Soldier Crabs from Australia and Japan

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During four weeks in February to March, 1977, I visited several coastal places of Tasmania, Victoria and New South Wales, and collected many Australian crabs including *Mictyris* species which are called the soldier crabs in view of their habits with congregation of immense individuals. At the sandy mud flats, in reality, the huge "armies" of *Mictyris* attracted my attention. The specimens collected in Tasmania are surprisingly different from the Japanese species, "*M. longicarpus* LATREILLE," and without doubt identified with *M. platycheles* H. MILNE EDWARDS. On the other hand, the specimens from New South Wales were seemingly different from the Japanese species. Through the kind information of Dr. D. J. G. GRIFFIN of the Australian Museum, I was able to consult the excellent paper on *Mictyris* by MCNEILL (1926), and convinced that the two are different from each other. The present short note is the result of direct comparison of the specimens of three Australian species and the Japanese "*M. longicarpus.*"

A discussion on the aberrant characters of *Mictyris*, the unique genus of the Mictyridae, was given by KEMP (1919), and subsequently the genus was thoroughly reviewed by MCNEILL (*op. cit.*). In his important contribution were described and figured *M. longicarpus* LATREILLE, 1806, *M. longicarpus* var. *brevidactylus* STIMPSON, 1858, *M. platycheles* H. MILNE EDWARDS, 1852, and a new species, *M. livingstonei.* Their geographical distributions were summarized as follows: *M. longicarpus* ranges from the southern New South Wales coast, and Perth, Western Australia, to New Caledonia, the islands in the Banda and Java Seas, Singapore, the Andaman and Nicobar Islands, and Akyab, Burma, facing the Bay of Bengal, and *M. longicarpus* var. *brevidactylus* from the Ryukyu Islands to Hong Kong and the Philippines. *M. platycheles* and *M. livingstonei* are endemic to Australia, being restricted to the east coast of Australia. The boundary between *M. longicarpus* and its variety is, though not always distinct, in the vicinity of the Sulu Sea or the Celebes Sea, to the south of the Philippines. Of the two species endemic to Australia, *M. livingstonei* ranges from Cooktown, northern Queensland, to Trial Bay, northern New South Wales, and *M. platycheles* is more southern, viz., from Moreton Bay, southern Queensland, to Melbourne, Victoria, and the north coast of Tasmania.

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1) *Mictyris longicarpus* LATREILLE, 1806, and *M. brevidactylus* STIMPSON, 1858

Many specimens referable to true *M. longicarpus* were collected at Port Stephens, Broken Bay, Burill Lake and Batemans Bay, New South Wales, and otherwise some specimens collected by Dr. T. HABE at Dunwich, near Brisbane, southern Queensland, were disposed for study.

In the field these specimens appeared in general much larger and more beautiful than the specimens from the Ryukyu Islands. As Japanese carcinologists have hitherto been unaware of MCNEILL's paper, Japanese specimens of *Mictyris* are still known as *M. longicarpus* even in monographs dealing with the carcinological systematics. Its northern limit is Tanega-shima Island, Southwest Japan, as mentioned by TAKEDA (1976).

A direct comparison of the specimens from Australia and Japan revealed that they are specifically distinct from each other, partly confirming the result of MCNEILL's study. The differences are, though rather small, constant and easily detected, as mentioned below.

The Australian species, *M. longicarpus*, is apparently much larger than the Japanese species, *M. brevidactylus*. The largest specimen of *M. longicarpus* mentioned by MCNEILL bears the carapace measuring 23 mm across the branchial regions of both sides and 28 mm from the front to the posterior margin. In the specimens examined at present the largest is a male from Dunwich, with 26.2 mm in length and 22.4 mm in breadth. Contrary to this, the Japanese specimens are much smaller, and it seems not always correct that MCNEILL considered the small size in the variety to be caused from their existence in an unfavourable environment. The largest specimens at hand from Ishigaki-jima Island, the Ryukyu Islands, is 16.5 mm in length and 15.0 mm in breadth.

The dorsal areolation is similar in both the species, but the branchial regions are more distinctly delimited with linear furrows in *M. longicarpus*. The posterior border of the carapace is, as already noted by MCNEILL, strongly developed as a prominent plate with basal constriction in *M. longicarpus*, and weakly without constriction in *M. brevidactylus*. *M. longicarpus* bears without doubt larger corneae with stouter stalks. In general, the lateral borders of the front are, as illustrated by MCNEILL, less strongly concave in *M. longicarpus*, but this feature seems somewhat variable and in some larger specimens of *M. longicarpus*, they are rather strongly concave as in *M. brevidactylus*. The anterolateral spine at each side is directed obliquely outward and only weakly upward in *M. longicarpus*, while that of *M. brevidactylus* is distinctly upward and only weakly outward. Thus, the general appearance of the carapace in the two species is markedly different from each other mainly due to the differences in the formation of the eyes and the posterior border of the carapace.

The basic formation of the chelipeds are also common to both the species, but the fingers are comparatively longer in *M. longicarpus*. This fact is indicated by that the immovable finger of the adult male is about one and a half length of the lower border of the palm in *M. longicarpus*, and about equal to its lower border in *M.*

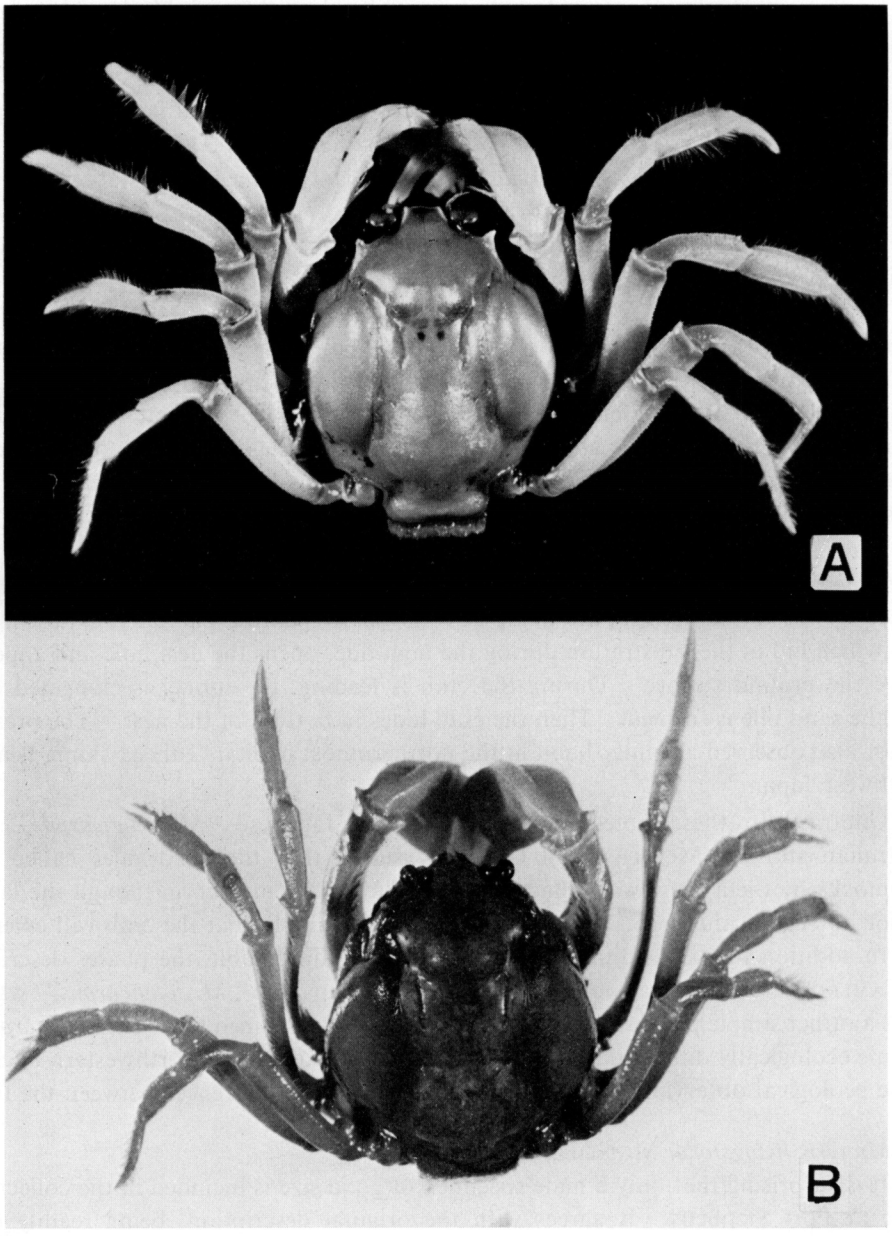

Fig. 1. *Mictyris longicarpus* LATREILLE (A), and *M. brevidactylus* STIMPSON (B).

brevidactylus. Thus, the chelae of *M. brevidactylus* is of appearance of considerable robustness. A tooth on the prehensile edge of the movable finger is not developed in the females and young males in both the species. The tooth in the adult males of

M. longicarpus is always conical and incisor-like, but that of *M. brevidactylus* is truncated and molar-like.

As for the ambulatory legs, the small difference in the length of dactylus of the last pair is noted. In *M. longicarpus* it exceeds considerably the length of the propodus, but only slightly in *M. brevidactylus*. Otherwise, the ambulatory legs are seemingly slenderer in *M. brevidactylus*, being probably indicated by statistical treatment.

The male first pleopod is different from each other, having a longer terminal chitinous process in *M. longicarpus*.

Some authors such as COWLES (1915), MCNEILL (*loc. cit.*), BALSS (1955–'56), ALTEVOGT (1957), SCHÖNE (1961), CAMERON (1966) and YAMAGUCHI (1976) have commented on the huge "armies" of *M. longicarpus*. Especially CAMERON's study made at Moreton Bay presents an excellent ecological note. A pattern of activities during the intertidal period was described as a series of phases, viz., the subterranean, emergence, preliminary feeding, trekking, feeding, army wandering, return, and aggressive wandering phases.

COWLES stated on "*M. longicarpus*" from the Philippines that the sand piles are formed by the crabs when feeding on the surface. According to YAMAGUCHI, these caused by the tunnel feeding are made as follows. When the habitat is exposed, the crab which hid in the substratum during the high tide, opens the nest hole and appears above the ground surface. During the crab is feeding, the tunnel is elongated and thus the sand pile is formed. Then the crab hides in bottom of the nest. The present author also observed a similar habit at the northernmost habitat, Tanega-shima Island, Southwest Japan.

Contrary to these notes on Philippine and Japanese "*M. longicarpus*," the Australian authors, MCNEILL and CAMERON stated that the sand piles called the hummocks by them are always made prior to the crabs' emergence, though the latter author noted that this formation does not necessarily imply that the crab will emerge.

In addition to such a difference in the tunnel feeding habit, the phases described by CAMERON are not always exactly applicable to Japanese "*M. longicarpus*," which bears a rather simple pattern of activity. It is therefore assumed that "*M. longicarpus*" became ecologically differentiated separately in Australia and the northwestern Pacific. These ecological observations support the morphological differences between the two.

2) *Mictyris livingstonei* MCNEILL, 1926

It is surprising that only a male specimen of good size is included in the collection made at Port Stephens. It agrees with the original description, being readily distinguished from the congeners. In spirit it is entirely creamy white. The carapace is 13.8 mm in length, and 13.4 mm in breadth across the branchial regions of both sides, so that the carapace is more globular than in the other species.

The median part of the carapace, viz., the gastric, cardiac and intestinal regions, is nearly smooth, and occupies the large part of the carapace due to the branchial

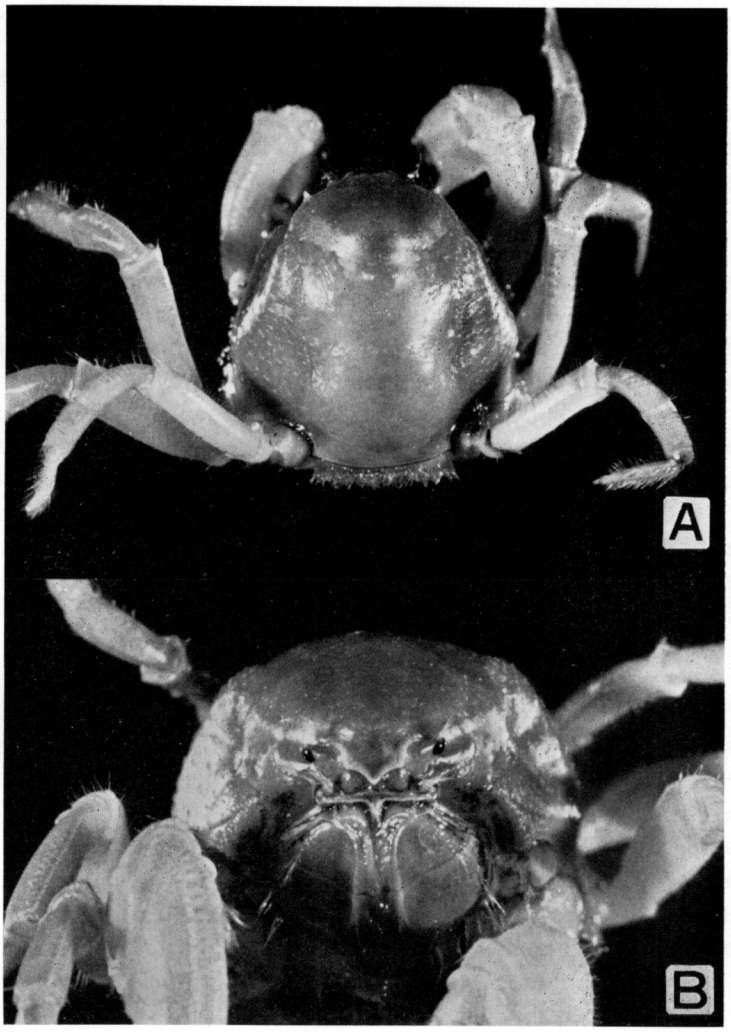

Fig. 2. *Mictyris livingstonei* McNeill.

regions of both sides being widely apart. The branchial regions are only moderately swollen, and sparsely covered with short granular ridges which are rugose and rather of scaly appearance. The posterior border of the carapace is nearly straight, as wide as the space between the anterolateral spines of both sides, not produced into a thin plate, both lateral ends being angulated. The front with the short and concave lateral borders agrees with one of the paratypes illustrated by the original author, being fairly pointed at the apex. The eyes are remarkably small. This feature is one of the characteristics of this species, and as the original author noted, may have been derived from the hiding habits without congregation on the surface of the exposed flats. The

anterolateral spines of each side is only a spiniform granule and directed obliquely outward, without a ridge running to the branchial region.

The chelipeds are comparatively stout and short. The movable finger bears no distinct tooth, but the usual place is indicated only by a low mound. The immovable finger is nearly as long as the lower border of the palm. The ambulatory legs are apparently stouter and shorter than those of *M. longicarpus* and *M. brevidactylus*, but less than those of *M. platycheles*. The dactylus of the last pair is nearly as long as, or only slightly longer than the propodus.

The male first pleopod is well calcified, with weak curvature and thickness at the apex, having a small chitinous process.

Considering the general formation of the carapace with weak development of the posterior plate, the chelipeds with the stouter chelae, and the ambulatory legs with the shorter dactylus of the last pair, this species is closer to *M. brevidactylus* than to *M. longicarpus*. However, the carapace is more globose with wider median part, the anterolateral spine of each side is smaller without a ridge running to the branchial region, the branchial regions are more or less rugose, the posterior plate of the carapace is less strongly developed, with angulated lateral ends of the border, the corneae are much smaller, the movable finger bears only an obsolete tooth, the ambulatory legs are much stouter, and the male first pleopod is slender.

3) *Mictyris platycheles* H. MILNE EDWARDS, 1852

Many specimens collected at Scamander, northeast Tasmania, and Batemans Bay and Broken Bay, New South Wales, were examined. This species is characteristic in all respects, without alteration of basic formation of the genus, so that it is readily distinguished from the congeners.

The carapace is apparently narrower, having the dorsally swollen and granulated branchial regions, which are laterally traversed each by four longitudinal furrows. The median part of the carapace is uneven and granulated for its most part. The posterior plate of the carapace is of moderate development, narrow and dorsally convex. The corneae are moderate and globose, being similar to those of *M. brevidactylus*. There is no distinct anterolateral spine, though this place is armed with a series of microscopical spinules in most specimens and rather angulated in some specimens. Then, a strong ridge to the branchial region is produced as a lateral edge of the hepatic region.

The chelipeds are rather slender, with the immovable finger considerably longer than the lower border of the palm. A tooth on the prehensile edge of the movable finger is very large and conical in the adult males. The ambulatory legs are short and stout. The propodi are flat and broad. The dactylus of the last pair is nearly as long as the propodus.

In the adult males the sternum is armed with a strong spine on each side of the last abdominal segment, but unarmed in the females and juveniles. The male first pleopod is not well calcified. It is rather similar to that of *M. livingstonei*, but slen-

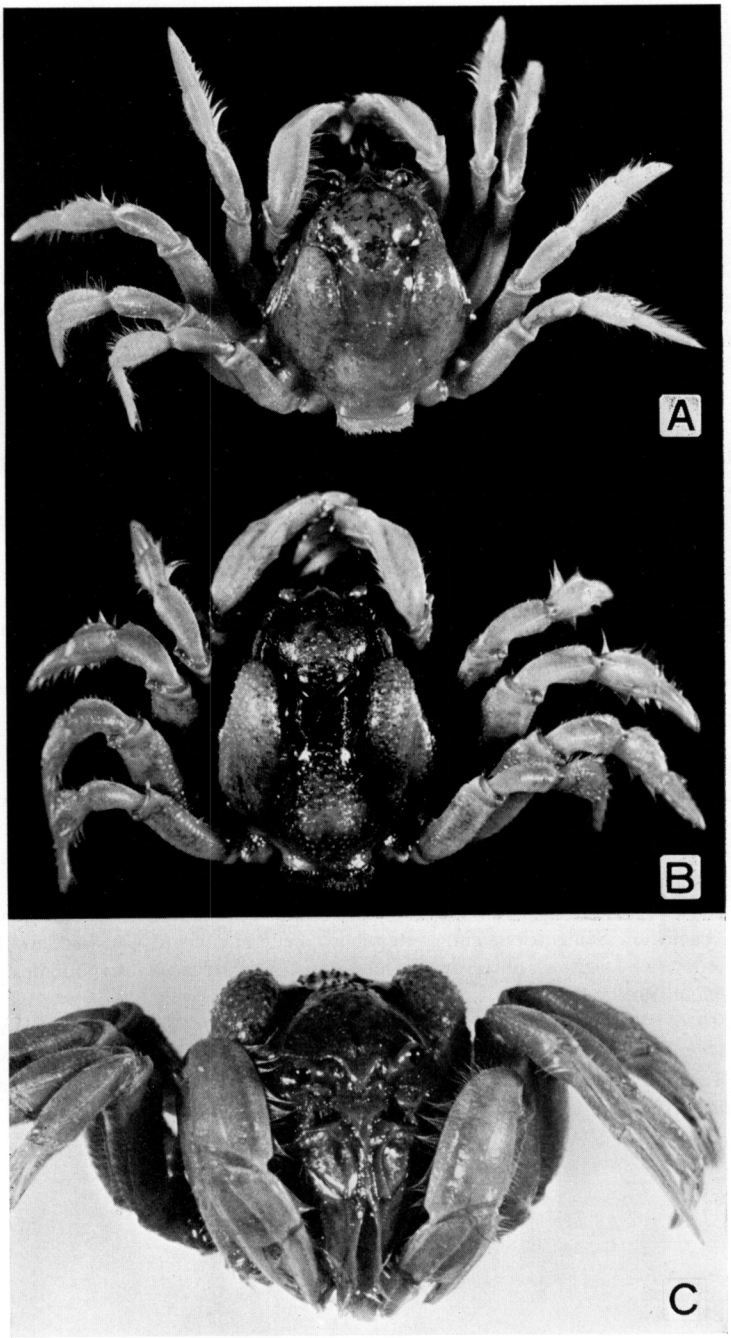

Fig. 3. *Mictyris platycheles* H. MILNE EDWARDS.

derer, nearly without distal curvature and thickness, being fringed with long plumose hairs along the shaft.

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