at an altitude of about 5000 feet (fig. 6). Enarotali, the government post, lies on the largest of the lakes, Paniai (fig. 1). The specimens immediately aroused my interest as they obviously belonged to an undescribed species, but, since no fullgrown males were present, the material was insufficient to serve as the basis for a description.

When in 1955 I visited the Wissel Lakes (fig. 1) myself in the company of my colleagues Dr. L. D. Brongersma and Dr. M. Boeseman, the acquisition of additional material of this *Macrobrachium* was high on my list of priorities. I was lucky enough to obtain a good series (more than 450 specimens) contain-

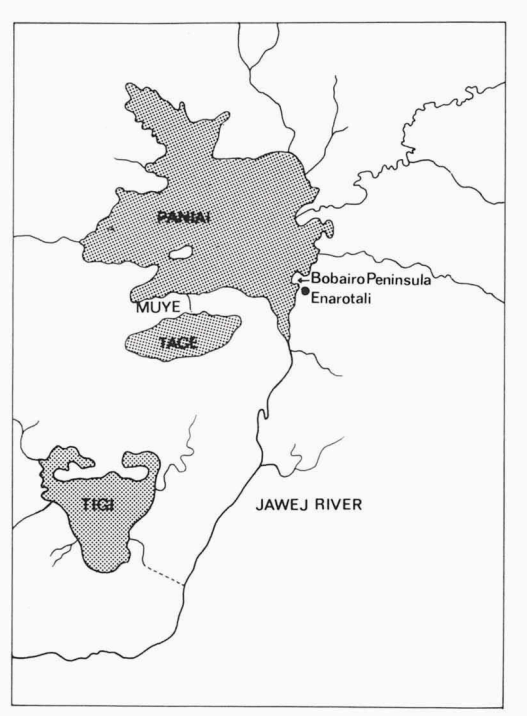

Fig. 1. Wissel Lakes region. 1:660.000.

ing adult males and ovigerous females. It is on this material that the following description of *Macrobrachium natulorum* is based.

The new species proved to be closest to *Macrobrachium lorentzi* (J. Roux) previously described from lowland areas of New Guinea. As new information on that species became available, it is also treated here.

The present paper is dedicated to Prof. Dr. Rudolf Altevogt at the occasion of his 60th birthday on 22 January 1984, as a token of admiration for his pioneer investigations on the biology of Crustacea Decapoda, in particular the fiddler crabs of the genus *Uca*.

Macrobrachium natulorum spec. nov.
(figs. 2, 3)

Macrobrachium spec. Holthuis, 1956: 134, fig. 3.
"An undescribed species" of *Macrobrachium* Holthuis, 1982: 610.

Wissel Lakes; 1952–1953; leg. M. Boelen. — 6 specimens, cl. 15-20 mm.

Near Enarotali, Wissel Lakes (exact locality not known, material found in the hospital at Enarotali on 16 February 1955); 1953-1954; leg. K. W. J. Boelen. — 82 specimens, cl. 8-21 mm (at least one ovigerous female, cl. 21 mm).

Between Bobairo Peninsula (east coast of Paniai Lake, just N. of Enarotali) and Muye (= Moeije) district (south coast of Paniai Lake, between it and Tage Lake), Paniai Lake, Wissel Lakes; January, February 1954; leg. K. W. J. Boelen. — 261 specimens, cl. 9-24 mm (with at least 11 ovigerous females, cl. 18-21 mm).

Jawej River (an effluent of Paniai Lake, leaving the lake in its S. E. corner) near Paniai Lake, at river bank, caught by native children, 7 January 1955, L. B. Holthuis, no. 669. — 17 specimens, cl. 11-25 mm (1 ovigerous female, cl. 21 mm).

Jawej River at the level of Tigi Lake, Wissel Lakes region; bought from native women, 13 January 1955; L. B. Holthuis, no. 675. — 105 specimens, cl. 13-21 mm (with 8 ovigerous females, cl. 15-17 mm).

Description. — The rostrum is short and does not reach beyond the end of the antennular peduncle, usually attaining the middle of the third segment; it is not very high. The rostral formula is 4-5) 9-13/2-3, being usually 4)11/2. The dorsal teeth of the rostrum extend backward over about 1/3 to 1/4 of the carapace. These dorsal teeth have the posterior two to four smaller and more erect than the others. The antennal spine is well developed; the hepatic spine is slightly smaller than the antennal and lies behind and distinctly below the latter, the two are not placed in a single line. The hepatic spine lies directly below the third of the dorsal rostral teeth or at the level between the third and fourth teeth. In adult males the anterior half of the carapace is roughened by numerous very small spinules, which are densest anterolaterally.

The abdomen is smooth, the pleura of the first four somites are broadly rounded, that of the fifth somite ends in a distinct angle with a narrowly rounded top. The fifth somite measures 5/6 of the length of the sixth. The telson is 1.5 times as long as the sixth somite. Both pairs of dorsal spines are placed behind the middle of the telson. The posterior margin of the telson ends in a blunt triangular median tooth. The posterior spines are rather short, but the inner pair distinctly overreaches the tip of the telson; the outer pair is about half as long as the inner. Between the inner spines there are numerous hairs in two layers: an upper transverse row of about ten to twelve shorter, naked bristles, and a lower transverse row of about the same number of longer, feathered setae.

The eyes are well developed with a rounded cornea which is darkly pigmented and wider but slightly shorter than the eyestalk; a small, black ocellus is placed against the cornea.

The stylocerite of the antennular peduncle reaches to the middle of the basal segment, the anterolateral spine of this segment is strong and almost attains the anterior margin of the second segment, reaching far beyond the anterior margin of the basal segment. The shorter branch of the outer antennular fla-

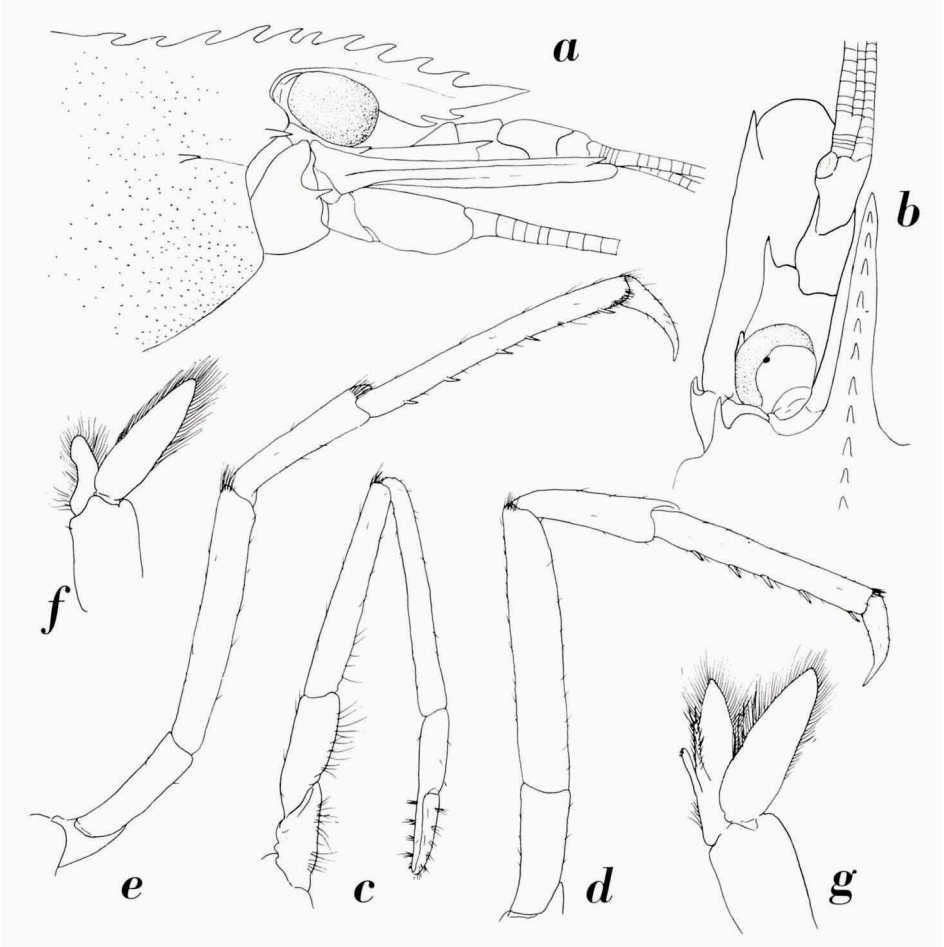

Fig. 2. *Macrobrachium natulorum* new species, male. a, anterior part of body in lateral view; b, rostrum, eye, antennula and antenna, in dorsal view; c, first pereiopod; d, third pereiopod; e, fifth pereiopod; f, first pleopod; g, second pleopod. a-g, ×6.

gellum is fused with the longer branch only in the extreme basal part; the free part of the shorter ramus shows a distinct serration at the inner margin.

The scaphocerite reaches distinctly beyond the antennular peduncle and is about 2.5 times as long as broad. The outer distal tooth is strong and curved slightly inward, it does not quite reach the end of the lamella.

The third maxilliped reaches to about the end of the antennular peduncle.

The first pereiopod reaches with the chela beyond the scaphocerite. The fingers are as long as the palm and the carpus is about 1.5 times as long as the chela. The length of the carpus is about 6 times its width. The merus is slightly shorter than the carpus.

The second legs of the adult male are strongly different in shape and size. The large leg reaches with carpus and chela beyond the scaphocerite. The fingers are as long as or slightly longer than the palm, they are straight with curved tips. The cutting edges of the fingers bear eight to twelve distinct but short and blunt teeth, which distally are smaller and placed wider apart than proximally; they are placed over the full extent of the cutting edges. The fingers and the extreme distal part of the palm are covered by a dense and long pubescence, which completely obscures the spinulation and denticulation of the fingers. The pubescence reaches all the way to the tips of the fingers and is of the same density all over. The hairs have to be removed to show the dentition of the cutting edges. These edges are straight and almost completely close over their full length. The palm is about 1.7 times as long as high; it is slightly compressed, its width measuring about 0.7 times its height. The very dense pubescence of the fingers extends only over a very narrow distal portion of the palm, which otherwise is naked but for a few scattered short stiff simple hairs. The spinulation of the palm consists of numerous very small spinules among which there are scattered larger spinules; the larger spinules are most distinct in the lower half of the palm, dorsally the large spinules diminish in size and are not so clearly set off from the smaller. The carpus is as long as the palm or slightly longer, it is practically cylindrical, narrowing rather abruptly near its base, it is about 2.5 times as long as high; its spinulation is like that of the palm, while also the short scattered simple hairs, but no velvety pubescence, are present. The merus is practically as long as, or slightly shorter than the carpus; it is twice as long as high, being somewhat swollen in the middle, the spinulation and setation is as in the carpus.

The smaller second leg of the adult male reaches with part of the carpus beyond the scaphocerite. The fingers are narrow and distinctly gaping; they show no distinct teeth on the cutting edge. They are fully twice as long as the palm. Long, stiff hairs are placed all over the chela, but there is no velvety pubescence and the outline of the fingers is not obscured; on either side of the cutting edges there are tufts of such long hairs, which fill the gap between the fingers when these are closed. On the palm the ventral hairs are longer and stronger than the dorsal. Small spinules are present on the palm. The carpus is slightly longer than the palm and about twice as long as high. Its spinulation is similar to that of the palm. The merus is as long as the carpus but less wide.

The third leg reaches just beyond the scaphocerite. The propodus is more than twice as long as the simple dactylus; it bears two parallel rows of four or five strong spines on the posterior margin. The carpus is about half as long as the merus, and the merus is somewhat longer than the propodus. The fifth leg is somewhat more slender than the third and has the propodus relatively long-

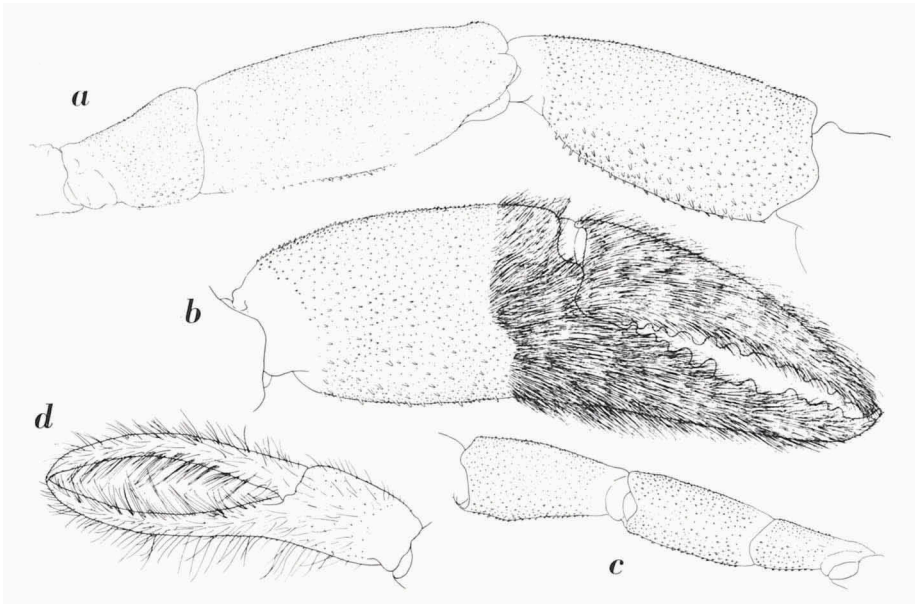

Fig. 3. *Macrobrachium natulorum* new species, male. a, ischium, merus and carpus of large second leg; b, chela of large second leg; c, ischium, merus and carpus of smaller second leg; d, chela of smaller second leg. a-d, ×6.

er, otherwise the two legs are similar; the posterior margin of the propodus shows one or two transverse distal rows of setae.

The endopod of the first male pleopod has the inner margin concave, the outer margin convex, the top is bluntly rounded. The appendix masculina of the second male pleopod is longer and stronger than the appendix interna and bears numerous stiff bristles.

The uropods are of the normal shape for the genus. The protopod ends dorsally in two blunt teeth: one over the base of the endopod, the other over the base of the exopod; the latter has the blunt tip curved inward. The outer margin of the exopod is slightly convex and ends in a blunt tooth, with a movable spine at its inner side.

The adult (ovigerous) female is similar to the male in most respects. The spinules in the anterior part of the carapace are fewer and smaller, being far less conspicuous. The smaller second leg has the fingers hardly at all gaping and the proximal part of the cutting edge, especially in the dactylus, has the teeth more distinct. The fingers are distinctly less than twice as long as the palm. The larger leg is relatively smaller than in the male, but shows the same pubescence. The dentition of the cutting edges is as in the male, only it does not reach as far distally, the end of the edge being entire. Both the left and

right second leg reach with a longer or shorter part of the carpus beyond the scaphocerite. The eggs are relatively few (about 30 to 40) and large, measuring about 1.5 by 2.0 mm.

In juveniles the carapace is smooth, showing no spinules. The second legs reach with the chela beyond the scaphocerite and are less different than in the adults; in both, the fingers are longer than the palm (1.2 to 1.3 times) and neither bears a velvety pubescence, only scattered setae. In the smaller leg the palm is twice as long as high, in the larger slightly less than twice. The cutting edges in the larger leg show some inconspicuous denticles in the extreme proximal part, in the smaller they are practically non-existent. The carpus is 2.5 to almost 3 times as long as high, being more slender than in the adults.

Size. — The total length of the specimens varies between 18 and 53 mm, corresponding to a carapace length of 9 to 25 mm. Ovigerous females have a total length of 32 to 49 mm and a carapace length of 15 to 21 mm. The eggs are 1.5 by 2.0 mm.

Colour. — The living specimen gives the impression of a pale bluish- or brownish-grey animal with pale green, large chelipeds. The carapace is rather uniformly greyish dorsally, sometimes more yellowish in the lateral parts, especially posteriorly. Sometimes there are lighter spots in the median and submedian regions of the anterior half. The rostrum is greyish with the midrib darker. The abdomen, including the pleura, is uniformly bluish- or brownish-grey; often the abdomen has a darker tinge than the carapace. The posterior margin of the tergites and pleura often shows a darker, brownish band. The posterior part of the abdomen and the tailfan may show a purplish tinge. The posterior half of the tailfan is darker than the anterior and sometimes forms a dark brown transverse band. The hairs on the tailfan are brown. The antennulae and scaphocerite are greenish- or bluish-grey, the scaphocerite sometimes with a darker median line. The first pereiopods are very pale grey. The second legs are greenish-grey to green; the outer surface of merus and carpus has some brownish. The chela of the large second leg has the palm greyish-green with a dark (almost black) longitudinal line in the upper half of the outer surface. The fingers are darker than the palm. The inner surface of the carpus and the chela are pale greyish-green. The other legs are pale bluish grey with a purple tinge, the dactylus is whitish, a dark spot is visible in the distal part of merus, carpus and propodus. The eggs are greyish-green.

Types. — Holotype is a fullgrown male (cl. 20 mm) from the Jawej River near Tigi Lake. All other specimens are paratypes. The material forms part of the collection of the Rijksmuseum van Natuurlijke Historie, Leiden.

Habitat (fig. 1). — Paniai Lake and Tigi Lake both are large freshwater lakes, Paniai lies at an altitude of 1749 m, Tigi at 1742 m and all known locali-

ties of *Macrobrachium natulorum* are at these or intermediate altitudes. Exact information about the habitat can only be given of the fourth lot (Jawej River near Paniai Lake) as the specimens were collected in my presence. On 7 January 1955, accompanied by a rower and an interpreter, I went from Enarotali down the Jawej River in a dugout canoe. Very soon after leaving Paniai Lake we met a Kapauku Papuan family (husband, wife and two children), whose canoe was moored on the river bank. The little boy, and afterwards also his sister (approximately 5 and 7 years old), brought me some prawns, which they had caught themselves, evidently in very shallow water. The whole family, plus my rower and the interpreter, were photographed by me (Holthuis, 1956: pl. 7 fig. 2; 1982: 615, fig. 5); each of the children was paid a blue glass bead (the official currency at that moment) for their contribution to science. Slightly farther down the river we saw a small canoe with two small native girls (about 4 and 7 years old); from the canoe which was moored on the river bank, the girls caught prawns with small fish spears. These spears were about 1.25 m long and made of a thin bamboo stick (1 cm thick), one end of which was split open and five wooden prongs, each about 7 cm long, put in. With string the prongs were fastened to the bamboo and to each other in such a way that they were diverging (fig. 4). The spear was thrust by the children over the prawns, which then were caught between the prongs. The very blunt tops of the prongs made that the prawns were not damaged. Here too, the fishery was carried out in very shallow water. The Jawej at the two points is quite a wide river, at times with steep rocky banks, while in some places the banks are lower and easily accessible. The prawns were bought by me for one blue glass bead and one of the fish spears for two. The spear at present forms part of the collection of the Rijksmuseum voor Volkenkunde (National Ethnological Museum) at Leiden.

Fig. 4. Top of fishing spear used by children to catch *Macrobrachium natulorum* in Jawej River, western New Guinea, 7 January 1955 (coll. Rijksmuseum voor Volkenkunde, Leiden, no. 3352.1). ×0.8. H. Heyn del.

Name. — The native name for the species as given to me at several occasions is "petógobo" with the e mute, all three o short and the accent on the first o. The specific name *natulorum* is derived from the Latin word *"natulus"* for small child, as part of the material was caught by small children.

Affinities. — The new species is close to *Macrobrachium lorentzi* (J. Roux,

1921), also from New Guinea. In the latter species, however, the distal part of the fingers of the large second leg of the adult male is bare, or has the pubescence much shorter and less dense than the proximal part. In the proximal 1/2 of the fingers the pubescence is similar to that of *M. natulorum*, and also extends a very small distance on to the palm. Furthermore, the carpus of the second leg in *M. lorentzi* is about 4 times as long as high, being much more slender than in the new species. On the whole, *M. lorentzi* is a more slender species.

Macrobrachium lorentzi (J. Roux, 1921)
(fig. 5)

Palaemon lorentzi J. Roux, 1921: 596, pl. 16 figs. 1-3.
Macrobrachium lorentzi – Holthuis, 1950: 16, 213, fig. 44; Holthuis, 1982: 610.

Kloof Bivak, on the Lorentz River (= Noord River), western New Guinea, 4°39'S 138°43.3'E, altitude 39 m; 27 November 1912; leg. G. Versteeg, 1912 Netherlands New Guinea Expedition. — 1 ♀ syntype, cl. 32 mm.

Alice River (tributary of Fly River) near Ningerum, Western District, Papua New Guinea, 5°49'S 141°10'E, lowlands (alt. less than 300 m); 30 July – 11 August 1974; leg. C. Boyden, don. P. Kailola. — 9 specimens, cl. 18–25 mm (1 ovigerous female, cl. 20 mm).

Remarks. — Among the types there evidently were no full grown complete males. The large males in the present material show a similar asymmetry between the left and right second leg as in *M. natulorum*. The fingers of the large chela are 4/3 as long as the palm, their cutting edges are beset with small, blunt teeth, about 20 in number, widely separated from each other and occupying the full extent of the edges. The pubescence of the chela differs from that of *M. natulorum* in that there is hardly any pubescence on the palm, and the distal third has the pubescence much shorter and less dense than the basal part of the fingers, where the pubescence is similar to that of *M. natulorum*. The carpus is longer than the palm, and as long as the fingers. It is four times as long as high. The merus is somewhat shorter than the carpus; both segments show only a few scattered hairs and both are covered by spinules, the largest being in the ventral half. The smaller leg of the adult male, like in *M. natulorum*, has the fingers twice as long as the palm and strongly gaping; the cutting edges show a few indistinct teeth in the extreme basal part. Tufts of setae are implanted on either side of the cutting edges, and fill the gap between the fingers. The carpus is longer than the palm but shorter than the fingers; it is three times as long as wide. The merus is practically as long as the carpus.

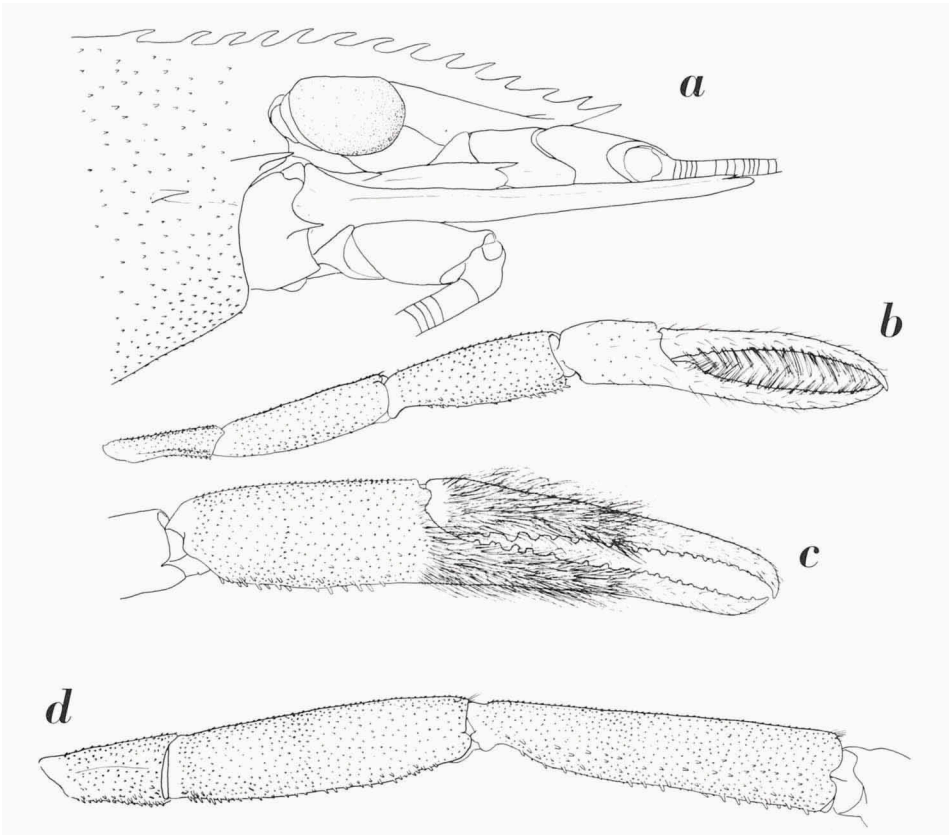

Fig. 5. *Macrobrachium lorentzi* (J. Roux, 1921), male from Ningerum, Papua New Guinea. a, anterior part of body in lateral view; b, smaller second leg; c, chela of larger second leg; c, ischium, merus and carpus of larger second leg. a, ×6; b-d, ×3.

The last three legs are similar to those of *M. natulorum*, but more slender.

The eggs are numerous and small, they are 1.0 to 1.2 mm in diameter, being thus much smaller than in *M. natulorum*.

Size. — This species is larger than *M. natulorum*: the total length varies between 43 and 83 mm, corresponding with a carapace length of about 18 to 35 mm.

Types. — The syntypes of this species, except one, are in the collection of the Zoologisch Museum Amsterdam; the one exception is the specimen mentioned above from Kloof Bivak, which is owned by the Rijksmuseum van Natuurlijke Historie, Leiden.

Distribution and habitat (fig. 6). — Until now the species was only known from the basin of the Lorentz (= Noord) River in S. W. Irian Jaya. The Lo-

rentz River originates from the southern slopes of the Central Mountain range at about 4°15′S 138°40-45′E, and flows down to the Arafura Sea. *M. lorentzi* was collected at Sabang (4°47′ S 138°47′E) on the Lorentz River, altitude less than 30 m; Alkmaar on the Lorentz River at 4°40′10″S 138°43′ 30″E, altitude 30 m; Kloof Bivak on the Lorentz River at 4°39′S 138°43.3′E, altitude 39 m; Went Mountains near the source of the Van der Sande River (a tributary of the Lorentz River), altitude possibly 400 m. Now the species is reported for the first time from Papua New Guinea. The Papuan material was received by the Leiden Museum from Mrs. P. Kailola of the Kanudi Fisheries Station at Konedobu; it was collected by Dr. C. Boyden, member of a Cambridge University research team that explored the Alice (= Ok Tedi) River. Ningerum is situated in the lowlands at an altitude of less than 300 m. No more details are known of the habitat of the species.

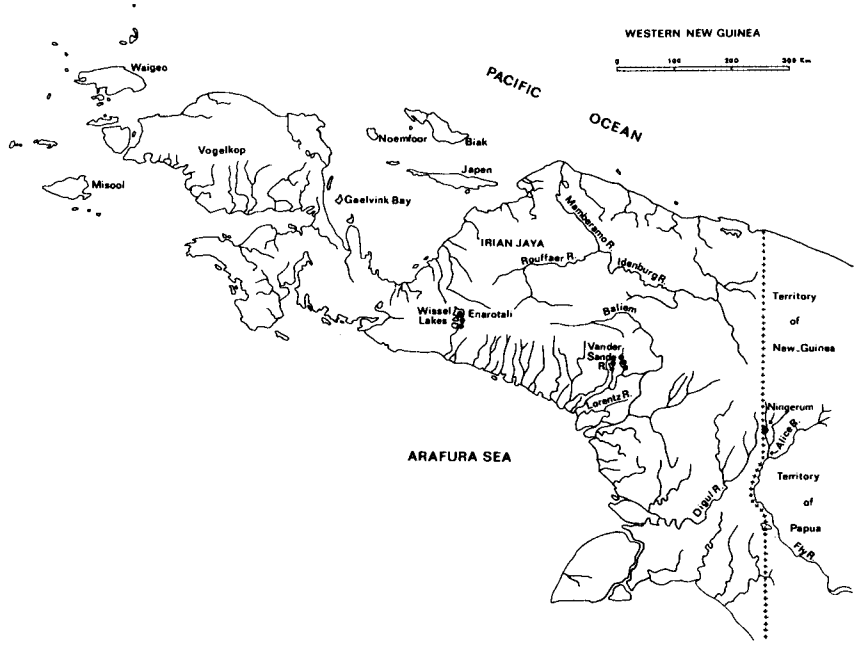

Fig. 6. Western New Guinea. showing the localities of *Macrobrachium natulorum* new species and *M. lorentzi* (J. Roux).

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