

JOURNAL OF THE EAST AFRICA NATURAL HISTORY SOCIETY AND NATIONAL MUSEUM

VOL. 28

7th APRIL 1971

No. 120

FRESHWATER PRAWNS OF THE GENUS *MACROBRACHIUM* (CRUSTACEA: PALAEMONIDAE) IN EAST AFRICA, WITH A KEY FOR THEIR IDENTIFICATION AND NOTES ON THEIR EXPLOITATION

By

R. G. BAILEY AND M. CRICHTON*

INTRODUCTION

During investigations of lake and reservoir fisheries in the drainage basins of the Rivers Wami and Ruvu in Tanzania, the widespread occurrence of river prawns belonging to the genus *Macrobrachium* Bate 1868, was noted (Lockley—unpublished Safari Notes nos. 53, 55 & 56, Dar es Salaam and Bailey 1966). In 1963 a study of the biology of these prawns in a small lake near Kilosa was commenced by the authors together with a collection of data on their distribution and use as food in Tanzania. In the course of this work a major problem was encountered with regard to the correct identification of collected material. Specimens were despatched to Dr. I. Gordon at the Natural History Section of the British Museum, who kindly discussed our problem and drew up a provisional key for the identification of species previously recorded in East Africa.

Since returning to the United Kingdom, the authors have been able to examine their own and other relevant material in the British Museum collections. This work, and an investigation of published accounts of the genus has enabled the compilation of a key for the identification of species of *Macrobrachium* occurring in East Africa. It is presented here for the benefit of fisheries staff and others working in the field, together with distribution data and some notes on their present exploitation.

Apart from the genus *Macrobrachium* which belongs to the family Palaemonidae, certain other genera of freshwater prawns, notably *Caridina*, are found in East Africa. The latter belong to the family Atyidae and may be readily distinguished by the unusual form of both pairs of chelate thoracic limbs, which, moreover, are little different in relative size, see *Figure 1*. In *Macrobrachium* the first two pairs of pereopods are likewise chelate, but of normal shape and markedly unequal in size.

SPECIES KEY.

Earlier keys for the identification of *Macrobrachium* in eastern and south-east Africa are given by Hilgendorf (1898) and Barnard (1950) respectively, but the following is largely based on that given by Holthius (1950) in his comprehensive account of

(* — Formerly with the Tanzanian Fisheries Division; present addresses — R. G. Bailey — Zoology Department, Chelsea College, University of London. M. Crichton — 65, Wellington Road, Ballsbridge, Dublin, Ireland).

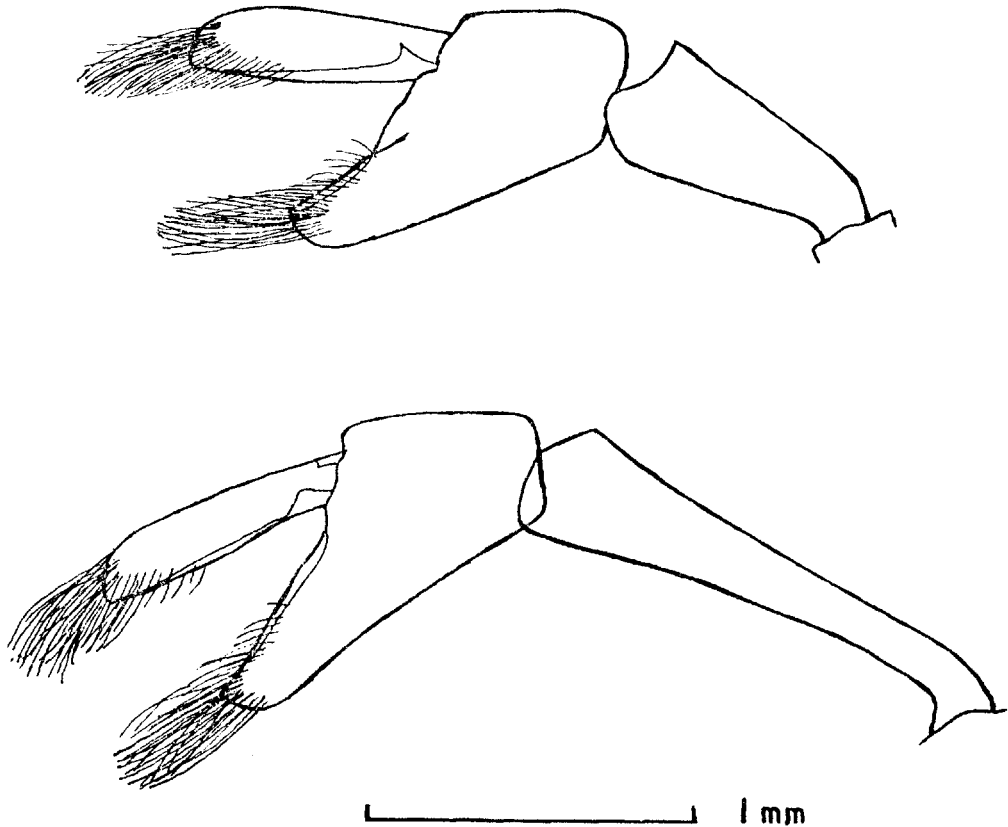


Figure I. First and second pereiopods of *Caridina nilotica*, Family Atyidae, (after Gordon 1930).

the genus in the Indo-West Pacific Region. All three authors have found that separation of the species must primarily rely on the characters of the rostrum and second pair of pereiopods of the adult male. The latter form the major chelipeds and in the adult male they become considerably elongated and enlarged, and the armature on the fingers of the chela is distinctive. In females and young males the second pereiopods are shorter and more slender, and the relative lengths of the different segments of the limb may be different from their condition in the adult male. Further, in young specimens the rostrum tends to be relatively longer and more slender.

In the following key most divisions are based on differences in the form of the second pereiopods of the adult male, and thus it is essential that complete specimens of the latter are included in collections for identification. A note on the recorded distribution of each species in Africa and the Western Indian Ocean is included in the key with additional comments on the material examined. The following abbreviations are used:— c/m —ratio of carpus to merus length; c/ch —ratio of carpus to chela length; c/p —ratio of carpus to palm length; p/f —ratio of palm to finger length and C.L.—carapace length. *Figure II* illustrates the features of the head and thorax of *Macrobrachium* used in the key, and the measurement of carapace length i.e. the distance from the posterior limit of the orbit to the posterior edge of the carapace. In *Figure III* the nomenclature of the segments of the second pereiopod is given and the form of the chela in several species is shown.

1. (a) Carpus of second pereopod of adult male distinctly longer than merus ($c/m=1.4-1.8$) 2.
- (b) Carpus of second pereopod of adult male about equal to or shorter than merus ($c/m=1.1$ or less) 5.
2. (a) Carpus of second pereopod of adult male about equal to or longer than chela (palm of chela distinctly longer than fingers), *Fig. III, 1* 3.
- (b) Carpus of second pereopod of adult male distinctly shorter than chela, (palm of chela about equal to or longer than fingers) 4.
3. (a) 9–11 dorsal rostral teeth, 3 of which are situated behind the posterior limit of the orbit *M.idae* (Heller) 1862.
(Tanzania—Zanzibar, Dar es Salaam, no recent record; Seychelles and Madagascar.)
- (b) (1) 12–17 dorsal rostral teeth, usually only 2 situated behind the posterior limit of the orbit, *Fig. II* *M.idella* (Hilgendorf) 1898.
(Tanzania—Rivers Wami & Ruvu, dams & lakes in their catchments, Ruaha & Kilombero tributaries of River Rufiji, Lake Babati; also Madagascar. Holthius (1950, p. 147) commenting on the close similarity of *M.idae* and *M.idella*, notes that former has smaller ova and a larger c/ch ratio in male. All specimens examined were referred to *M.idella*. Rostrum shorter than or almost reaching apex of antennal scale. 13–16 dorsal rostral teeth, in a few cases with 3 behind posterior limit of orbit; some slight spacing of teeth towards tip. 4, infrequently 5 ventral rostral teeth. Second pereopods of adult male—long and slender; $c/ch=0.9-1.1$; $p/f=1.35-1.60$. Fingers with 1 and 2 proximal teeth, concealed by a dense brownish coat of short hairs or setae in some specimens, see *Fig. III, 1*. All segments of limb with small tubercles and fine, scattered setae. 3rd–5th pereopods—slender, pubescent. Carapace—smooth or minutely spinulose anterio-ventrally. C.L. of largest specimen examined—17mm.)
4. (a) Chela of second pereopod of adult male with tubercles in 2 rows, one along either side of cutting edges of fingers. Rostrum not markedly curving upwards, just shorter than antennal scale. 3–5 ventral rostral teeth *M.rude* (Heller) 1862.
(Tanzania—Rivers Sigi, Wami & Ruvu; Zanzibar?; Kenya—River Athi-Sabaki; Somali Rep.—River Juba; Mozambique, South Africa and Madagascar. 10–15 dorsal rostral teeth, 2 or 3 behind posterior limit of orbit. Some specimens exhibit a marked spacing of dorsal teeth towards tip of rostrum. Second pereopods of adult male with $c/ch=0.50-0.75$, $p/f=1.0-1.2$. All segments of limb pubescent and fingers densely covered with setae in some specimens. Carapace—generally granular anteriorly. C.L. of largest specimen examined—30mm.)
- (b) Chela of second pereopod of adult male without tubercles beyond a few proximal teeth on fingers. Rostrum usually distinctly curving upwards and reaching apex of antennal scale. (4)5–7 ventral rostral teeth *M.equidens* (Dana) 1852.
(Tanzania—River Ruvu & Zanzibar; Kenya—Rivers Korumi & Tana; Mozambique, South Africa and Madagascar. An essentially brackish water species but extending into freshwater. 9–13 dorsal rostral teeth, 3 behind posterior limit of orbit. Second pereopod of adult male with $c/ch=0.70-0.86$, $p/f=1.10-1.37$. All segments of limb pubescent and with small spinules. Long scattered setae on fingers. Carapace—smooth. C.L. of largest specimen examined—22mm.)

5. (a) Second pereopods of adult male equal or subequal in shape; fingers of smaller not gaping and not provided with stiff setae 6.
 (b) Second pereopods of adult male very unequal in shape; fingers of smaller chela generally gaping with stiff setae, see Fig. III, 2 & 3
M. lepidactylus Hilgendorf 1879.
 (Tanzania—Rivers Pangani, Ruvu & Rufiji also Zanzibar; Kenya—River Athi—Sabaki; Somali Rep.; Mozambique, South Africa and Madagascar. Rostrum shorter than antennal scale, teeth broad and erect, 11–14 in dorsal row with 4–5 situated behind posterior limit of orbit, and 2 in ventral row. Second pereopods of adult male strong and robust, all segments with scale-like tubercles and short scattered setae. Smaller chela with palm much shorter than fingers, $p/f=0.4-0.6$. Larger chela with palm broad, more or less equal to finger length. Latter with well developed teeth along cutting edges, hooked distally, see Fig. III, 3. There is a flattened ventral tooth between the bases of the uropods. This feature also found in females, which likewise have scaly pereopods. C.L. of largest specimen examined—42mm.)
6. (a) Fingers of chela of second pereopod of male without teeth, or with a minute proximal tubercle only. Very small species 7.
 (b) Fingers of chela of second pereopod of adult male with distinct teeth. Relatively large species 8.
7. (a) 1 dorsal rostral tooth behind posterior limit of orbit, 1–2 ventral rostral teeth *M. niloticum* (Roux) 1833.
 (Kenya—Lake Rudolf; River Nile. 10–11 dorsal rostral teeth. Second pereopod of male with carpus subequal to merus, and longer than palm of chela, $c/p=1.60-1.85$. Palm slightly swollen, shorter than fingers, $p/f=0.53-0.60$. Fingers with short scattered setae, but no teeth—may separate slightly towards their minutely hooked tips. Limb smooth. C.L. of largest specimen examined—6.5mm.)
 (b) 2–3 dorsal rostral teeth behind posterior limit of orbit, 3–5 ventral rostral teeth *M. moorei* (Calman) 1899.
 (Indigenous to Lake Tanganyika. 11–13 dorsal rostral teeth. Second pereopod of male with carpus equal to merus, and longer than palm of chela, $c/p=1.30-1.56$. Palm shorter than fingers, $p/f=0.67-0.83$. Fingers straight, without teeth or with a single minute tubercle close to the base of one. Limb with short scattered setae, carpus and palm minutely spinulose. Females with 2 rounded tubercles at base of fingers were noted, see also Calman 1906. C.L. of largest specimen examined—6.3mm.)
8. (a) Fingers of chela of second pereopod of adult male with a number of teeth on the proximal half or along the entire cutting edge (Fig. III, 5). Teeth generally of equal size, but if any are slightly larger, these are always nearest base of finger 9.
 (b) Fingers of chela of second pereopod of adult male with 1–2 relatively large teeth and smaller teeth present between the first large tooth and base of finger (Fig. III, 4) *M. lar* (Fabricius) 1798.
 (Tanzania—Zanzibar & Pemba—not recorded from mainland; Seychelles; Mauritius and Madagascar. Rostrum not or just reaching apex of antennal scale, with 7–8 dorsal teeth and 2–4 ventral teeth. Second pereopod of adult male with $c/m=0.91-0.98$; chela with a strikingly long palm, $c/p=0.56-0.64$ and $p/f=1.5-1.9$. Tips of fingers unevenly hooked; each with a single large tooth and one or

more smaller, rounded proximal teeth, see *Fig. III, 4*. All segments of limb granular, with ventral rows of recumbent spines; short scattered setae on fingers. A ventral tooth is present between bases of uropods. C.L. of largest specimen examined—48mm.)

9. (a) Chela of second pereiopod of adult male with palm and basal part of fingers covered in velvety hairs and having a woolly appearance, *Fig. III, 5* *M. scabriculum* (Heller) 1862.
(Tanzania—Rivers Pangani, Ruvu & Rufiji, also Zanzibar; Kenya—Rivers Athi-Sabaki & Tana; Somali Rep.—River Juba; Mozambique. Rostrum shorter than antennal scale; 12–16 dorsal teeth with 3–5 behind posterior limit of orbit, and 2–4 ventral teeth. Second pereiopod of adult male with carpus usually equal to merus in length and equal to or longer than palm of chela. Teeth along entire cutting edges of chela, increasing slightly in size towards the base of fingers. All segments of limb with scattered hair-like setae, minutely spinulose. Carapace-granular. C.L. of largest specimen examined—29mm.)
- (b) Chela of second pereiopod of adult male naked, or with a few scattered hairs *M. patsa* (Coutiere) 1899.
(Kenya—Tsavo tributary of River Sabaki; Madagascar. No material examined.)

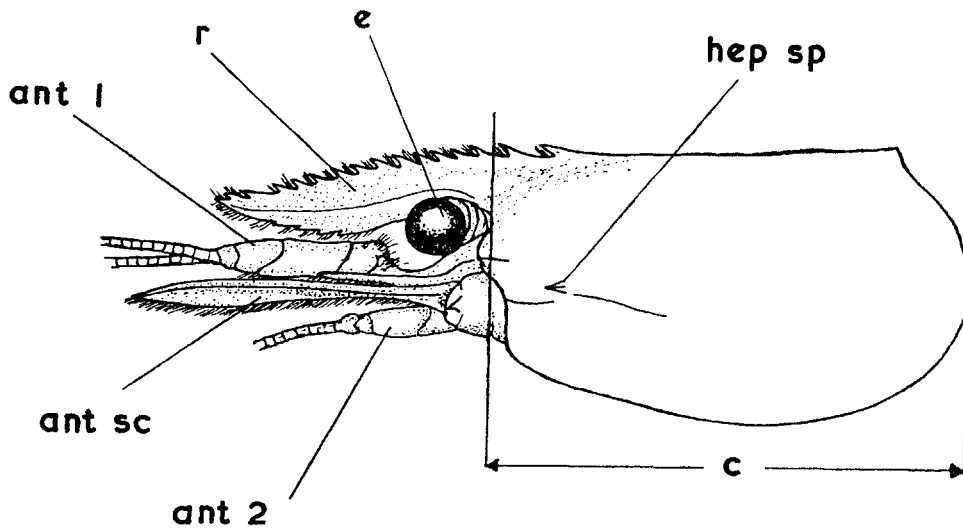


Figure II. Head and thorax of *Macrobrachium idella* (male). ant 1 - antennule, ant 2 - antenna, ant sc - antennal scale, r - rostrum (with 15 dorsal teeth are 2 of which, situated behind the posterior limit of the orbit, and 4 ventral teeth), e - eye, hep sp - hepatic spine and c - carapace length (17mm. in specimen drawn).

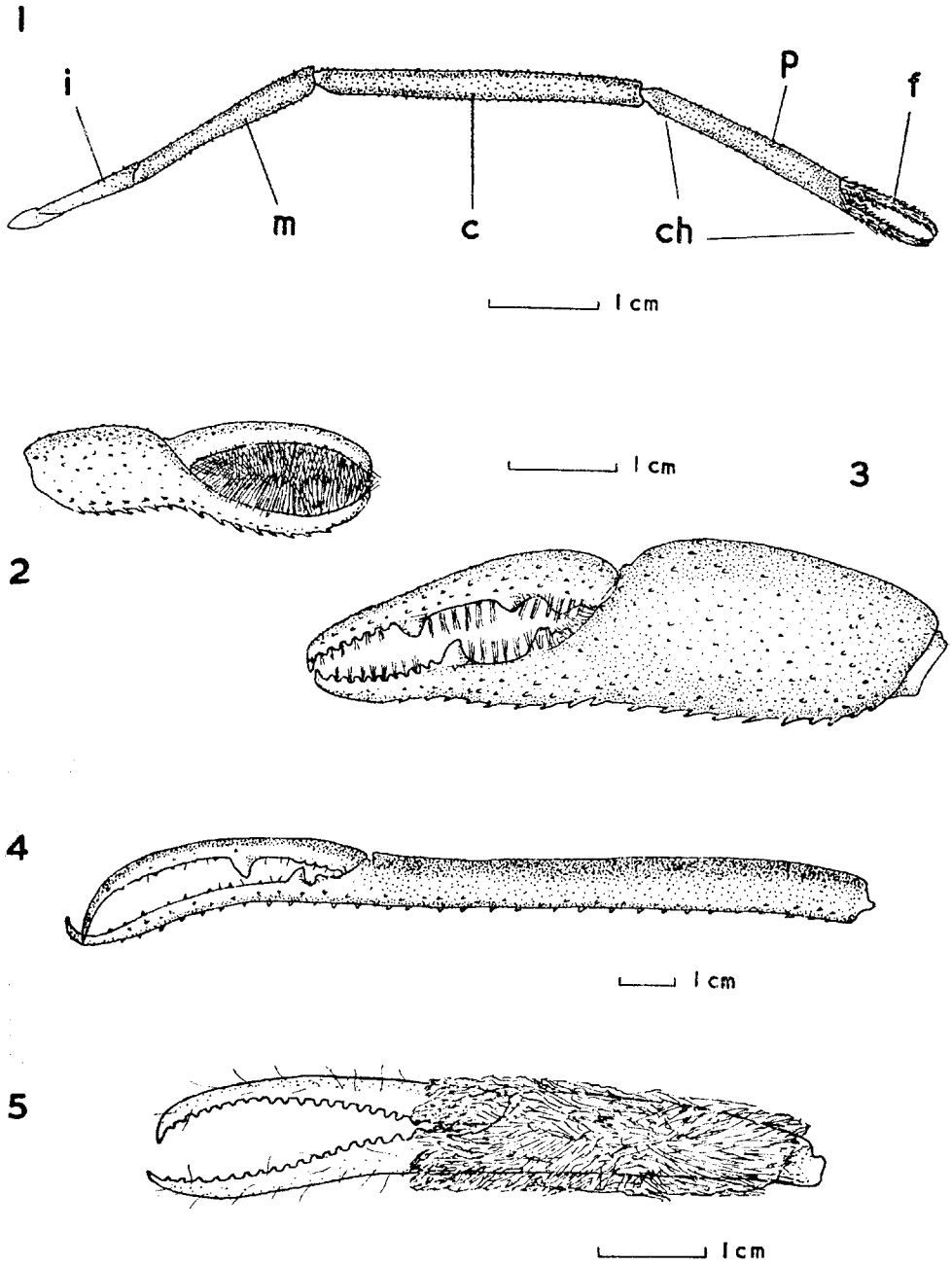


Figure III. 1 - second pereiopod of adult male of *Macrobrachium idella* (Caparace Length - 17mm.),
i - ischium, m - merus, c - carpus, ch - chela, p - palm, f - fingers.
2 - small chela and 3 - large chela of adult male of *M. lepidactylus*. (C.L. - 32.8mm.).
4 - chela of adult male of *M. lar* (C.L. - 48mm.).
5 - chela of adult male of *M. scabriculum* (C.L. - 29mm.).

NOTES ON THE EXPLOITATION OF MACROBRACHIUM IN EAST AFRICA.**Tanzania**

To obtain information on the utilization of freshwater prawns a questionnaire was circulated to Fisheries Staff in various localities. With few exceptions nil returns were received. This, together with the authors' observations in the field and at fish markets suggests that at present freshwater prawns have little commercial importance, although they may be exploited locally in a few places, where they are easily caught in large numbers.

On the lower Rufiji *Macrobrachium* is recorded from basket traps in parts of the main river and from seining in seasonal flood pools and lagoons. The catch may be offered for sale in local markets. *Macrobrachium lepidactylus* and *M. scabriculum* are two species recorded in this area and *M. rude* has been noted in the fish market at Dar es Salaam to the north. However, in the coastal region the principal interest lies with the marine penaeid prawns, for which there is an important fishery notably around the Rufiji delta.

Further inland, *Macrobrachium idella* and less commonly *M. rude*, are occasionally caught by villagers employing short lengths of cloth as improvised seines in the marginal shallows of lakes and dams in the Wami and Ruvu basins. The catch is primarily for home consumption but evidence of a slight commercial interest has been noted. At Kidete on the Central Railway, cooked prawns from Lake Gombo are offered for sale to train passengers, and at Hombolo Reservoir where prawns from the River Wami were introduced by Fisheries Staff, the catch is reported to have a limited outlet among a section of the community in nearby Dodoma. Unlike the coastal region, however, prawns are not generally acceptable as food in these more central areas, but wherever possible encouragement is and should be given to a wider development of the habit of taking catches for domestic use since, suitably cooked and flavoured, they can provide a useful 'relish' accompaniment to staple foods. It was largely with this in mind, that stocking trials with *M. idella* in small ponds near the Central Agricultural Research Centre at Kilosa were carried out. These were successful in that prawns thrived and egg-carrying females were observed throughout the year. (An account of the biology of these prawns in a small lake is in preparation.)

Kenya

Whitehead (1960) comments that while *Macrobrachium lepidactylus*, *M. scabriculum* and *M. rude* make a significant contribution to basket trap catches on the lower Sabaki River, they have only a small and fluctuating commercial value. The former is the largest (up to 40gm.) but less commonly caught species.

Attempts to culture *M. lepidactylus* taken from this river, have been made by the Fisheries Department at the Sagana Fish Culture Farm. The prawns, which were provided with cover and fed regularly on chopped *Tilapia* meat, survived in pond conditions, but at no time was there any indication of breeding (Kenya Fisheries Dept. Annual Reports 1960-62).

Apart from the instances given above no other recent attempts to culture species of *Macrobrachium* are recorded in East Africa, although it is interesting to note that the possibilities of freshwater Crustacea were explored in Uganda with the limited introduction in 1963 of the American crayfish *Procambarus clarkii* for pond culture.

Elsewhere considerable success has been achieved in the culture of species of *Macrobrachium*. For example in Florida *M. acanthurus* and *M. carcinus* are cultivated artificially and considered to be of commercial value (Ingle & Eldred 1960) and in parts of the Indo-Pacific Region young prawns of the large brackish water form *M. rosenbergi* are grown in ponds and irrigated rice fields in combination with non-carnivorous fish (Ling & Merican 1962).

ACKNOWLEDGEMENT

We wish to acknowledge our gratitude to Dr. Isabella Gordon of the Crustacea Section of the British Museum (Natural History), for her early advice and helpful criticism of the manuscript.

LIST OF MATERIAL IN THE BRITISH MUSEUM EXAMINED

Species	Brit.Mus.Reg.No.	Locality
<i>M.idella</i>	unregistered	Lake near Kilosa, R.Wami, Tanzania
<i>M.rude</i>	1951.4.16.1-6	Sabaki & Tana Rivers, Kenya
	1955.1.24.1-7	R.Sabaki
	1962.9.18.13	R.Sabaki
	1964.7.10.50-53	Dar es Salaam, Tanzania
	unregistered	Durban Museum, South Africa
<i>M.equidens</i>	1962.9.18.14	R.Korumi, Kenya
	unregistered	Singapore & Solomon Islands
<i>M.lepidactylus</i>	1915.11.12.1-3	Tributaries of R.Athi, Kenya
	1955.1.24.9	R.Sabaki
	1967.105.1-2	R.Sigi, Tanzania
	unregistered	R.Pangani, Tanzania
<i>M.niloticum</i>	1906.6.1.1-2	White Nile
	1934.2.8.30-139	Lake Rudolf, Kenya
<i>M.moorei</i>	1906.2.12.1-10	L.Tanganyika
<i>M.lar</i>	1928.9.24.1-3	R.ChemChem, Zanzibar
	unregistered	Seychelles
<i>M.scabriculum</i>	1914.6.1.6-19	Madagascar
	1951.4.16.7-20	Sabaki & Tana Rivers, Kenya
	1955.1.24.10-12	R.Sabaki
	1962.9.18.15	R.Sabaki

REFERENCES

- BAILEY, R. G. 1966. The dam fisheries of Tanzania, *E. Afr. agric. J.*, 32(1) pp. 1-15.
- BARNARD, K. H. 1950. Descriptive catalogue of the South African Decapod Crustacea (crabs and shrimps). *Ann. S. Afr. Mus.*, 38, pp. 838-864.
- CALMAN W. T., 1906. Report on the Macrurous Crustacea. Zoological Results of the Third Tanganyika Expedition conducted by Dr. W. A. Cunnington 1904-1905. *Proc. Zool. Soc. Lond. (1)*, pp. 187-206.
- GORDON I., 1930. African freshwater prawns of the species *Caridina nilotica* (Roux) with special reference to the Nile Basin. *Proc. Zool. Soc. Lond. (1)*, pp. 3-50.
- HILGENDORF F., 1898. Die Land-und Susswasser-Dekapoden Ostafrikas. *Deutsch Ost Africa* 4,(7), pp. 1-37.
- HOLTHIUS L. B., 1950. The Decapoda of the Siboga Expedition, Part X, The Palaemonidae 1. Sub-family Palaemoninae. *Siboga Exped. mon.* 39a9 pp. 1-267.
- INGLE R. M. & ELDRED, B. 1960. Notes on the artificial cultivation of freshwater shrimps. *W. Indies Fish. Bull. (4)*, pp. 1-5.
- LING S. W. & MERICAN, A. B. O., 1962. Notes on the life-history and habits of the adults and larval stages of *Macrobrachium rosenbergii* (De Man), *Proc. Indo-Pacific Fish. Council, (2 & 3)*, pp. 55-61.
- WHITEHEAD P. J. P., 1960. The river fisheries of Kenya, Pt. II—The lower Athi (Sabaki) River, *E. Afr. agric. J.*, 25(4), pp. 259-265.

(Received 19th January, 1970).