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Taxonomy and biogeography of the freshwater crabs of Tanzania, East Africa (Brachyura: Potamoidea: Potamonautidae, Platythelphusidae, Deckeniidae)

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ABSTRACT

The taxonomy of the freshwater crabs of Tanzania, East Africa is revised based on a large collection of previously unreported material. The crabs are treated here as a distinct regional subset of the African continental fauna. We recognize 25 species belonging to three genera (*Potamonautes* MacLeay, 1838, *Platythelphusa* A. Milne-Edwards, 1872, and *Deckenia* Hilgendorf, 1869a) and three families (the Potamonautidae Bott, 1970, the Platythelphusidae Colosi, 1920, and the Deckeniidae Ortmann, 1897). Tanzania is home to fourteen species of *Potamonautes* (including one new species), 9 species of *Platythelphusa* and 2 species of *Deckenia*. These estimates can be expected to change as the taxonomy of the freshwater crabs of this region becomes more refined. *Potamonautes unisulcatus* (Rathbun, 1933) is removed from synonymy and is recognized as a valid species; *P. platycentron* (Hilgendorf, 1897), originally a subspecies of *P. johnstoni* (Miers, 1885), is regarded

as a valid species; *P. ambiguus* (Rathbun, 1904) is treated here as a junior subjective synonym of *P. johnstoni* (Miers, 1885), and *P. johnstoni stappersi* (Balss, 1936) is treated as a junior subjective synonym of *P. loveridgei* (Rathbun, 1933). The present work adds another species of *Potamonautes*, *P. xiphoidus* **n. sp.** from Tanzania. A number of morphological characters (including the shape and size of the dorsal membrane of gonopod 1) are identified to help clarify the taxonomy of *Potamonautes* in Tanzania. A revised species list for Tanzania is provided, as well as updated identification keys to the families, genera and species of Tanzanian freshwater crabs. The distribution of each species is refined based on new localities. Three out of 25 species (12.5%) (*P. infravallatus, P. unisulcatus* and *P. xiphoidus*) are endemic to Tanzania, but this number rises to 13 out of 25 (52%) if the Lake Tanganyika endemic species which occur in other countries that border the lake are included. Only two of the 25 Tanzanian species of freshwater crabs (*P. lirrangensis* and *P. suprasulcatus*) occur outside of the East African region in the D. R. Congo and Malawi.

Key words: Crustacea, Brachyura, Potamoidea, Potamonautidae, *Potamonautes*, Platythelphusidae, *Platythelphusa*, Deckeniidae, *Deckenia*, freshwater crabs, taxonomy, Tanzania, Lake Tanganyika, East Africa

INTRODUCTION

The freshwater crab fauna of Africa as a whole comprises over 100 species that are currently assigned to 11 genera and four families (Cumberlidge 1999). The fauna of Tanzania is treated here as a distinct regional subset of the African continental fauna and recognizes 25 species in three genera and three families (Bott 1955; Williams 1968; Cumberlidge 1999). These estimates can be expected to change as exploration increases and the taxonomy of the freshwater crabs of this region becomes more refined.

Freshwater crabs are of great economic importance in Africa because these animals sometimes form a significant part of the diet of large numbers of people in rural areas, and because the crabs have been implicated in the transmission of disease-causing parasites in humans (Williams *et al*. 1964; Williams 1968; Voelker & Sachs 1977). Furthermore, the recent upsurge of interest in biodiversity inventories and conservation in Africa (an interest that is particularly strong in East Africa), has led to an increased need for biologists and conservation agencies to be able to identify the freshwater crabs of this region. The general neglect of African freshwater crabs over the years means that today their taxonomy is unstable and unreliable, species lists are inaccurate, distribution patterns are largely unknown, and little is known of the population levels or conservation status of most species in the region. Inadequate keys also make identification difficult for non-specialists.

Three genera (*Potamonautes* MacLeay, 1838, *Platythelphusa* A. Milne-Edwards, 1872, and *Deckenia* Hilgendorf, 1869) belonging to three families (Potamonautidae Bott, 1970, Platythelphusidae Colosi, 1920, and Deckeniidae Ortmann, 1897), have so far been recorded from Tanzania. Two of these genera have been the subject of recent taxonomic revisions: *Deckenia* by Ng *et al*. (1995) and *Platythelphusa* by Cumberlidge *et al.* (1999), with additions by Marijnissen *et al*. (2004). Less attention has been paid to the taxonomy

of *Potamonautes*, which is the largest and most cosmopolitan of the three genera, including more than 60 species distributed throughout sub-Saharan Africa (Cumberlidge 1999), with over half of these species occurring in East Africa.

Although *Potamonautes* is an important genus in terms of the number of its species, its taxonomy is currently very unstable and estimates of species numbers are somewhat unreliable. *Potamonautes* is slowly being revised in stages, with authors treating different geographical subsets of the genus, including West Africa (Cumberlidge 1999), South Africa (Stewart 1997a, b; Stewart & Cook 1998; Daniels *et al.* 1998; Daniels *et al.* 2001; Gouws *et al.* 2001) and Lake Tanganyika (Coulter 1991; Cumberlidge 1999; Cumberlidge *et al*. 1999; Marijnissen *et al*. 2004). These efforts have led to the discovery of several new species of *Potamonautes* (Stewart 1997a, b; Stewart & Cook 1998; Daniels *et al.*1998; Cumberlidge 1999; Corace *et al.* 2001; Daniels *et al.* 2001, 2002; Gouws *et al.* 2001; Cumberlidge *et al.* 2002; Reed & Cumberlidge 2004; Cumberlidge & Vannini 2004; Cumberlidge & Tavares 2006), and it is likely that the size of the genus will grow further as taxonomic discrimination improves and as biodiversity studies survey the continent in more detail.

The monographs of Rathbun (1904, 1905, 1906) and Bott (1955) treated the freshwater crab fauna of Africa as a whole, and these works (especially that of Bott 1955) are still used by many as the standard taxonomic references. Bott (1955) is, however, out of date, and contains many inconsistencies (Cumberlidge 1999). The present work therefore aims to revise the taxonomy of the freshwater crabs of Tanzania, produce a revised species list, update identification keys and summarize their distribution patterns and conservation status.

The first record of freshwater crabs in Tanzania was the description of *Thelphusa obesa* A. Milne-Edwards, 1868 (now *Potamonautes obesus*) from Zanzibar (then part of German East Africa). Hilgendorf (1969a) described *Deckenia imitatrix* from East Africa, which he placed in the family Deckeniidae; and Miers (1885) added a second species of *Potamonautes* from Mount Kilimanjaro (as *Thelphusa depressa* var. *johnstoni* Miers, 1885). The latter part of the nineteeth century saw the description of the first species of *Platythelphusa*, five more species of *Potamonautes* and another species of *Deckenia* from Tanzania (A. Milne-Edwards 1887; Hilgendorf 1892, 1897, 1898). A further seven species of *Potamonautes* and five of *Platythelphusa* were described from the area in the first half of the twentieth century: Cunnington (1899, 1907) added two species, Rathbun (1905, 1933) four species, Capart (1952) four species and Bott (1955) one species. Almost 50 years passed until the discovery of the three most recently described species: *Potamonautes raybouldi* Cumberlidge & Vannini, 2004, *Platythephusa immaculata* Marijnissen, Schram, Cumberlidge & Michel, 2004, and *P. praelongata* Marijnissen, Schram, Cumberlidge & Michel, 2004. The present work adds another species of *Potamonautes, P. xiphoidus* **n. sp.,** from Tanzania.

TABLE 1. Present identifications of freshwater crabs from Tanzania compared with those of Bott (1955).

Identification in Bott (1955)	**Present Identification**
POTAMONIDAE	POTAMONAUTIDAE
Potamonautes (Rotundopotamonautes) emini emini	*Potamonautes emini*
Potamonautes (Gerdalopotamonautes) gerdalensis	*Potamonautes gerdalensis*
Potamonautes (Rotundopotamonautes) infravallatus	*Potamonautes infravallatus*
Potamonautes (Lirrangopotamonautes) johnstoni johnstoni	*Potamonautes johnstoni*
Potamonautes (Lirrangopotamonautes) lirrangensis	*Potamonautes lirrangensis*
Potamonautes (Tripotamonautes) loveridgei	*Potamonautes loveridgei*
Potamonautes (Obesopotamonautes) obesus obesus	*Potamonautes obesus*
Potamonautes (Platypotamonautes) pilosus	*Potamonautes pilosus*
Potamonautes (Lirrangopotamonautes) johnstoni platycentron	*Potamonautes platycentron*
Potamonautes (Platypotamonautes) platynotus	*Potamonautes platynotus*
Not included in Bott (1955)	*Potamonautes raybouldi*
Potamonautes (Arcopotamonautes) suprasulcatus suprasulcatus	*Potamonautes suprasulcatus*
A junior subjective synonym of *P. johnstoni*	*Potamonautes unisulcatus*
Not included in Bott (1955)	*Potamonautes xiphoidus*
POTAMONIDAE	PLATYTHELPHUSIDAE
Potamonautes (Platythelphusa) armata armata	*Platythelphusa armata*
Potamonautes (Platythelphusa) armata armata	*Platythelphusa conculcata*
Not included in Bott (1955)	*Platythelphusa denticulata*
Not included in Bott (1955)	*Platythelphusa echinata*
Not included in Bott (1955)	*Platythelphusa immaculata*
Potamonautes (Platythelphusa) armata armata	*Platythelphusa maculata*
Not included in Bott (1955)	*Platythelphusa polita*
Not included in Bott (1955)	*Platythelphusa praelongata*
Not included in Bott (1955)	*Platythelphusa tuberculata*
DECKENIIDAE	DECKENIIDAE
Deckenia imitatrix	*Deckenia imitatrix*
Deckenia mitis	*Deckenia mitis*

Perhaps the most significant works on the freshwater crabs of Africa were those of Capart (1954) on the types of African freshwater crabs at the Muséum National d'Histoire Naturelle, Paris, the revision of the freshwater crabs of Lake Tanganyika (Capart 1952),

and the monograph by Bott (1955), which included a new classification of the group. Bott (1955) based his classification on the morphology of the gonopods as well as on characters derived from somatic morphology, and revived interest in characters of the mandible. His conclusions laid the foundations for the modern taxonomy of the group, although he did not change the traditional classification of *Deckenia*, and treated *Platythelphusa* as a monotypic subgenus of *Potamonautes*. Bott (1955) recognized thirty-eight species and fourteen subspecies of *Potamonautes* which he placed in fifteen subgenera. For Tanzania, Bott (1955) recognized a total of 15 species and subspecies of *Potamonautes*, which he assigned to eight different subgenera (Table 1). He also synonymized a number of other described taxa and described one new taxon, *Potamonautes (Gerdalopotamonautes) gerdalensis* Bott, 1955.

However, much of Bott's taxonomic work concerning Tanzania (and indeed, the rest of the continent) has proved to be of limited use to subsequent workers, especially when it comes to the identification of specimens (Cumberlidge 1999). In particular, Bott's (1955) descriptions, identification keys and classifications are unreliable, and nearly all are in need of revision (Cumberlidge 1999). The recent studies of the relationships of African freshwater crabs by Cumberlidge (1997, 1998, 1999), Cumberlidge *et al.* (1999), Cumberlidge & Sternberg (1999) and Daniels *et al.* (2002) do not support the use of Bott's (1955) subgenera, with these workers citing inconsistencies in the diagnoses of species included in the subgenera examined. Bott's (1955) subgeneric groupings for the Tanzanian taxa were also found to be inconsistent and are not employed here.

The higher taxonomy used here follows that found in Martin & Davis (2001), which recognized four African freshwater crab families, the Potamidae Ortmann, 1896, the Deckeniidae Ortmann, 1897, the Platythelphusidae Colosi, 1920, and the Potamonautidae Bott, 1970. Species of *Platythelphusa* and *Deckenia* were identified using the keys provided by Cumberlidge *et al.* (1999), Marijnissen *et al.* (2004) and Ng *et al.* (1995), while specimens assigned to the problematic genus *Potamonautes* were identified following reference to Bott (1955) together with direct comparison of specimens with the relevant type material. A substantial number of changes to the taxonomy suggested by Bott (1955) are made: all of his subgeneric categories, most of his subspecific categories and many of his synonymies are not accepted (Table 1).

MATERIALS AND METHODS

This revision is based on the examination of all relevant type material and of more than 1,000 previously unstudied specimens from Tanzania collected by T. R. Williams (formerly of the University of Liverpool, UK) that are now part of the collection at NMU. Over a period of several years beginning in the 1960s, Williams and his colleagues surveyed the freshwater crabs of more than 100 different localities in Tanzania, mainly in the northern mountains (Mounts Kilimanjaro and Meru), the Eastern Arc mountains and the

coastal lowland forests, making these regions among the most surveyed parts of that country for these animals. Other material used in this study came from Frontier Tanzania who surveyed the coastal forests of the country. Also included are collections of recent surveys of Lake Tanganyika by R. Bills (Albany Museum, South Africa) and by S. Marijnissen (University of Amsterdam, The Netherlands).

Emphasis has been placed on the gonopods, mandibles, somatic characters and carapace proportions, as well as on characters new to the taxonomy of African freshwater crabs, such as the size and shape of the dorsal membrane of gonopod 1. Terminology is adapted from Cumberlidge (1999). All measurements are given in mm. New combinations of characters of the carapace, third maxilliped, sternum, cheliped and gonopod 1 were used to diagnose each species based on the type material. Carapace width (cw), carapace length (cl), carapace height (ch) and front width (fw) were measured with Manostat calipers, correct to at least 0.1 mm. Carapace proportions were calculated using ratios of these characters to front width and carapace length. The mean and standard deviation of each carapace proportion (cw/fw, cl/fw, ch/fw and fw/cl) were obtained for all individuals observed from each species (Table 2), and these proportions were also calculated separately for adults of each species (Table 3).

TABLE 2. The mean carapace proportions for specimens of all ages (juvenile, subadult and adult) of the species of *Potamonautes* included in this study. For abbreviations see Materials and methods.

Species	cw/fw		cl/fw		ch/fw		fw/cl	
	mean ± s.d.		mean ± s.d.		mean ± s.d.		mean ± s.d.	
P. emini (n=89)	3.2	0.2	2.2	0.1	1.3	0.1	0.5	0.0
P. gerdalensis (n=52)	3.2	0.3	2.3	0.1	1.3	0.1	0.4	0.0
P. infravallatus (n=2)	3.9		2.5		1.2		0.4	
P. johnstoni (n=37)	3.5	0.3	2.5	0.1	1.4	0.1	0.4	0.0
P. lirrangensis (n=51)	3.5	0.3	2.6	0.2	1.3	0.1	0.4	0.0
P. loveridgei (n=35)	3.4	0.4	2.3	0.2	1.3	0.2	0.4	0.1
P. obesus (n=69)	2.8	0.2	2.1	0.1	1.3	0.2	0.5	0.0
P. pilosus (n=16)	3.2	0.2	2.2	0.1	1.4	0.1	0.4	0.0
P. platycentron (n=9)	3.4	0.1	2.4	0.1	1.3	0.0	0.4	0.0
P. platynotus (n=10)	3.3	0.2	2.3	0.1	1.1	0.1	0.4	0.0
P. raybouldi (n=30)	4.1	0.3	3.0	0.2	1.5	0.1	0.3	0.0
P. suprasulcatus (n=170)	3.3	0.3	2.4	0.2	1.2	0.2	0.4	0.0
P. unisulcatus (n=38)	3.2	0.2	2.3	0.2	1.3	0.1	0.4	0.0
P. xiphoidus (n=26)	3.3	0.2	2.3	0.1	1.3	0.1	0.4	0.0

TABLE 3. The mean carapace proportions of adult specimens of the species of *Potamonautes* included in this study. For abbreviations see Materials and methods.

Species	cw/fw mean ± s.d.		cl/fw mean ± s.d.		ch/fw mean ± s.d.		fw/cl mean ± s.d.	
P. emini (n=89)	3.2	0.2	2.2	0.1	1.3	0.1	0.5	0.0
P. gerdalensis (n=52)	3.4	0.1	2.4	0.1	1.3	0.1	0.4	0.0
P. infravallatus (n=2)	3.9		2.5		1.2		0.4	
P. johnstoni (n=12)	3.7	0.2	2.6	0.1	1.4	0.1	0.4	0.0
P. lirrangensis (n=23)	3.6	0.2	2.7	0.2	1.4	0.1	0.4	0.0
P. loveridgei (n=11)	3.6	0.2	2.4	0.1	1.4	0.1	0.4	0.1
P. obesus (n=31)	2.9	0.2	2.2	0.1	1.3	0.1	0.5	0.0
P. pilosus (n=7)	3.3	0.2	2.3	0.1	1.5	0.1	0.4	0.0
P. platycentron (n=1)	3.7		2.6		1.3		0.4	
P. platynotus (n=2)	3.4		2.3		1.2		0.4	
P. raybouldi (n=16)	4.3	0.2	3.0	0.1	1.5	0.1	0.3	0.0
P. suprasulcatus (n=26)	3.6	0.2	2.5	0.1	1.3	0.1	0.4	0.0
P. unisulcatus (n=7)	3.4	0.2	2.5	0.2	1.3	0.1	0.4	0.0
P. xiphoidus (n=11)	3.3	0.2	2.3	0.1	1.3	0.1	0.4	0.0

Species distribution maps were based on the identification of specimens following careful reference to type material. Unfortunately, the notes accompanying most museum specimens are typically limited and usually only provide the date, locality and collector, and include little other biological information. Furthermore, the task of finding localities on current maps is complicated by the brevity of some of the labels accompanying the specimens and by the large-scale changes in the names of cities, towns, villages and geographical features that occurred in the 1960s following the end of the colonial era in Africa. Geographic coordinates for topographic names were obtained by reference to the *Times Atlas* and to the Fuzzy Gazetteer (http://tomcat-dmaweb1.jrc.it/fuzzyg/query/). All latitude and longitude coordinates were converted to digital degrees and compiled in a gazetteer (Appendix). Species distribution maps showing country boundaries, major rivers and lakes were produced using Arcview 8.1 GIS software (ESRI) (Beadle 1974). The conservation status of the freshwater crabs of Tanzania is summarized in Table 4.

Abbreviations used: cw, distance across the carapace at the widest point; cl, carapace length measured along the median line, from the anterior to the posterior margin; ch, carapace height, the maximum height of the cephalothorax; fw, front width measured along the anterior margin; s, thoracic sternite; s4/s5, s4/s5, s5/s6, s6/s7, s7/s8, sternal sulci between adjacent thoracic sternites; e, thoracic episternite; s4/e4, s5/e5, s6/e6, s7/e7, episternal

sulci between adjacent thoracic sternites and episternites; p1–p5, pereiopods 1–5; BMNH = The Natural History Museum, London, U.K.; MCZ = Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA; MNHN = Muséum National d'Histoire Naturelle, Paris, France; MRAC = Musée Royal de l'Afrique Centrale, Tervuren, Belgium; NHMW = Naturhistorisches Museum, Vienna, Austria; NMU = Northern Michigan University, Marquette, MI, USA; SMF = Forschungsinstitut Senckenberg, Frankfurt, Germany; NNM = Nairobi, Kenya; SMNH = Naturhistoriska Riksmuseet, Stockholm, Sweden; USNM = United States National Museum of Natural History, Smithsonian Institution, Washington DC, USA; ZIM = Zoological Institute and Museum, Hamburg, Germany; ZMA = Zoological Museum, Amsterdam, The Netherlands; ZMB = Museum für Naturkunde der Humboldt-Universität, Berlin, Germany; ZSM = Zoologisches Staatssammlung, München, Germany.

TAXONOMY

List of species found in Tanzania

Family Potamonautidae Bott, 1970

Genus *Potamonautes* MacLeay, 1838

Potamonautes emini (Hilgendorf, 1892)

Potamonautes gerdalensis Bott, 1955

Potamonautes infravallatus (Hilgendorf, 1898)

Potamonautes johnstoni (Miers, 1885)

Potamonautes lirrangensis (Rathbun, 1904)

Potamonautes loveridgei (Rathbun, 1933)

Potamonautes obesus (A. Milne-Edwards, 1868)

Potamonautes pilosus (Hilgendorf, 1898)

Potamonautes platycentron (Hilgendorf, 1897)

Potamonautes platynotus (Cunnington, 1907)

Potamonautes raybouldi Cumberlidge & Vannini, 2004

Potamonautes suprasulcatus (Hilgendorf, 1898)

Potamonautes unisulcatus (Rathbun, 1933)

Potamonautes xiphoidus **n. sp.**

Family Deckeniidae Hilgendorf, 1869a

Genus *Deckenia* Hilgendorf, 1869a

Deckenia imitatrix Hilgendorf, 1869

Deckenia mitis Hilgendorf, 1898

Family Platythelphusidae Colosi, 1920

Genus *Platythelphusa* A. Milne-Edwards, 1887

Platythelphusa armata (A. Milne-Edwards, 1887)

Platythelphusa conculcata Cunnington, 1907
Platythelphusa denticulata Capart, 1952
Platythelphusa echinata Capart, 1952
Platythelphusa immaculata Marijnissen, Schram, Cumberlidge & Michel, 2004
Platythelphusa maculata (Cunnington, 1899)
Platythelphusa polita Capart, 1952
Platythelphusa praelongata Marijnissen, Schram, Cumberlidge & Michel, 2004
Platythelphusa tuberculata Capart, 1952

Key to families and genera of freshwater crabs of Tanzania
(adapted from Cumberlidge 1999 and Cumberlidge *et al.* 1999)

1 Frontal margin lined by small teeth or distinct granules; external angles of front either sharp spines or small granules; stout triangular process/small tooth (descending frontal tooth) beneath external angles of front, descending into orbital hiatus ..... ***Platythelphusa*** **(Platythelphusidae)**
- Frontal margin, external angles of front smooth; no process beneath external angles of front **2**
2 Antennules folding vertically; front with distinct medial lobe; anterior respiratory channels elongated, tube-like, openings projecting upward, level with frontal margin on either side of frontal medial lobe ..... ***Deckenia*** **(Deckeniidae)**
- Antennules folding horizontally; front straight; anterior respiratory channels simple holes, openings level with dorsolateral corners of third maxillipeds ..... ***Potamonautes*** **(Potamonautidae)**

FAMILY POTAMONAUTIDAE Bott, 1970

Genus *Potamonautes* MacLeay, 1838 (Figs. 1–186, Plates I–XIV)

Type species. *Thelphusa perlata* H. Milne Edwards, 1837

Diagnosis. Members of the genus *Potamonautes* can be recognized as follows: mandibular palp two-segmented, anterolateral margin lacking intermediate tooth between exorbital and epibranchial teeth; exopod of third maxilliped with long flagellum; terminal article of gonopod 1 short (about one quarter to one third as long as subterminal segment of gonopod 1), terminal article of gonopod 2 with long flagellum about 0.5–0.75 times as long as subterminal segment of gonopod 2.

Remarks. More than 60 species of *Potamonautes* are found in continental Africa (Bott 1959, 1960, 1964, 1968, 1970; Cumberlidge 1999; Stewart 1997a, b; Stewart *et al.*

1995; Stewart & Cook 1998; Daniels *et al*. 1998, 2001; Corace *et al*. 2001; Gouws *et al*. 2001; Cumberlidge *et al*. 2002; Cumberlidge & Vannini 2004; Cumberlidge & Tavares 2006). The species of *Potamonautes* with representatives in Tanzania were assigned to five different subgenera by Bott (1955). However, none of Bott's (1955) subgenera are recognized here due to doubts about these categories that have been expressed by several authors (Cumberlidge 1997, 1998, 1999; Cumberlidge & Boyko 2000; Daniels *et al*. 2002; Cumberlidge & Tavares, 2006).

Distribution. The vast majority of the species of *Potamonautes* are found in continental Africa south of the Sahara, although two are found along the Nile valley as far north as Cairo, Egypt (Cumberlidge 1999). At least 30 species are found in East Africa, with 14 of these occurring in Tanzania (Reed 2003).

Key to the species of *Potamonautes* from Tanzania

1 Second carpal tooth of cheliped large, distinct, greater than one half size of first carpal tooth **2**
- Second carpal tooth absent or reduced, less than one half size of first carpal tooth **5**
2 Ischium of third maxilliped lacking vertical sulcus; sternal sulcus s3/s4 incomplete, consisting only of two deep side notches; s4 with raised rounded margins where chelipeds insert; vertical (pleural) groove on carapace continuing down below epimeral sulcus, dividing sidewall into four parts; lateral and medial lobes on terminal article of gonopod 1 of equal height; terminal article tapering evenly along length, not distinctly widened in mid section (Figs. 157–158) ..... ***P. obesus***
- Ischium of third maxilliped with vertical sulcus; sternal sulcus s3/s4 complete; sternite s4 smooth, lacking raised rounded margins; vertical (pleural) groove on carapace sidewall terminating at epimeral sulcus, dividing sidewall into three parts; medial and lateral lobes on terminal article not of equal height; terminal article distally widened in middle **3**
3 Lateral lobe of terminal article of gonopod 1 higher than medial lobe; distal margin of subterminal segment at dorsal membrane of gonopod 1 deeply v-shaped (Figs. 153–154) ..... ***P. lirrangensis***
- Medial lobe of terminal article of gonopod 1 higher than lateral lobe; distal margin of subterminal segment at dorsal membrane of gonopod 1 either straight or slightly concave **4**
4 Anterolateral margin behind epibranchial tooth lined with teeth or large granules; subhepatic, subbranchial, pterygostomial regions of carapace sidewall heavily granulated; propodus of cheliped granulated with reticulated pattern; distal margin of subterminal segment at dorsal membrane of gonopod 1 concave, base of terminal article at dorsal membrane concave; distal margin of subterminal segment of gonopod 1 widened, forming rounded medial shoulder (Figs. 165–166)..... ***P. raybouldi***

- Anterolateral margin behind epibranchial tooth smooth; subhepatic, subbranchial, pterygostomial regions of carapace sidewall smooth; propodus of cheliped smooth uniformly colored; distal margin of subterminal segment at dorsal membrane of gonopod 1 straight, base of terminal article at dorsal membrane straight (forming right triangle); distal margin of subterminal segment of gonopod 1 slim not widened, not forming rounded medial shoulder (Figs. 155–156) ..... ***P. loveridgei***

5 Sternal sulcus s3/s4 complete **6**

- Sternal sulcus s3/s4 reduced to two notches **11**

6 Terminal article of gonopod 1 broad-based short straight cone (in line with longitudinal axis of subterminal segment), straight, neither curved nor bent, with distinctive fields of setae; dorsal membrane slim barely visible (Figs. 149–150).. ***P. infravallatus***

- Terminal article of gonopod 1 long, either slim along its length or widened in middle, either gently curved outward or bent sharply outward; dorsal membrane visible **7**

7 Medial, lateral lobes of terminal article of gonopod 1 of equal height **8**

- Medial, lateral lobes of terminal article of gonopod 1 unequal (one higher than other). **10**

8 Exorbital tooth large pointed; anterolateral margin of carapace behind epibranchial tooth lined with small teeth; all three regions of carapace sidewall granulated (Figs. 163–164) ..... ***P. platynotus***

- Exorbital tooth low; anterolateral margin behind epibranchial tooth lined with granules; sidewall of carapace smooth in suborbital subhepatic regions covered with carinae in pterygostomial region **9**

9 Terminal article of gonopod 1 of medium length, with distinctly upcurved tip, medial distal margin of subterminal segment wide, forming rounded shoulder (Figs. 147–148) ..... ***P. gerdalensis***

- Terminal article of gonopod 1 long slim needle-like, tip not curving upward, medial distal margin of subterminal segment slim lacking rounded shoulder (Figs. 167–168)…***P. suprasulcatus***

10 First carpal tooth of major cheliped slim pointed; middle lateral part of terminal article of gonopod 1 with high crest; base of terminal article concave at dorsal membrane; distinct gap between dactylus and fixed finger of propodus of closed major cheliped, tips of fingers pointed (Figs. 151–152) ..... ***P. johnstoni***

- First carpal tooth of cheliped broad blunt; middle lateral part of terminal article of gonopod 1 with low crest; base of terminal article straight at dorsal membrane; no gap between dactylus and fixed finger of propodus of closed major cheliped, tips of fingers rounded (Figs. 163–164) ..... ***P. platycentron***

11 Terminal article of gonopod 1 straight along entire length, tapering evenly to pointed tip (Figs. 171–172) ..... ***P. xiphoidus***

- Distal part of terminal article of gonopod 1 curving outward **12**

12 Ischium of third maxilliped with deep vertical sulcus (Figs. 145–146)..... ***P. emini***

- Ischium of third maxilliped either lacking vertical sulcus or with faint sulcus **13**
13 Second carpal tooth on carpus of cheliped small, granular (Figs. 159–160) .. ***P. pilosus***
- Second carpal tooth on carpus of cheliped small, sharp (Figs. 167–168)..... ..... ***P. unisulcatus***

***1. Potamonautes emini* (Hilgendorf, 1892)** (Figs. 1–11, 145–146, 173, plate I)

Thelphusa emini Hilgendorf, 1892: 11; 1898: 17–18.
Potamon Emini—de Man, 1898: 436; Capart, 1954: 832, figs. 19, 32.
Potamon (Geothelphusa) Emini—Rathbun, 1904: pl. 18, fig. 9; 1905: 209; 1909: 102; 1922: 35; Lenz, 1910: 5; Bouvier, 1921: 50, fig. 4.
Potamon (Potamonautes) emini—Balss, 1929: 345.
Geothelphusa emini—Balss, 1936: 193, fig. 28.
Potamon emini—Chace, 1942: 193.
Potamonautes (Rotundopotamonautes) emini emini—Bott, 1955: 280–291, pl. 24, fig. 1a–d, fig. 54.
Potamonautes emini—Cumberlidge, 1997: 581; 1998: 199.

Type material: TANZANIA: *Telphusa emini* Hilgendorf, 1898, male lectotype (cw 15.4, cl 10.4, ch 5.1, fw 5.1 mm) (ZMB 8406), preserved dry, Bukoba.

Additional material examined: TANZANIA: Bukoba District, on Bukoba-Biharamulo road, 8 km from Bukoba, Wazi River, Bungonzi stream (small), Ndolage, 1,417 m , 4 adult females (cw 27.2 to cw 36.5 mm; 2 damaged), 12 males (cw 22.1 to cw 33.2 mm), 1967 (A. W. R. McCrae) (NMU TRW1967.01); Bukoba District, Kyarubamba River near Pantelukis, 3 adult females (cw 25 to cw 27.7 mm), adult male (cw 29.7 mm), 2 subadult males (cw 22.9, cw 23.9mm), subadult female (cw 22.6 mm), juvenile female (cw 18.3 mm), 10.xii.1966 (A. W. R. McCrae) (NMU TRW1967.02); Bukoba District, on Bukoba-Biharamulo road, 8 km from Bukoba, Wazi River, adult female (cw 32.4 mm), 2 adult males (cw 28.2, cw 31.5 mm), 5.xii.1966 (A. W. R. McCrae) (NMU TRW1967.03a); Bukoba District, on Bukoba-Biharamulo road, 8 km from Bukoba, Wazi River, 10 adult females (cw 27 to cw 32 mm), 6 subadult females (cw 24.2 to cw 26.8 mm), 8 juvenile females (cw 21 to cw 23 mm), 5.xii.1966 (A. W. R. McCrae) (NMU TRW1967.03b); Bukoba District, Kanyamugua River, 5 adult females (cw 26 to cw 30.6 mm), 2 subadult females (cw 25.7, 27.1 mm), 6 males (cw 24.4 to cw 30.1 mm), 2 juvenile males (cw 20.5, 21.4 mm), 2 juvenile females (cw 23.1, 23.6 mm), 7.xii.1966 (A. W. R. McCrae) (NMU TRW1967.04a); Bukoba District, Kanyamugua River, adult female (cw 30.3 mm), 4 adult males (cw 25.8 to cw 29.4 mm), 3 juvenile males (cw 21.8 to cw 22.8 mm), 3 subadult females (cw 24.4 to cw 25.9 mm), juvenile female (cw 21.4 mm), 7.xii.1966 (A. W. R. McCrae) (NMU TRW1967.04b); Bunyaro District, Upper Waki River, Nyantonzi area, adult female (cw 27.1 mm), 2 males (cw 24.7, 25.9 mm), 18.viii.1965 (A.W.R McCrae) (NMU TRW1966.16); Bukoba District, Kanyamugua River at foot of plateau, 2 adult females (cw 31.5, 34.3 mm), male (cw 25.4 mm), juvenile female (cw 20 mm), 7.xii.1966

(A. W. R. McCrae) (NMU TRW1967.00); UGANDA: Ugungwe Mountains, Kigoya, ovigerous female (cw 17.6 mm), i.1930 (A. Loveridge) (USNM 64109). **DEMOCRATIC REPUBLIC OF THE CONGO:** Kisangani, male (cw 18.5 mm) (USNM 102264).

Diagnosis. Postfrontal crest distinct; epibranchial tooth absent; exorbital tooth low; grooves on posterior carapace faint; anterolateral margin continuous with posterolateral margin; all 3 regions of carapace sidewalls smooth; s3/s4 incomplete, deep at sides, faint across middle; margins of s4 raised, rounded where chelipeds insert; episternal sulcus s4/e4 absent, s5/e5, s6/e6, s7/e7 complete; ischium of third maxilliped with vertical sulcus; dactylus of adult male major cheliped slender, arched, enclosing oval interspace; first carpal tooth of cheliped large spine, second carpal tooth small, with another small tooth behind it; medial inferior margin granulated with large rounded distal meral tooth surrounded with granules, lateral inferior margin granulated; first half of terminal article of gonopod 1 straight with parallel sides, angled slightly outward, second half curving sharply outward, tapering gently to broad tip; terminal article of gonopod 1 not significantly widened in middle, lateral, medial folds low, evenly sized; base of terminal article concave at dorsal membrane; distal margin of subterminal segment concave at dorsal membrane; the dorsal membrane broad at lateral margin, tapering to point at medial margin.

Size. Small, with an adult size range from cw 17.6 to cw 36.5 mm.

Variation. The chelipeds of *P. emini* undergo allometric growth in males, whereby the dactylus of the major cheliped is straight in young crabs, becoming arched in adults, where the entire major cheliped is much longer and higher than the minor cheliped. Heterochely is also seen in female crabs but the dramatic arching of the dactylus is absent.

Type locality. Bukoba Bay, Tanzania.

Distribution. Tanzania, Democratic Republic of Congo, Uganda, Rwanda.

Remarks. The male lectotype of *Telphusa emini* Hilgendorf, 1898 (cw 15.4, cl 10.4, ch 5.1, fw 5.1 mm) (ZMB 8406) is preserved dry and was photographed by Bott (1955: fig. Pl. XXIV, fig. 1a–d). Identification of specimens in the present work was based on comparisons with a subadult male paratype (cw 14.2, cl 9.8, ch 4.8, fw 4.12 mm) (ZMB 11384) from Bukoba, Tanzania. Bott (1955) synonymized *P. (G.) mutandensi*s Chace, 1942 from Lake Mutanda in Uganda and from Lake Kivu in Rwanda with *P. emini*, but this opinion is not supported here because of distinct differences in characters of the first gonopod of the types of these two taxa examined here.

Natural history and conservation status. *Potamonautes emini* is a widespread and abundant species that has been collected recently. A. W. R. McCrae's field notes record *P. emini* from streams where the water flow was slow, almost stagnant, with iron oxide flocculates on the streambed. This species was also collected from underneath rocks and cobbles in fast flowing streams near Lake Tanganyika (S. Marijnissen, pers. comm). The conservation status of *P. emini* is categorized as least concern (LC) (Table 4) because both the range of occurrence and the area of occupancy are in excess of the thresholds for vul-

nerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected relatively recently from more than one locality (present study, S. Marijnissen, pers. comm.) and that this species is well represented in museum collections

TABLE 4. Checklist of native Tanzanian freshwater crabs and their conservation status. Conservation status abbreviations: LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, for other abbreviations see IUCN (2004), Red List ver. 3.1 (2001).

Family	Species	Year Described	Conservation Status Red List Ver. 3.1 (2001) (IUCN 2004)
Potamonautidae	*Potamonautes emini*	1892	LC
Potamonautidae	*Potamonautes gerdalensis*	1955	VU B1ab(i); C2a(i)
Potamonautidae	*Potamonautes infravallatus*	1898	VU B1ab(i); C2a(i)
Potamonautidae	*Potamonautes johnstoni*	1885	VU B1ab(i); C2a(i)
Potamonautidae	*Potamonautes lirrangensis*	1904	LC
Potamonautidae	*Potamonautes loveridgei*	1933	LC
Potamonautidae	*Potamonautes obesus*	1868	LC
Potamonautidae	*Potamonautes pilosus*	1898	VU B1ab(i); C2a(i)
Potamonautidae	*Potamonautes platycentron*	1897	EN B1ab(i)+2ab(i); C2a(i)
Potamonautidae	*Potamonautes platynotus*	1907	LC
Potamonautidae	*Potamonautes raybouldi*	2004	VU B1ab(iii); C2a(i)
Potamonautidae	*Potamonautes suprasulcatus*	1898	LC
Potamonautidae	*Potamonautes unisulcatus*	1933	EN B1ab(i); C2a(i)
Potamonautidae	*Potamonautes xiphoidus*	2005	VU B1a+B2a
Deckeniidae	*Deckenia imitatrix*	1869	VU A4c; B1b(ii,iii)
Deckeniidae	*Deckenia mitis*	1898	VU A4c; B1b(ii,iii)
Platythelphusidae	*Platythelphusa armata*	1887	LC
Platythelphusidae	*Platythelphusa conculcata*	1907	LC
Platythelphusidae	*Platythelphusa denticulata*	1952	VU D2
Platythelphusidae	*Platythelphusa echinata*	1952	LC
Platythelphusidae	*Platythelphusa immaculata*	2004	NT B1ab(i); D1
Platythelphusidae	*Platythelphusa maculata*	1899	LC
Platythelphusidae	*Platythelphusa polita*	1952	LC
Platythelphusidae	*Platythelphusa praelongata*	2004	VU D2
Platythelphusidae	*Platythelphusa tuberculata*	1952	LC

***2. Potamonautes gerdalensis* Bott, 1955** (Figs. 12–22, 147–148, 174, plate II)

Potamonautes (Gerdalopotamonautes) gerdalensis Bott, 1955: 261–262, figs. 34, 82, pl. 13, fig. 3a–d.
Potamonautes gerdalensis—Cumberlidge, 1998: 199.

Type material examined: TANZANIA: Girdalo, on the border between Tanzania and Kenya, adult male holotype (cw 34 mm), adult female paratype (cw 29.3 mm), juvenile paratype (cw 22.1 mm), 27.i.1911 (Kattwinkel) (ZSM 1189/1).

Additional material examined: KENYA: Nyanza Province, Kisii, upper reaches of the Kitare River, male (cw 36.3 mm), 13 female subadults and juveniles (cw 10.2 to cw 34 mm), 3 juvenile males (cw 17.9 to cw 20.5 mm) 23.ix.1960 (R. B. Highton) (NMU TRW1960.05); Nyanza Province, Kisu, near Kodera, Sauda, Kitare and Awash Rivers, subadult male adult (cw 31.8 mm), subadult male (cw 26 mm), subadult male (cw 24.6 mm), subadult female (cw 29.5 mm), subadult female (cw 27 mm), 16.xii.1959 (J. McMahon) (BMNH 1951.10.31.1–5).

Diagnosis. Postfrontal crest sharp-edged, completely crossing carapace; exorbital tooth low, epibranchial tooth absent; anterolateral margin behind epibranchial tooth faintly granulated, curving inward for short distance over branchial region of carapace; suborbital region of carapace sidewall smooth, subhepatic, pterygostomial regions of carapace sidewalls with fields of granules, short carinae; ischium of third maxilliped with vertical sulcus; sternal sulcus s3/s4 wide, deep, completely crossing sternum, touching anterior margin of sternoabdominal cavity; episternal sulcus s4/e4 missing, s5/e5 incomplete, s6/e6, s7/e7 complete; first carpal tooth of P1 large, pointed, second carpal tooth granular, with several small granules behind it; merus of cheliped elongated, dactylus arched, enclosing oval interspace; basal part of terminal article of gonopod 1 thickened; lateral, medial folds low, even-sized, separated by broad seminal groove; medial fold wider (but not higher) than lateral fold; tip of terminal article of gonopod 1 short, hook-shaped, inwardly curved; distal margin of subterminal segment highest on lateral side (forming rounded shoulder), lowest on medial side; dorsal membrane on lateral side very broad, clearly separating terminal article from subterminal segment; dorsal membrane on medial side narrow at boundary between segments; groove for gonopod 2 on subterminal segment of gonopod 1 broad.

Size. Medium to large, with a pubertal molt occurring between cws 34–35 mm.

Variation. The chelipeds of *P. gerdalensis* exhibit allometric growth. Heterochely becomes obvious in adult males as well as adult females, though to a lesser degree. The dactylus of the major cheliped in younger crabs is straight, and when closed its teeth completely meet those of the fixed finger. In older crabs the dactylus does not meet the fixed finger when closed. The degree of arching of the dactylus of the major cheliped of adult males varies and the enclosed interspace varies from narrow to oval. The sulcus of the ischium of the third maxilliped is always present, but varies from deepin subadults (Kisu

specimens) to weak (holotype) in adults.

Type locality. Girdalo Tanzania, on the border between Tanzania and Kenya. Unfortunately, when Bott (1955) established the species *P. gerdalensis* and the subgenus *Gerdalopotamonautes* he adopted the spelling based on the type locality of 'Gerdalo'. Today, this location is known in gazetteers as 'Girdalo', while the spelling 'Gerdalo' is not recoverable.

Distribution. Mara and Arusha regions of Tanzania and the Nyanza Province of Kenya. The NMU collection contains two specimens of *P. gerdalensis* both from the Nyanza Province of Kenya that represent the only new material known since the original description of this species in 1955. These records extend the range of this species northwest along the border between Tanzania and Kenya.

Remarks. This material was identified following direct examination by one of us (NC) of the holotype (an adult male, cw 34 mm) and paratypes, an adult female (cw 29.3 mm) and a juvenile (cw 22.1 mm), 27.i.1911 (Kattwinkel) (ZSM 1189/1), as well as Bott's (1955) photographs and illustrations of the holotype. Bott (1955) erected the subgenus *P. (Gerdalopotamonautes)* to contain a single species, *P. gerdalensis*; and although Cumberlidge (1998) accepted the validity of the species, he did not recognize the subgenus, and this opinion is followed here. *Potamonautes gerdalensis* is morphologically close to *P. alluaudi* (Bouvier, 1921) from Mount Kenya and the Aberdares in Kenya: both are large species, both have a sharp-edged complete postfrontal crest, a low exorbital tooth, a missing epibranchial tooth and a rounded shoulder on the distal medial margin of the subterminal segment of gonopod 1. However, these two taxa can be clearly distinguished by the form of the terminal article of the first gonopod (the tip of the terminal article is sharply upcurved in *P. gerdalensis* and straight in *P. alluaudi*).

Natural history and conservation status. The conservation status of *P. gerdalensis* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be low based on indirect measures such as the lack of recent collections of specimens and its poor representation in museum collections.

3. Potamonautes infravallatus (Hilgendorf, 1898) (Figs. 23–30, 149–150, 175, plate III)

Telphusa infravallata Hilgendorf, 1898: 12–13, fig 2, 2a.
Potamon (Potamonautes) infravallata—Rathbun, 1905: 174.
Potamon (Potamonautes) usambarae Rathbun, 1933: 257, pl. 6; Chace, 1942: 189, fig. 2.
Potamon infravallatus—Chace, 1942: 213.
Potamonautes (Rotundopotamonautes) infravallatus—Bott, 1955: 293–294, pl. XXV, fig. 2a–d, fig. 57.

Type material examined: TANZANIA: *Telphusa infravallata*: Usambara Mountains, Buloa, adult male type (cw 23.4, cl 15.4, ch 7.4, fw 6.5 mm) (ZMB 11378); *Potamon (Pot-*

amonautes) usambarae: male subadult cotype (cw 22.4, cl 16.8, ch 6.8, fw 6.0 mm); female subadult cotype (cw 12.2, cl 9.5, ch 4.9, fw 3.6 mm), East Usambara Mountains, Amani, xii.1926 (A. Loveridge) (MCZ 7680).

Additional material examined: TANZANIA: East Usambara Mountains, Amani, female (damaged), male (damaged), 8.xii.1926 (A. Loveridge) (USNM 64108); Amani, East Usambara mountains, 2 males (cws 17.1, 18.2 mm), 1.i.1964 (J. N. Raybould) (NMU TRW1964.03b); East Usambara Mountains, Amani, 3 males (cw 19.8 to cw 22 mm), adult female (cw 24.1 mm), 2 subadult females (cws 19.8, 21.4 mm), v.1966 (J. N. Raybould) (NMU TRW1966.12a); West Usambara Mountains, Milinga River, Tewe near Mlalo, adult female (cw 22.8 mm), 18.ii.1967 (J. N. Raybould) (NMU TRW1967.11); East Usambara Mountains, Amani, 3 juvenile males (cw 10.9 to cw 12.1 mm), 3 juveniles (cw 9.8 to cw 12.2 mm), 3 juvenile females (cw 12.8 to cw 14.2 mm), 6 males (cw 15 to cw 18.4 mm), 3 subadult females (cw 16.9 to cw 17.3 mm), 2 adult females (cw 17.8 to cw 18.4 mm), subadult female (damaged), (NMU TRW1970.06); 4 subadult females (cw 15.9 to cw 18.2 mm), 7 males (cw 14.7 to cw 18.6 mm), 9.iii.1972 (NMU 09.03.1972); West Usambara Mountains, 3 km north of Mazumbai, 1 specimen, 13.ii.1975, (Dunbar) (NMU TRW1975.01).

Diagnosis. Postfrontal crest distinct, granulated, complete; exorbital tooth small, low; epibranchial tooth small, granular, anterolateral margin immediately behind epibranchial tooth lined by granules; ischium of third maxilliped with deep vertical sulcus; thoracic sternal sulcus s3/s4 deep at sides, shallow across middle; sternite s4 with raised rounded marginal ridges at points where chelipeds articulate; dactylus of major cheliped of adult males slender; first carpal tooth on carpus of cheliped sharp spine; second carpal tooth sub-equal spine, followed by one or two small teeth; ventral margins of merus of pereiopod 1 both lined by large granules; distal meral tooth large, pointed; terminal article of gonopod 1 short, stout, tapering cone, in line with longitudinal axis of gonopod; terminal article of gonopod 1 covered entirely by fields of short spines or stiff bristles; lateral, medial folds both low, of equal size; dorsal membrane not visible.

Size. Small, with an adult size range beginning at cw 23 mm.

Type locality. *Telphusa infravallata*: Buloa, Usambara Mountains, Tanzania; *P. usambarae*: Amani, Usambara Mountains, Tanzania.

Distribution. East and West Usambara Mountains, Tanzania.

Remarks. Identification of *P. infravallatus* was based on examination of the adult male type of *Telphusa infravallata* Hilgendorf, 1898 (cw 23.4, cl 15.4, ch 7.4, fw 6.5 mm) (ZMB 11378). Bott (1955) synonymized *P. infravallatus* with *Potamon (Potamonautes) usambarae* Rathbun, 1933, and this is accepted here following comparison of *P. infravallatus* to the male cotype of *P. (P.) usambarae* from the Usambara Mountains (cw 22.8 mm) (MCZ 7680).

Natural history and conservation status. The conservation status of *P. infravallatus* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence

and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species, but its population is estimated to be declining (despite the material presented here), based on indirect measures such a relatively poor representation in museum collections and increasing habitat disturbance associated with growing human populations in the region.

4. Potamonautes johnstoni (Miers, 1885) (Figs. 31–40, 151–152, 176, plate IV)

Thelphusa depressa var. *johnstoni* Miers, 1885: 237–239.
Telphusa hilgendorfi Pfeffer, 1889: 32.
Potamon (Potamonautes) ambiguus Rathbun, 1904: pl. 14, fig. 7; 1905: 171.
Potamon (Potamonautes) mrogoroensis—Rathbun, 1905: 173 (not Hilgendorf, 1898).
Potamon (Potamonautes) Johnstoni—Rathbun, 1905: 170.
Potamonautes johnstoni—Balss, 1929: 343–344; 1936: 180–182, fig. 17; Cumberlidge, 1997: 580–581; 1998: 200.
Potamonautes johnstoni f. *typical*—Pesta, 1937: 157.
Potamon johnstoni—Chace, 1942: 214.
Potamon (Potamonautes) hilgendorfi—Rathbun, 1933: 256; 1935: 6; Chace, 1942: 186.
Potamonautes (Lirrangopotamonautes) johnstoni johnstoni—Bott, 1955: 265–267: pl. XV, fig. 2a–d, fig. 36a, b.

Type material examined: TANZANIA: *Thelphusa depressa* var. *johnstoni* Miers, 1885: Kilimanjaro, male type (cw 57, cl 40, ch 24.2, fw 16.2 mm) (BMNH 1885.2). *Potamon* (*Potamonautes) ambiguus* (Rathbun, 1905): female type, Kilimanjaro, Saumi River, 1,000 to 1,600 m asl (USNM 30008). Holotype of *Telphusa hilgendorfi* Pfeffer, 1889 (subadult female, cw 20.8, cl 15.1, ch 7.2, fw 6.1 mm; ZMB 11377).

Additional material examined: TANZANIA: West Usambara Mountains, Garaya River near Dindila Factory, adult male (cw 71.6 mm), adult female (cw 84.1 mm), 5.ix.1964 (J. N. Raybould) (NMU TRW1966.05); south slopes of Kilimanjaro, Kondeni River near Marangu, adult male (cw 52.3 mm), 6.v.1966 (J. N. Raybould) (NMU TRW1966.13); 16 km east of Arusha, Usa River (tributary of Kikuletwa River, itself a tributary of the Pangani River) male (cw 53 mm), female (cw 48.7 mm) 26.v.1966 (J. N. Raybould) (NMU TRW1966.14); Kibalwa, near Taveta, canal from Lumi River, subadult female (cw 46.5 mm), 1.ii.1967 (J. E. Hudson) (NMU TRW1968.10); Kibalwa, near Taveta, Canal from Lumi River, male (cw 53.5 mm), 1.ii.1967 (J. E. Hudson) (NMU TRW1968.12); East Usambara Mountains, Amani, male (cw 76.4 mm) 6.v.1966 (J. N. Raybould) (NMU TRW1969.02); East Usambara Mountains, Amani, subadult female (cw 64.6 mm), 2 males (cws 61.1, 62 mm), 1970 (T. R. Williams) (NMU TRW1970.01); male (soft-shelled), 6.vii.1970 (T. R. Williams) (NMU 076.1970.1); East Usambara Mountains, Amani, male (cw 56.8 mm), 1970 (T. R. Williams) (NMU TRW1970.03); East Usambara Mountains, Amani, subadult female (cw 48 mm), 27.iii.1971 (NMU TRW1970.05); canal near Taveta, male (cw 65.5 mm), adult female (cw 69.4 mm), 1971 (NMU TRW1971.11);

Kilimanjaro area, Mue River, station 2, 3 males (cw 45.9 to cw 50.1 mm) (NMU TRW EA62.67); East Usambara Mountains, Amani, Dodwe River, female with hatchlings (cw 77.9 mm), 1962 (T. R. Williams) (NMU TRW-EA62.25); stream on Mount Kilimanjaro, 5 juvenile males (cw 21.9 to cw 38.9 mm), iv.1967 (J. E. Hudson) (NMU TRW1968.11); 3 juvenile males (cw 18.5 to cw 36.3 mm), 2 juvenile females (cw 25.5, 34.3 mm) (NMU 03.29.1972.1–5); canal west of Taveta, 4 males (cw 48.9, 57 mm, 2 damaged) 2 females (cw 56.5 mm; 1 damaged), 2 juvenile females (cw 32.9, 33.2 mm) (J. E. Hudson) (NMU 07.2001.c). **KENYA:** stream above Kibo, 3 males (cw 42 to cw 63.7 mm) (J. E. Hudson) (NMU TRW1971.13); stream above Kibo, 22 juveniles (J. E. Hudson) (NMU TRW1971.14); "Afrique Orientale" (either Boura [Taita] or Kilimanjaro), male (cw 47.4 mm), 1904 (C. H. Alluaud) (USNM 32297); Mount Mbolo, Taita, male, iv.1934 (A. Loveridge) (USNM 70913).

Diagnosis. Postfrontal crest sharp-edged distinct, complete; exorbital tooth small, low; epibranchial tooth small granule, anterolateral margin immediately behind epibranchial tooth smooth; ischium of third maxilliped with vertical sulcus; thoracic sternal sulcus s3/s4 complete, deep; sternite s4 lacking raised marginal ridges at points where chelipeds articulate; episternal sulci s4/e4–s7/e7 all clearly marked; dactylus of major cheliped of adult males broad, curving but not arched; first carpal tooth on carpus of cheliped sharp spine; second carpal tooth sub-equal spine; medial inferior margin of merus of pereiopod 1 lined with teeth, lateral inferior margin granulated; distal meral tooth large, pointed; proximal half of terminal article of gonopod 1 straight, second half bending outward at 45° angle; lateral side of terminal article of gonopod 1 widened in middle by distinctly raised lateral fold forming long crest; medial fold small, low; base of terminal article concave at dorsal membrane; distal margin of subterminal segment at dorsal membrane u-shaped, medial, lateral sides equally high; dorsal membrane subcircular, narrowest at medial, lateral margins.

Size. Large, with an adult size range between cws 45–50 mm. The largest specimen examined was an adult female, cw 84.1 mm.

Type locality. Kilimanjaro, Tanzania.

Distribution. Kenya and Tanzania.

Remarks. All specimens of *P. johnstoni* were identified based on comparisons with detailed illustrations of the carapace, mouthparts, sternum, abdomen and gonopods of the male type specimen of *T. depressa* var. *johnstoni* Miers, 1885 (cw 57 mm) (BMNH 1885.2) from Kilimanjaro. Unfortunately, Calman (1913) used the same name to describe a specimen from the Ruwenzori Mountains in Uganda. Cumberlidge (1997, 1998) examined the type material of both of these taxa and concluded that the specimens from Kilimanjaro and the Ruwenzoris belong to two distinct species. The specimens from Kilimanjaro retain the name *Potamonautes johnstoni* Miers, 1885 by priority, while the type of Calman's (1913) species from the Ruwenzoris corresponds to *Potamonautes aloysiisabaudiae* (Nobili, 1906).

Bott (1955) synonymized *P. johnstoni* with seven different taxa, but Cumberlidge (1997, 1998) found all of these synonymies to be questionable. The carapace, sternum, mandibles and cheliped of the type specimens of *Telphusa reichardi* Hilgendorf, 1898 (a subadult female, cw 33.8, cl 23.7, ch 11.4, fw 10 mm; ZMB 7463), *Telphusa suprasulcata* var. *pseudoperlata* Hilgendorf, 1898 (a subadult male, cw 32.1, cl 24.3, ch 9.9, fw 9.2 mm; ZMB 9348) and *Telphusa mrogoroense* Hilgendorf, 1898 (a subadult female, cw 20.8, cl 15.1, ch 7.2, fw 6.1 mm; ZMB 11377) were examined in the present study by NC. In each of these taxa, the characters correspond well with those of subadult specimens of *P. suprasulcatus* (Hilgendorf, 1898) and all are treated here as junior subjective synonyms of *P. suprasulcatus*. However, the type of *Telphusa hilgendorfi* Hilgendorf, 1898 (a subadult female, cw 20.8, cl 15.1, ch 7.2, fw 6.1 mm; ZMB 11377) was found to correspond well with *P. johnstoni* and is considered here to be a junior synonym of *P. johnstoni*.

Bott (1955) also synonymized *P. johnstoni* with *Potamon (Potamonautes) unisulcatus* Rathbun, 1933 and with *Potamon (Potamonautes) montivagus* Chace, 1953. Comparison of *P. johnstoni* to the types of *P. (P.) unisulcatus* (an adult male, cw 33, cl 21, ch 9, fw 10 mm; MCZ 7678a) and of *P. (P.) montivagus* (an adult male, cw 65.5, cl 44.2, ch 21.8, fw 16.6 mm; MCZ 12611) found the characters of the carapace, sternum, mandibles and cheliped to be unique in each taxon. Therefore, Bott's (1955) opinion that *P. (P.) unisulcatus* and *P. (P.) montivagus* are junior subjective synonyms of *P. johnstoni* is not accepted in the present work. Finally, Bott (1955) regarded *Potamon (Potamonautes) ambiguus* to be a junior synonym of *P. suprasulcatus*, but examination of the characters of the carapace, chelipeds and first gonopods of the type of *P. (P.) ambiguus* (USNM 30008) support the conclusion that this taxon should properly be treated as a junior synonym of *P. johnstoni* (Miers, 1885).

Natural history and conservation status. The conservation status of *P. johnstoni* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species, but its population is estimated to be declining based on indirect measures such as lack of recent collections of specimens, a relatively poor representation in museum collections and increasing habitat disturbance associated with growing human populations in the region.

5. Potamonautes lirrangensis (Rathbun, 1904) (Figs. 41–51, 153–154, 177, plate V)

Potamon (Potamonautes) lirrangensis Rathbun, 1904: pl. 14, fig. 8.
Potamon (Potamonautes) lirrangensis—Rathbun, 1905: 169; 1921: 413–415, pl. 25, 26, fig. 3, fig. 8.; Balss, 1914: 404; 1929: 374–348; Chace, 1942: 188–189, fig. 1.
Potamon (Potamonautes) orbitospinus Cunnington, 1907: 250–251, pl. 16, fig. 1.
Potamonautes orbitospinus—Balss, 1929: 439, 1936: fig. 18.
Potamonautes lirrangensis—Balss 1936: 188–189, fig. 24

Potamon orbitospinus—Chace, 1942: 218.

Potamonautes (Lirranpotamonautes) lirrangensis—Bott, 1955: 268–270, pl. XVI, fig. 2a–d, fig. 38, 39, 83.

Type material examined: TANZANIA: *Potamon (Potamonautes) lirrangensis* Rathbun, 1904: adult female type (cw 53.9, cl 37.8, fw 12 mm) from Lirranga, D. R. Congo, 5.ix.1891 (J. Dybowski) (MNHN).

Additional material Examined: TANZANIA: Kigoma area, Taveta, Mungonya River, male (cw 39.6 mm), juvenile female (cw 35.7 mm), 16.iv.1971 (NMU TRW1971.05); Kigoma district, Uvinza, Malagarasi River, juvenile female (damaged), 20.iv.1971 (NMU TRW1971.07); Kigoma district, Uvinza, Malagarasi River, adult female (cw 81 mm), 25.iv.1971 (NMU TRW1971.15). **DEMOCRATIC REPUBLIC OF THE CONGO:** Kisangani, 3 females (cw 45.1 to cw 59.8 mm), female ovigerous (cw 54.8 mm), iv.1915 (Herbert Lang) (USNM 54306); Kisangani, 5 females (cw 36.8 to cw 51.9 mm), 2 males (cws 29.2, 60.2 mm), iv.1915 (Herbert Lang) (USNM 54307); Lake Kivu at Kisenyi, in water at the shoreline, female (cw 26.9 mm), 12.v.1955 (Bredin Expedition-W. L. Schmitt) (USNM 98937); male (cw 46.4 mm), (Bredin Expedition-W. L. Schmitt) (USNM 98938); Kisangani, vicinity of Wagenia fishery, male (cw 59.1 mm), (Bredin Expedition-W. L. Schmitt) (USNM 98939); Kisangani, rocky gorge of Tshope Falls, male (cw 40.4 mm), 2 females (cws 24.8, 40 mm), 19.iv.1955 (Bredin Expedition-W. L. Schmitt) (USNM 98940); Kisangani, vicinity of Wagenia fishery, female (cw 53.6 mm), (Bredin Expedition-W. L. Schmitt) (USNM 98941); Kisangani, 2 ovigerous females (cws 53.7, 56.5 mm), female (cw 62.6 mm), 20.iv.1955 (Bredin Expedition-W. L. Schmitt) (USNM 98942); Kisangani, female with hatchlings (cw 60.1 mm), 20.iv.1955 (Bredin Expedition-W. L. Schmitt) (USNM 98943); Kisangani, Wagenia fishery, 3 males (cw 39.4 to cw 60.9 mm), 10 females (cw 40.3 to cw 66.5 mm), 3 ovigerous females (cw 54.7 to cw 66.5 mm), 25.iv.1955 (Bredin Expedition, W. L. Schmitt) (USNM 98944). **MALAWI:** Lake Malawi, North of Monkey Bay under 91 m of water, female (damaged), 5.iv.1972 (D. H. Eades) (NMU TRW1972.02); Lake Malawi, Monkey Bay, among rock in sand with little vegetation, male (cw 51.4 mm), 24.iii.1968 (D. H. Eades) (NMU TRW1972.04); Lake Malawi, east and northeast of Monkey Bay, Lake Malawi, male (cw 46.5 mm), 23.v.1968 (D. H. Eades) (NMU TRW1972.05).

Diagnosis. Postfrontal crest distinct complete; grooves on posterior part of carapace deep; exorbital tooth large forward pointing spine, epibranchial tooth small spine; antero-lateral margin behind epibranchial tooth curving strongly outward, then curving inward over posterolateral margin, lined by either large granules or small teeth; vertical sulcus on ischium of third maxilliped faint; thoracic sternal sulcus s3/s4 complete, deep at sides, shallow across middle; dactylus of major cheliped of adult male broad, curved; first carpal tooth on carpus of cheliped large sharp spine; second carpal tooth sharp spine smaller than first tooth; ventral margins of merus of pereiopod 1 both heavily granulated, distal meral tooth sharp spine; first half of terminal article of gonopod 1 straight with parallel sides

angled slightly outward, second half bent sharply outward at 90° angle to longitudinal axis of gonopod tapering to broad upcurved tip; lateral side of terminal article of gonopod 1 significantly widened in middle by enlarged lateral fold; medial fold smaller lower in dorsal view; distal margin of subterminal segment at dorsal membrane deeply v-shaped; dorsal membrane broadest at medial margin, narrow at lateral margin.

Size. Large, with a pubertal molt starting around cw 52 mm (a series of six ovigerous females ranged from cw 53.7 to cw 81 mm).

Type locality. Lirranga, at the confluence of the Congo and the Oubangi Rivers, Democratic Republic of Congo.

Distribution. Upper reaches of the Congo River, Democratic Republic of Congo; Lake Kivu, Rwanda; Malagarasi River near Lake Tanganyika, Tanzania; Lake Malawi, Malawi.

Remarks. Our opinion is based on the direct examination of the adult female type of *Potamon (Potamonautes) lirrangensis* Rathbun, 1904 (cw 53.9, cl 37.8, fw 12 mm) from Lirranga, collected by J. Dybowski, 5.ix.1891, which was also illustrated by Capart (1954: fig. 28). Bott (1955) synonymized *P. orbitospinosus* Cunnington, 1907 from Lake Malawi with *P. lirrangensis*. Cunnington (1907) provided plates with the dorsal view of the entire animal and a series of frontal views of *P. orbitospinosus.* The characters described by Cunnington (1907) for *P. orbitospinosus* clearly correspond to those of *P. lirrangensis*, and this synonymy is accepted here.

Natural history and conservation status. The conservation status of *P. lirrangensis* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and area of occupancy that are both in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such the fact that it has been collected recently from rocky areas in Lake Kivu and from small fast flowing rivers, as well as from large slow flowing rivers flowing into Lake Tanganyika (M. Mbalassa and S. Marijnissen, pers. comm). In addition, *P. lirrangensis* supports a local fishery in Lake Malawi, and this species is well represented in museum collections.

6. Potamonautes loveridgei (Rathbun, 1933) (Figs. 52–61, 155–156, 178, plate VI)

Potamon (Potamonautes) loveridgei Rathbun, 1933: 251–253, pl. 1–2, fig. 3
Potamonautes johnstoni stappersi Balss, 1936: 182–184, fig. 19.
Potamon loveridgei—Chace, 1942: 215.
Potamonautes (Tripotamonautes) loveridgei—Bott, 1955: 263, pl. XIV, fig. 1a–d, fig. 31.
Potamonautes loveridgei—Cumberlidge, 1997: 583; 1998: 201.

Type material examined: TANZANIA: *Potamon (Potmaonautes) loveridgei* Rathbun, 1933, male holotype Uzungwe (=Udzungwe) Mountains (MCZ 7676). *Potamon (Potamonautes) johnstoni stappersi* Balss, 1936: male type (cw 39.5, cl 26.8, ch 15.3, fw 11.0 mm), Sambala River.

Additional material examined: TANZANIA: Ujiji, Luicke River, 2 males (cw 34.8, 38.5 mm), 2 females (cws 39.8, 48.2 mm), 24.iii.1930 (A. Loveridge) (USNM 64102); Rungwe Mountains, Nkuka Forest, 2 males (cws 23.6, 29.6 mm), 2 females (cws 18.3, 18.8 mm), 24.iii.1935 (A. Loveridge) (USNM 64105); 32 km from Kigoma on road to Kasula, small stream, 2 males (cws 43.4, 54.2 mm), female (cw 52.4 mm), 17.iv.1971 (T. R. Williams) (NMU TRW1971.07); 2 juvenile males (cws 15.5, 34.6 mm), 2 females (cws 33.8, 33.9 mm), juvenile female (cw 13.5 mm); Lushoto District, 2 km north of Mayo, 2 juvenile males (cws 21.2, 28.5 mm), 11.iii.1975 (T. R. Williams) (NMU TRW1975.03); Lushoto District, 1 km west of Mayo, subadult female (cw 33.9 mm), juvenile (cw 15.7 mm), juvenile (damaged), male (damaged), 11.iii.1975 (T. R. Williams) (NMU TRW1975.07); 5 males (cw 30.5 to cw 40.5 mm), female (cw 38 mm), 4.xii.1966 (F. Malaisse) (NMU TRW04.12.1966.1–6).

Diagnosis. Postfrontal crest sharp complete; grooves on posterior part of carapace faint, shallow; exorbital tooth large, triangular, epibranchial tooth missing; anterolateral margin behind epibranchial tooth smooth, curving strongly outward; ischium of third maxilliped with deep vertical sulcus; thoracic sternal sulcus s3/s4 deep at sides, shallow across middle; margins of sternite s4 raised, rounded; dactylus of major cheliped of adult males broad but not arched; first carpal tooth on carpus of cheliped large sharp spine; second carpal tooth sharp spine smaller than first tooth; ventral margins of merus of pereiopod 1 both distinctly granulated; distal meral tooth sharp spine; first half of terminal article of gonopod 1 straight with parallel sides angled slightly outward, second half bent at 45° angle to longitudinal axis of gonopod tapering to pointed upcurved tip; terminal article of gonopod 1 significantly widened in middle by enlarged lateral fold forming high longitudinal crest; medial fold small, low; deep groove running along entire length of terminal article between two folds; base of terminal article curving down highest at medial margin; distal margin of subterminal segment at dorsal membrane straight; dorsal membrane subtriangular, with base of triangle on lateral margin, apex on medial margin.

Size. The adult size range is from cw 37.9 to cw 54.2 mm.

Variation. The chelipeds of *P. loveridgei* become heterochelic during the subadult and adult stages. This is most apparent in males where growth in the major cheliped results in the dactylus becoming highly arched, leaving a narrow gap between it and the fixed finger. The dactylus of the closed major cheliped in juveniles is straight and its teeth interlock with those of the fixed finger. The groove on the ischium of the third maxilliped varies from deep to weak and is deepest in younger crabs.

Type locality. Luiche River (Ujiji and Dabaga), Uzungwe (Uzongwe) (Rungwe) Mountains, Tanzania.

Distribution. Tanzania, Democratic Republic of Congo. *Potamonautes loveridgei* is found in the rivers that flow into Lake Tanganyika.

Remarks. These specimens were identified by comparison to illustrations of the male holotype of *P. (P.) loveridgei* Rathbun, 1933 from the Uzungwe Mountains (MCZ 7676).

Our examination of the male type of *P. (P.) johnstoni stappersi* Balss, 1936 from the Sambala River in Tanzania leads us to regard this taxon as a junior subjective synonym of *P. loveridgei*. Balss (1936) illustrated the distinctive gonopod of *P. loveridgei* (as *P. johnstoni stappersi*). The assignment by Bott (1955) of *P. loveridgei* to the subgenus *(Tripotamonautes)* is not recognized here due to doubts about the validity of that subgenus.

Natural history and conservation status. The conservation status of *P. loveridgei* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and an area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (present study; I. R. Bills, pers. comm.) and that it is well represented in museum collections

7. Potamonautes obesus (A Milne-Edwards, 1868) (Figs. 62–71, 157–158, 179, plate VII)

Thelphusa obesa A. Milne-Edwards, 1868: 86, pl. 20, fig. 1–4; 1869: 178; 1887: 146; Pfeffer, 1889: 33.
Telphusa obesa—Hilgendorf, 1878: 801; 1891: 20; 1898: 16.
Potamon (Potamonautes) obesum—Ortmann, 1897: 303, 305.
Potamon obesum—de Man, 1898: 434, 437.
Potamon (Potamonautes) Bottegoi—de Man, 1898: 262–270, fig. 3.
Potamon (Potamonautes) obesus—Rathbun, 1904: pl. 15, fig. 8, 9; 1905: 180, fig. 45; Sendler, 1912: 199; Bouvier, 1921: 49; Chace, 1942: 1907; Barnard, 1950: 192; Capart, 1954: 841, fig. 36, 17.
Potamon (Potamonautes) Bottegoi Rathbun, 1905: 180; 1933: 258; 1935: 26; Colosi, 1925: 2; Parisi, 1925: 98; Barnard, 1950:192, fig. 34 f, g.
Potamonautes obesus—Balss, 1929: 348; Barnard, 1935: 484; Cumberlidge, 1997: 580; 1998: 202–203; Reed & Cumberlidge, 2004: 418–423, figs. 1–8, 17–25. 30.
Potamon bottegoi—Chace, 1942: 208.
Potamonautes (Obesopotamonautes) obesus obesus—Bott, 1955: 257–259, pl. XXII fig. 2a–d, fig. 19, 80; Pretzmann, 1977: 238, figs 7–12.
Potamonautes bottegoi—Cumberlidge, 1997: 581–582; 1998: 198.

Type material examined: TANZANIA: *Thelphusa obesa* A. Milne-Edwards, 1868, dried, adult male, form II, holotype (cw 50.6, cl 39.5 mm), Zanzibar (Grandidier) (MNHN-B4632). **SOMALIA:** de Man (1898) described *Potamon (Potamonautes) bottegoi* de Man, 1898 based on four sub-adult males from Matagoi Bool (=Bohol), between Brava and Lugh (Captain Bottego), x.1895; one of these males, a paratype (cw 27 mm) (ZMA 102868) was examined in the present study. Bott (1955) listed the 'type' of *Potamon (Potamonautes) bottegoi* as the specimen with the following dimensions: cw 31, cl 24, ch 13, fw 10 mm. Pretzmann (1977) referred to all four specimens from Matagoi Bool as the 'holotype', but did not specify an individual specimen.

Additional material examined: for a complete account of other material from Tanzania, Kenya, Somalia and Malawi see Reed & Cumberlidge (2004).

Diagnosis. Carapace very high (ch/fw 1.5), smooth rounded; exorbital tooth small, low, epibranchial tooth small, pointed, positioned well behind postfrontal crest; carapace sidewall clearly divided into four parts; episternal sulci s4/e4 s7/e7 incomplete, s5/e5 s6/e6 complete; dactylus of major cheliped of form I adult males (cw 39–42 mm) flat broad, palm very high; dactylus of major cheliped of form II adult males (cw 43–59.6 mm) highly curved, slim, elongated (propodus of cheliped longer than cw), palm very high; terminal article of gonopod 1 directed outward at 45° angle to vertical; terminal article of gonopod 1 slim, tapering to slightly upcurved tip; lateral fold on terminal article of gonopod 1 wider higher than medial fold; subterminal segment of gonopod 1 columnar (broad from base to distal margin); basal margin of terminal article at dorsal membrane almost horizontal; distal margin of subterminal segment slightly curved at dorsal membrane with medial side raised slightly higher than lateral side; dorsal membrane equally wide on medial, lateral margins.

Size. The adult size range is from cw 33 to cw 59.6 mm.

Variation. Reed & Cumberlidge (2004) provide a detailed description of the series of changes the major cheliped of the male undergoes from juvenile to subadult stages and in the subsequent molts of the adult stage.

Type locality. *Potamonautes obesus*: Zanzibar, Tanzania. *Potamon* (*Potamonautes*) *bottegoi* de Man, 1898**:** Matagoi Bool (Bohol), Somalia.

Distribution. Somalia, Kenya, Tanzania (the coastal region, plus Zanzibar and Pemba islands) and Malawi (Reed & Cumberlidge 2004). Barnard (1950) reported this species from Harare, Zimbabwe.

Remarks. Photographs of the male holotype and of an ovigerous female from Nyassa (cw 49.5, cl 35.5 mm) are provided by Rathbun (1904, 180–182, plate VII, figs. 8, 9), and the holotype was illustrated by Capart (1954). Reed & Cumberlidge (2004) redescribed *Potamonautes obesus* and considered *Potamon* (*Potamonautes*) *bottegoi* de Man, 1898 to be a junior subjective synonym of *P. obesus* and *Potamonautes calcaratus* (Gordon, 1929) to be a valid species, and this opinion is accepted here.

Natural history and conservation status. *Potamonautes obesus* is a semi-terrestrial crab that occurs in a wide variety of habitats ranging from the banks of rivers to rice fields, where it digs burrows down to reach ground water (S. Marijnissen, pers. comm.). The conservation status of *P. obesus* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (Reed & Cumberlidge 2004; S. Marijnissen, pers. comm.) and that it is well represented in museum collections.

***8. Potamonautes pilosus* (Hilgendorf, 1898)** (Figs. 72–81, 159–160, 180, plate VIII)

Thelphusa pilosa Hilgendorf, 1898: 17–18.
Potamon pilosum—de Man, 1898: 437.
Potamon (Geothelphusa) pilosus—Rathbun, 1905: 210.
Potamon pilosus—Chace, 1942: 219.
Potamonautes (Platypotamonautes) pilosus—Bott, 1955: 237–238 (part only, not Figs. 16, 68, Pl. V, 1a–d).

Type material examined: TANZANIA: *Telphusa pilosa* subadult male lectotype (cw 22.8, cl 15.7, ch 7.9, fw 5.8 mm), rain forest near Marangu (= Maranga), 3°17'S, 37°31'E, Morogoro District, at the base of Mount Kilimanjaro (ZMB 11387).

Additional material examined: TANZANIA: Kilimanjaro, Marangu, Monju River, 2,730 m asl, rocky river in forest, male (cw 26.2 mm) 2.iii.1975 (J. Grunewald) (NMU 1975.09). **KENYA:** Namanga Hill, river campsite, 1,768 m asl, 2°31’S, 36°47’E, adult male (cw 38.5 mm) 23.iii.1986 (NNM); Namanga Hill, river campsite, 1,768 m asl, 2°31’S, 36°47’E, female subadult (cw 36.7 mm) 23.iii.1986 (NNM); Namanga Hill, river campsite, 1,768 m asl, 2°31’S, 36°47’E, female subadult (cw 32.8 mm) 23.iii.1986 (NNM); Kibwesi (NNM); Kilimanjaro area near Taveta, junction of Mue & Mwenda Rivers, 6–7 m wide, many large boulders, stones in between, embedded in silty sand, occasional stony-gravelly riffles, in a deeply shaded gully in forest, adult male (cw 30.2 mm) from unshaded pool, 5 juveniles from riffles (cw 7.1 to cw 12.9 mm) 3.iii.1962 (NMU TRW-EA62.66).

Diagnosis. Postfrontal crest incomplete, not completely crossing carapace, distinct gap between raised epigastric crests; ends of crest raised where it meets anterolateral margins; exorbital tooth low, epibranchial tooth absent; anterolateral margin behind epibranchial tooth granulated, fading posteriorally; all three regions of carapace sidewalls smooth; sternal sulcus s3/s4 incomplete consisting of short deep sections at sides, but sulcus absent in middle; lateral margins of s4 not thickened or raised; episternal sulci s4/e4, s5/e5, s6/e6, s7/e7 all faint, incomplete; ischium of third maxilliped with deep vertical sulcus; lower margin of propodus of major cheliped of adult males elongated, longer than carapace width; first carpal tooth of P1 large, pointed, second carpal tooth short, pointed, followed by 2 small granules; merus of cheliped elongated, dactylus highly arched, enclosing oval interspace; terminal article of gonopod 1 curving outward at 45° angle to longitudinal axis of gonopod; proximally, terminal article broad lateral fold higher than medial fold, distally article narrow, tip curving upward; distal margin of subterminal segment distinctly widened on medial side (forming rounded shoulder) narrow on lateral side; dorsal membrane very broad on lateral side where membrane clearly separates terminal article from subterminal segment; dorsal membrane narrow on medial side where these two structures meet.

Size. A medium sized species with a pubertal molt occurring around cw 37 mm.

Type locality. Rain forest near Marangu (= Maranga), Morogoro District, at the base of Mount Kilimanjaro, Tanzania.

Distribution. Along the border between Kenya and Tanzania.

Remarks. The lectotype of *Telphusa pilosa* is a subadult male (cw 22.8, cl 15.7, ch 7.9, fw 5.8 mm) (ZMB 11387) that was figured by Bott (1955) and examined in the present study. Bott (1955) synonymized *P. pilosus* with *Potamon (Potamonautes) odhneri* Colosi, 1924. Our opinion is based on our examination of a series of specimens from two localities in Kenya and a topotypal specimen from Tanzania. Comparison of a female syntype of *Potamon (Potamonautes) odhneri* from near Meru, Kenya (SMNH 11852) with the type of *P. pilosus* raises doubts about the validity of Bott's (1955) synonymy which is not accepted here. It should be noted that Bott's (1955) photographs of *P. pilosus* (Pl. V, 1a–d) show the female paratype of *P. (P.) odhneri* Colosi, 1924 (SMNH 6430, cw 23, cl 17, ch 10, fw 7.5 mm) from Limuru, near Mount Kenya, Kenya, and not the lectotype of *T. pilosus*. *Potamonautes pilosus* is similar to *P. neumanni* from southern Kenya, but the two taxa can be distinguished by the following characters: in *P. neumanni* the sternal sulcus s3/s4 is complete and crosses the sternum, and the lateral margins of sternite s4 are raised, thickened, and rounded at the points where the chelipeds articulate.

Natural history and conservation status. The conservation status of *P. pilosus* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species, but its population is estimated to be declining based on indirect measures such as lack of recent collections of specimens, a relatively poor representation in museum collections and increasing habitat disturbance associated with growing human populations in the region.

9. Potamonautes platycentron (Hilgendorf, 1897) (Figs. 82–92, 161–162, 181, plate IX)

Telphusa platycentron Hilgendorf, 1897: 81–85, 1898: 11–12, pl. fig. 4, 4a–c.
Potamon platycentron—de Man, 1898: 437; Chace, 1942: 220.
Potamon (Potamonautes) platycentron—Rathbun, 1905: 173.
Potamonautes platycentron—Balss 1929: 349.
Potamonautes (Lirrangopotamonautes) johnstoni platycentron—Bott, 1955: 267–268, pl. XVI, fig. 1a–d, fig. 37.

Type material examined: TANZANIA: Lake Chala, Kilimanjaro, Tanzania, subadult male lectotype (ZMB 9656), cw 46, cl 34, ch 22, fw 13 mm.

Additional material examined: KENYA: Lake Chala, near Taveta, from the margins of the lake, lake-bed stony, 762 m asl, 4 subadult females (cw 49.4 to cw 55.5 mm), 2 subadult males (cws 50. 8, 51.7 mm), vii.1967 (J. E. Hudson) (NMU TRW1991.12).

Diagnosis. Postfrontal crest sharp-edged meeting anterolateral margins at epibranchial teeth; exorbital tooth sharp, triangular; epibranchial tooth small, granular; anterolateral margins granulated curving inward over carapace; all three regions of carapace sidewall smooth; sternal sulcus s3/s4 complete; lateral margins of s4 thin, not raised; episternal

sulci s4/e4, s5/e5, s6/e6, s7/e7 all deep; ischium of third maxilliped with vertical sulcus; dorsal surface of carpus of major cheliped with carinae; first carpal tooth large, thick; second carpal tooth short, with one small tooth/granule behind it; medial inferior margin lined with teeth; distal meral tooth large, sharp; lateral inferior margin granulated; dactylus of closed major cheliped broad meshing with fixed finger of propodus; lower margin of propodus of cheliped straight; propodus granulated on posterior portion; first half of terminal article of gonopod 1 straight, second half bent at close to 90° angle to longitudinal axis of gonopod, tapering to pointed, upcurved tip; terminal article of gonopod 1 widened in middle by lateral fold forming high longitudinal crest; medial fold small, low; basal margin of terminal article straight at dorsal membrane, but slanted toward medial side; distal margin of subterminal segment v-shaped at base of dorsal membrane; dorsal membrane broad at both medial, lateral margins.

Size. A large-bodied species. All females observed were subadult, with the abdomen of the largest specimen (cw 55.5 mm) very close to maturity.

Variation. *Potamonautes platycentron* exhibits heterochely where the major cheliped of males is larger than the minor cheliped, while the overall shape and appearance of the major cheliped remains unchanged.

Type locality. Lake Chala spanning the border between Kenya and Tanzania.

Distribution. *Potamonautes platycentron* is endemic to Lake Chala (3°19'S, 37°41'E). The border between Kenya and Tanzania crosses the slopes of Kilimanjaro and passes through this crater lake. The locality information lists *P. platycentron* from Kenya but it is highly likely that this species is also found on the Tanzanian side of Lake Chala, so it is included in the list of species for Tanzania for completeness.

Remarks. Bott (1955) included this taxon as a subspecies of *P. johnstoni* and the two taxa share a large body size and characters of the postfrontal crest and chelipeds. However, the two taxa can be distinguished as follows. The dactylus of the major cheliped of *P. platycentron* is very broad with a rounded tip (whereas that of *P. johnstoni* is slim and pointed); the first carpal tooth of *P. platycentron* is thick and broad (whereas that of *P. johnstoni* is slim and pointed); the medial inferior margin of the merus of the cheliped of *P. platycentron* is lined by sharp teeth (whereas that of *P. johnstoni* is granulated or lined by small teeth); the dorsal membrane of gonopod 1 of *P. platycentron* is diagonally sloped at the distal margin (whereas that of *P. johnstoni* is rounded); and the lateral fold of the terminal article of gonopod 1 of *P. platycentron* is low (whereas that of *P. johnstoni* is high). For these reasons, these two taxa are treated in the present work as two valid species.

Natural history and conservation status. The conservation status of *P. platycentron* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species, but its population is estimated to be declining, based on indirect measures such as the lack of recent collections of specimens, a poor representation in museum collections and increasing habitat disturbance associated with growing human populations in the region.

***10. Potamonautes platynotus* (Cunnington, 1907)** (Figs. 93–103, 163–164, 182, plate X)

Potamon (Potamonautes) platynotus Cunnington, 1907: 264–266, pl. 17, fig. 1–2.

Potamonautes platynotus—Balss, 1929: 349–350; 1936: 185; Cumberlidge, 1998: 203–204; Cumberlidge *et al*., 1999: 1488; Cumberlidge & Sternberg, 1999: 406, table 1, fig. 1; *:* Sternberg & Cumberlidge, 1999: 134.

Potamon platynotus—Chace, 1942: 220.

Potamonautes (Platypotamonautes) platynotus—Bott, 1955: 235–236, pl. IV, fig. 1a–d, 12, 66; Coulter, 1991: 253–255, fig. 4, tables 9.xx, 9.xxi.

Type material examined: TANZANIA: Lake Tanganyika, male (cw 30.7, 20.3 mm), female (cw 48.2, cl 33.7 mm).

Additional material examined: TANZANIA: Lake Tanganyika, Kigoma, from under stones at margin of lake, male (cw 39.1 mm), 23.iv.1971 (J. N. Raybould) (NMU TRW1997.18). **DEMOCRATIC REPUBLIC OF THE CONGO:** Lake Tanganyika, female (cw 31.6 mm), male (cw 23.8 mm), (USNM 63298); Lake Tanganyika, 2 males (cws 20.2, 36.3 mm), 3 females (cw 20.2 to cw 22.6 mm), juvenile (cw 11.9 mm), 19.v.1955 (Bredin Expedition-W. L. Schmitt) (USNM 98935); Lake Tanganyika, Mulungu, female (dried), vi–viii.1955 (Bredin Expedition-W. L. Schmitt) (USNM 98934). **ZAMBIA:** Lake Tanganyika, north end of Mpulungu, Northern Province, depth of capture 0–4 m, male (cw 45.6 mm), subadult female (cw 38.1 mm), 1.xi.1970 (Dr. R. M. Bailey, Stewart, Cech *et al.*) (USNM 1007569).

Diagnosis. Postfrontal crest distinct complete; grooves on posterior region of carapace deep; exorbital tooth large, forward-pointing spine, epibranchial tooth small, pointed; anterolateral margin between exorbital, epibranchial teeth lined by row of small even, pointed teeth; ischium of third maxilliped faint; thoracic sternal sulcus s3/s4 complete, deep at sides, faint in middle; dactylus of major cheliped of adult males broad, arched with large molar teeth proximally, black pigment distally; propodus of cheliped broad with several large rounded molar teeth, lower margin of propodus of cheliped straight; first carpal tooth on carpus of cheliped long, sharp spine; second carpal tooth also sharp spine, but smaller than first tooth; ventral margins of merus of pereiopod 1 heavily granulated, distal meral tooth sharp spine; terminal article of gonopod 1 short, cone-like, directed outward, with distinct bristles along both margins; basal part broad distal part narrow with upcurved tip; basal part significantly widened by high lateral fold becoming low, even distally; medial fold low, even along length; base of terminal article at dorsal membrane lined with long, dense bristles; distal margin of subterminal segment highest at lateral margin curving down to medial margin; dorsal membrane subrectangular, broad at both lateral, medial sides.

Size. Medium size, with a pubertal molt around cw 39 mm. The largest specimen known is cw 54.2 mm.

Variation. The dactylus of the major cheliped is dark brown/black in the middle and the anterior margin of the propodus of the major cheliped is rose colored.

Type locality. Lake Tanganyika.

Distribution. Lake Tanganyika, Tanzania, Democratic Republic of Congo and Zambia (Capart 1954; Cumberlidge *et al*. 1999).

Remarks. This species is endemic to Lake Tanganyika in Tanzania, the Democratic Republic of Congo and Zambia (Capart 1954; Cumberlidge *et al*. 1999).

Natural history and conservation status. *Potamonautes platynotus* occurs in rocky areas in Lake Tanganyika and is mainly found in the shallow littoral zone up to a maximum depth of approximately 10 meters. This species is primarily aquatic, but it has been observed out of water feeding on top of rocks, and it can survive for several hours (up to half a day) without access to water (S. Marijnissen, pers. comm.). The conservation status of *P. platynotus* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and an area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (S. Marijnissen, pers. comm.), that it is supplied to the international aquarium trade and that it is well represented in museum collections.

11. Potamonautes raybouldi Cumberlidge & Vannini, 2004 (Figs. 104–112, 165–166, 183, plate XI)

Potamonautes raybouldi Cumberlidge & Vannini, 2004: 683–689, Figs. 1–2.

Type material examined: TANZANIA: Adult male holotype (cw 55.7 mm) from water-filled tree hole in forest 500 m asl, near Zigi, 9 km from Amani, East Usambara mountains, iv.1966 (J. N. Raybould) (NMU KMH 11486); two adult male paratypes (cws 39.6, 40.5 mm) (from water-filled tree holes in forest 500 m asl, near Zigi, 9 km from Amani, East Usambara mountains, iv.1966 (J. N. Raybould) (NMU TRW1966.A.2); East Usambara mountains near Zigi, 9 km from Amani, from water-filled tree holes in forest 500 m asl, subadult female (cw 36.9 mm), subadult male (cw 29.6 mm) vi.1966 (J. N. Raybould) (NMU TRW1966.B.2); adult male (cw 46.5 mm), subadult female (cw 36.2 mm), in water-filled tree holes in forest near Amani, East Usambara mountains, iv.1966 (J. N. Raybould) (NMU TRW1966.11).

Additional material. For a complete account of other material from Tanzania and Kenya, see Cumberlidge & Vannini (2004).

Diagnosis. Postfrontal crest sharp-edged, spanning entire carapace; exorbital tooth large, sharp, directed forward; epibranchial tooth reduced to small granule; anterolateral margin between exorbital, epibranchial teeth smooth; anterolateral margin posterior to epibranchial teeth raised, granulated, end curving inward over carapace surface; carapace highly arched (ch/fw 1.5–1.7); suborbital margin smooth raised; suborbital, subhepatic regions of carapace sidewalls with fields of large granules, pterygostomial region smooth;

thoracic sternal sulcus s3/s4 complete, deep, v-shaped, not meeting anterior margin of sternoabdominal cavity; episternal sulci s4/e4, s5/e5, s6/e6 s7/e7 all complete; second carpal tooth of carpus of cheliped pointed, large, half size of first tooth, directed at 70°–90° angle to first tooth; tip of terminal article of gonopod 1 curving sharply upward; terminal article distinctly widened in middle by high medial fold; distal margin of subterminal segment concave, medial margin much wider than lateral margin, forming rounded medial shoulder; base of terminal article at dorsal membrane concave; dorsal membrane wide on lateral margin tapering to point at medial margin; inner outer surfaces of merus, carpus, of palm of propodus of cheliped all with conspicuous reticulated rust-red pattern over cream background.

Size. The size range of adult males and females begins at around cw 39 mm.

Type locality. Zigi, 9 km from Amani, East Usambara Mountains, Tanzania.

Distribution. Kenya and Tanzania.

Remarks. Cumberlidge & Vannini (2004) provided detailed comparisons to other species of *Potamonautes*, as well as notes on the distribution, natural history and color of the crab.

Natural history and conservation status. *Potamonautes raybouldi* occurs in water-filled tree holes in deciduous forests (Bayliss 2002; Cumberlidge & Vannini 2004). Bayliss (2002) provided a detailed ecological study of the habitat of this species. A discussion of freshwater crabs that live in phytotelmic habitats is provided by Cumberlidge *et al*. (2005). The conservation status of *P. raybouldi* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species but its population is estimated to be declining based on its specialized habitat requirements (water-filled tree holes) and on the increasing habitat disturbance from deforestation associated with growing human populations in the region.

12. Potamonautes suprasulcatus (Hilgendorf, 1898) (Figs. 113–123, 167–168, 184, plate XII)

Telphusa suprasulcata Hilgendorf, 1898: 8–9, fig. 5, 5a–d.
Telphusa reichardi—Hilgendorf, 1898: 13.
Telphusa suprasulcata var. *pseudoperlata* Hilgendorf, 1898: 9.
Telphusa mrogoroense Hilgendorf, 1898: 10.
Potamon suprasulcatus—de Man, 1898: 438.
Potamon (Potamonautes) suprasulcatus—Rathbun, 1905: 172; Colosi, 1924: 4.
Potamon suprasulcatus—Chace, 1942: 222.
Potamonautes (Arcopotamonautes) suprasulcatus suprasulcatus—Bott, 1955: 270–272, pl. XVII, fig. 1a–d, 40.
Potamonautes suprasulcatus—Cumberlidge, 1998: 204.

Type material examined: TANZANIA: Mrogoro, male lectotype (cw 55, cl 37, ch 21, fw 15 mm) (ZMB 9037).

Additional material examined: TANZANIA: East Usambara Mountains, Amani, 2 females (one damaged), female (cw 31.9 mm), xii.1926 (A. Loveridge) (USNM 64103); male (cw 27.3 mm), male (damaged), (USNM 64260); margin of the Serengeti Plains, about 60 m north and a little west of Mbulu, some 300 m from the east coast and about 4°„S of the equator from a small isolated stream arising in a spring, running a 3 km course, finally drying up completely, male (cw 44 mm), (R. L. Sutton, Jr.) (USNM 64966); South Pare Mountains, Gonja, River at Mwembe, female (cw 43.3 mm), 3 juvenile females (cw 28.5 to cw 30.4 mm), 4 juvenile males (cw 20 to cw 30.8 mm), 18 juveniles (cw 10.8 to cw 25.4 mm), (NMU TRW-EA62.36); Uluguru Mountains, river and stream near Bunduzi, 3 males (cw 36.9 to cw 54.4 mm), 2 juvenile females (cws 42.7, 44.2 mm), 1962 (NMU TRW-EA62.42A); Uluguru Mountains, Bunduki, male (cw 36.5 mm), (NMU TRW-EA62.42B); Uluguru Mountains, Bunduki, 3 males (cw 47.8 to cw 62.1 mm), male (damaged), (NMU TRW-EA62.42C); East Usambara Mountains, Amani, 2 females (cws 39.5, 45.6 mm), female (carapace removed), 2 males (cws 38.3, 53.5 mm), (NMU TRW1964.01); East Usambara Mountains, Amani, male (cw 49.1 mm), 1964 (NMU TRW1964.02b); Northern Iringa, Kilombero River, male (cws 51.2, 56.2 mm), female (cw 49.7 mm), 11.ix.1965 (W. Hausermann) (NMU TRW1965.05); East Usambara Mountains, Amani, male (cw 65 mm), 1968 (NMU TRW1968.01); Mahenge Mountains, 2 males (cws 36.2, 54.2 mm), 1965 (W. Hausermann) (NMU TRW1965.01); Iringa Mountains, 2 males (cws 41.7, 48.1 mm), 22.vii.1965 (W. H.) (NMU TRW1965.02); Southern Mahenge, Kilombero River, 2 females (cws 45.3, 52.2 mm), male (cw 43.8, cl 29.3, ch 17.2, fw 12 mm), 11.ix.1965 (W. Hausermann) (NMU TRW1965.04); Amani, East Usambara mountains, Nenguruwe Stream, tributary of Sigi River, male (cw 59.7 mm), ix.1965 (J. N. Raybould) (NMU TRWix.1965.7); West Usambara Mountains, Lwandai, near Soni, Mkusu River, male (cw 46.6 mm), female (cw 41.4 mm), 8 juveniles (cw 12.1 to cw 22 mm), 9.vi.1964 (J. N. Raybould) (NMU TRW1964.04); West Usambara Mountains, northeast margin, Makangala River below Malo, male (cw 67.8 mm), female (cw 43 mm), juvenile (damaged), juvenile (cw 14.7 mm), 1966 (NMU TRW1967.10); Uluguru Mountains, Morogoro, juvenile (cw 14.6 mm), 1.viii.1967 (NMU TRW1967.12); Mahnge Region, West Sali River, female (cw 65.1 mm), 8.iv.1967 (J. N. Raybould) (NMU TRW1967.14); stream at Mbinga, male (cw 53.8 mm), female (cw 38.5 mm), 29.viii.1967 (J. N. Raybould) (NMU TRW1967.22); Ruvuma (=Ruvoma) River below Matongoro Forest, male (cw 53.5 mm), female (cw 42.7 mm), 2 juvenile males (cws 29, 34.3 mm), 20.viii.1967 (J. N. Raybould) (NMU TRW1967.18); Ruvuma (=Ruvoma) region, Ndengu stream near Litembo mission, 2 males (cw 32.7, 36.1 mm), 2 females (cw 25.8, 31.7 mm), juvenile (cw 14.3 mm), 30.viii.1967 (T. R. Williams) (NMU TRW1967.17); Njombe, Ruhuji River, below falls, 2 females (cw 38.7, 42.4 mm), male (cw 33.3 mm), 9.vi.1968 (NMU TRW1968.05); West Songea, Mpandangindo, Lipupuma stream, juvenile female (cw 31.7 mm), juvenile male (cw 26.5 mm), 22.viii.1967 (NMU TRW1967.19); Kinda Kibati,

Chogo River, female (cw 65.8 mm), 12.xi.1969 (NMU TRW1971.06); male (cw 50.9 mm), (NMU TRW1971.16); Kilimanjaro, juvenile (cw 18.4 mm), iii.1972 (Joy) (NMU TRW-JOY iii.1972a); Kilimanjaro, male juvenile (cw 21.7 mm), iii.1972 (Joy) (NMU TRW-JOY iii.1972b); Kiwira, near Tukuruyu, between Mbega and north end of Lake Malawi, Kipoke River, juvenile (cw 16.9 mm), juvenile male (cw 24.7 mm), 13.xi.1976 (NMU TRW1973.02); Kilimanjaro, male (cw 31.5 mm), 2 juvenile females (cw 22.1, 23.1 mm), 3 juveniles (cw 8.7, 11.9 mm), iii.1971 (Joy) (NMU TRW-JOY iii.1971b); Kilimanjaro, 2 females (cw 21.3, 32.9 mm), 8 juveniles (cw 8 to cw 11.6 mm), iii.1972 (Joy) (NMU TRW-JOY iii.1972c); Itete, Mwatisa, Mwakareli River, 2 males (cws 31.1, 38.3 mm), 19.ix.1976 (NMU TRW1973.03); Chamhawi near Mpwapwa, male (cw 63.7 mm), 19.v.1976 (T. R. Williams) (NMU TRW1971.10); East Usambara Mountains, Amani, male (cw 44.5 mm), (J. N. Raybould); Matumbi, Nambunjo and Muengei Rivers, female (damaged), 4 females (cw 36.2 to cw 46.1 mm), male (cw 51.3 mm), 2 juvenile females (cws 15.4, 18.1 mm), juvenile (cw 13.1 mm), xi.1989 (J. Kingdon) (NMU TRWxi.1989b). **MALAWI:** Misuku, Wilindi Forest, 3 males (cw 16. 90 to cw 35.2 mm), 2 females (cws 21.8, 30.8 mm), 1-16.x.1948 (A. Loveridge) (USNM 91156). **ZAMBIA:** 12 km south-southeast Mpulungu, Lunzua stream, 5 juveniles (cw 9.2 to cw 29.4 mm), 8 juvenile females (cw 16.4 to cw 31.2 mm), 2 subadult females (cws 34, 42.8 mm), subadult male (cw 42.4 mm), 2.vi.1970 (R. M. Bailey, Balon, Stewart, Ellis) (USNM 1007382); Lake Tanganyika, subadult female (cw 35.7 mm) (USNM 54717).

Diagnosis. Postfrontal crest distinct, granulated, completely crossing carapace; grooves on posterior part of carapace deep, distinct, especially cervical branchial grooves; exorbital, epibranchial teeth low but distinct; anterolateral margin behind epibranchial tooth heavily granulated; subhepatic region of carapace sidewall heavily granulated, suborbital, pterygostomial regions both smooth; ischium of third maxilliped with faint vertical sulcus; thoracic sternal sulcus s3/s4 either faint or missing; episternal sulci s4/e4–s7/e7 all faint; dactylus of major cheliped of adult males broad not arched; first carpal tooth on carpus of cheliped sharp spine; second carpal tooth smaller spine, with no other teeth behind it; ventral margins of merus of pereiopod 1 both distinctly granulated; distal meral tooth large, pointed; terminal article of gonopod 1 long, slim, needle-like; distal third curving outward at 90° angle to longitudinal axis of gonopod, tapering to slender pointed tip; lateral, medial folds both low; distal margin of subterminal segment slightly concave where it meets dorsal membrane; dorsal membrane widest in middle, equally broad on medial lateral margins.

Size. Large, with a pubertal molt between cw 48–50 mm, and an adult size range reaching cw 74.2 mm.

Type locality. Mrogoro, Tanzania.

Distribution. Malawi, Tanzania and Zambia, and the tributaries of rivers flowing into Lake Tanganyika.

Remarks. Specimens of *P. suprasulcatus* were identified based on direct examination of the type specimen and on the illustrations of the type provided by Hilgendorf (1898)

and Bott (1955). The following type specimens were examined by one of us (NC): *Telphusa reichardi* Hilgendorf, 1898 from Tabora, Tanzania, a subadult female (cw 33.8, cl 23.7, ch 11.4, fw 10 mm) (ZMB 7463); *Telphusa suprasulcata* var. *pseudoperlata* Hilgendorf, 1898 from Usambara, Tanzania, a subadult male (cw 32.1, cl 24.3, ch 9.9, fw 9.2 mm) (ZMB 9348)*; Telphusa mrogoroense* Hilgendorf, 1898 from Mrogoro, close to Dares-Salaam, Tanzania, a subadult female (cw 20.8, cl 15.1, ch 7.2, fw 6.1 mm) (ZMB 11377). All of these subadult specimens were considered here to be junior subjective synonyms of *P. suprasulcatus*. *Potamon (Potamonautes) rodolphianus* and *P. (P.) rothschildi* were treated by Bott (1955) as junior synonyms of *P. suprasulcatus*. We have compared *P. suprasulcatus* with the male type specimens of *P. rodolphianus* and *P. rothschildi*, and conclude that each of these taxa is a valid species. Furthermore, the illustration of the first gonopod of *P. rothschildi* provided by Capart (1954) is very different in a number of characters from *P. suprasulcatus* and *P. rothschildi* should probably be recognized as a valid species.

Natural history and conservation status. This species lives in major rivers and streams. The conservation status of *P. suprasulcatus* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and area of occupancy well in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (present study; S. Marijnissen pers. comm.) and that it is well represented in museum collections

13. Potamonautes unisulcatus (Rathbun, 1933) (Figs. 124–133, 169–170, 185, plate XIII)

Potamon (Potamonautes) johnstoni unisulcatus Rathbun, 1933: 255, figs. 2–4, pl. 2.
Potamon unisulcatus—Chace, 1942: 223.
Potamonautes (Lirrangopotamonautes) johnstoni johnstoni—Bott, 1955: 265–267, pl. XV, fig. 2a–d, fig. 36a, b.

Type material examined: TANZANIA: *Potamon (Potamonautes) unisulcatus* Rathbun, 1933: adult male type (cw 33, cl 21, ch 9, fw 10 mm) Bagilo, Uluguru Mountains (MCZ 7678a).

Additional material examined: TANZANIA: Uluguru Mountains, Bunduki, Kitange-Tange River (tributary of Maeta River), between small falls, 1933 m asl, 7 m wide, large boulders, gravel, stones and sand, 23.ii.1962 (NMU TRW-EA62.45); Kitange-Tange River, Bunduki, Uluguru Mountains, male (cw 30.1 mm), female (cw 27 mm), 3 juveniles (cw 15.9 to cw 17.1 mm), juvenile (damaged) (NMU TRW-EA62.47); Uluguru Mountains, Bunduki, Kitange-Tange River (tributary of Maeta River), female (cw 41.4 mm), male (31.7 mm), 3 juveniles (cw 15 to cw 18.3 mm), (NMU TRW-EA62.50a); Songea District, Ruvuma region, Mkulusi near Kigonsera, male (cw 29.5 mm), female (cw 30

mm), juvenile male (cw 17 mm), 28.viii.1967 (T. R. Williams) (NMU TRW1967.15).

Diagnosis. Postfrontal crest sharp-edged, completely crossing carapace; posterolateral regions of carapace with carinae; exorbital tooth low but distinct, epibranchial tooth reduced to small granule; anterolateral margin behind epibranchial tooth heavily granulated; carapace sidewalls smooth, vertical (pleural) groove meeting anterolateral margin between exorbital, epibranchial teeth; ischium of third maxilliped lacking vertical sulcus; thoracic sternal sulcus s3/s4 faint at sides, missing in middle; episternal sulci s4/e4 missing, s5/e5, s6/e6, s7/e7 complete, but weak; dactylus of major cheliped of adult males broad, not arched; first carpal tooth on carpus of cheliped large sharp spine; second carpal tooth small spine, with no other teeth behind it; ventral margins of merus of pereiopod 1 both distinctly granulated; distal meral tooth small, pointed; terminal article of gonopod 1 curving outward, lateral fold highly curved in first third, medial fold low, distal part of gonopod 1 tapering to straight point; distal margin of subterminal segment u-shaped, highest at medial margin with small shoulder on medial side; dorsal membrane sub-oval, narrow at medial lateral margins.

Size. The adult size range is from cw 28.4 to cw 41.4 mm.

Type locality. Bagilo, Uluguru Mountains, Tanzania.

Distribution. Uluguru Mountains, Tanzania.

Remarks. Bott (1955) treated *Potamon (Potamonautes) unisulcatus* Rathbun, 1933 as a junior synonym of *P. johnstoni* (Miers, 1885). However, this view is not followed here following comparisons of the type specimen of *P. (P.) unisulcatus*, an adult male (cw 33, cl 21, ch 9, fw 10 mm) (MCZ 7678a) with the type of *P. johnstoni* (Miers, 1885). The first gonopod of *P. (P.) unisulcatus* (Figs. 169–170) is clearly very different from that of *P. johnstoni* (Figs. 151–152), so *P. unisulcatus* is removed from synonymy and recognized here as a valid species. The conservation status of *P. unisulcatus* is categorized as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species but its population is estimated to be declining based on indirect factors such as the lack of recent specimens, its poor representation in museum collections and increasing habitat disturbance from deforestation associated with growing human populations in the region.

14. Potamonautes xiphoidus n. sp. (Figs. 134–144, 171–172, 186, Plate XIV)

Type material examined: TANZANIA: West Usambara Mountains, Herkulu Estate, Lushoto District, Tanga region, adult male holotype, here designated (cw 38.3, cl 26.1, ch 15.6, fw 11.4 mm), xi.1964 (J. N. Raybould) (NMU TRW1966.06b). West Usambara Mountains, Herkulu Estate, Lushoto District, Tanga region, subadult male paratype, here designated (cw 27.2, cl 19.3, ch 11.7, fw 8.4 mm), xi.1964 (J. N. Raybould) (NMU TRW1966.06b).

Additional material examined: TANZANIA: West Usambara Mountains, streams and dams near Herkulu Estate, Lushoto District, Tanga region, 5 males (cw 16.1 to cw 33 mm), 2 adult females (cws 30.9, 33.1 mm), 4 juvenile females (cw 21.6 to cw 25.3 mm), 2 subadult females (cws 16, 16.2 mm), xi.1964 (J. N. Raybould) (NMU TRW1966.06a); West Usambara Mountains, Mkolo River, 3 km NNE of Mayo, Lushoto District, 11.iii.1975 (J. N. Raybould) (NMU TRW1975.02); East Usambara Mountains, Amani, female (damaged), male (damaged), 8.xii.1926 (A. Loveridge) (USNM 64108); East Usambara Mountains, Amani, found away from water in a cultivated area, 25.v.1966 (J. N. Raybould) (NMU TRW1966.10); East Usambara Mountains, Amani, 2 juveniles (cws 10.9, 11.6 mm), juvenile female (cw 13 mm), 3 subadult females (cw 18.7 to cw 20 mm), 7 males (cw 17.6 to cw 25.6 mm), 2 adult females (cws 24.2, 27 mm), 1970 (NMU TRW1970.09).

Diagnosis. Carapace medium height (ch/fw 1.3), anterolateral margin smooth, continuous with posterolateral margin, postfrontal crest distinct, sides curving down, not completely meeting anterolateral margins, midgroove deep, epibranchial tooth absent, exorbital angle smooth, blunt; carapace sidewalls smooth, vertical (pleural) groove weak, not meeting anterolateral margin; sternal sulcus s1/s2 visible, s2/s3 deep, straight, s3/s4 reduced to two deep notches, with sternal bulges on s4; episternal sulci s4/e4, s5/e5, s6/e6, s7/e7 complete, but weak; ischium of third maxilliped with very weak groove; first carpal tooth of cheliped sharp spine, second carpal tooth of cheliped small, sharp; merus of major cheliped very slim and long (2/3 cw) superior margin of merus of cheliped with smooth carinae, medial inferior margin with small granules and small pointed tooth, lateral inferior margin weakly granulated; major cheliped longer than carapace width (ratio 1.1), dactylus of major cheliped narrow, highly arched, enclosing large oval interspace, fixed finger of propodus with two small pointed teeth, lower margin of propodus of cheliped concave in middle; terminal article of gonopod 1 straight, slightly directed outwards, small hairs cover the terminal article, lateral, medial folds equal, small setae covering terminal article, base of subterminal segment broad, tapering to terminal article.

Size. Small, with a pubertal molt from cw 19 to cw 26 mm. The largest adult specimen is a male, cw 38.3 mm.

Variation. The chelipeds of *P. xiphoidus* exhibit allometric growth, which results in obvious heterochely in older male crabs, and to a lesser degree in older females. The dactylus of the major cheliped in juveniles is straight with teeth meshing with those of the fixed finger. The dactylus of adults is highly arched, forming an oval gap between it and the fixed finger when closed. The smallest male specimen exhibiting a high degree of heterochely was cw 16.1 mm. However, some male specimens as large as cw 27.4 mm showed equality in the size of the chelipeds.

Type locality. The Herkulu Estate, a tea plantation in the Western Usambara Mountains in Lushoto District of the Tanga region of Tanzania. This locality is 1,666 m asl and is situated in the montane forest zone, where areas of forest have been retained to prevent soil erosion.

Distribution. This species is endemic to the Usambara Mountains in Tanzania. The rivers of the western slopes of the Usambaras drain into the Pangani River, while the eastern slopes are drained by the Sigi River and its tributaries.

Remarks. This species is morphologically close to *P. infravallatus*, but can be recognized by differences in the terminal article of the first gonopod, which is short with bristles in *P. infravallatus* (Figs. 169–170) and a long, straight, smooth evenly-tapering spear-like process in *P. xiphoidus* (Figs. 171–172). The conservation status of *P. xiphoidus* is categorized here as vulnerable (VU) (Table 4) because it has a narrow range of occurrence and a restricted area of occupancy that are both below the thresholds for vulnerable (VU) (IUCN 2004). It is difficult to estimate the population status and trends of this species but its population is estimated to be declining based on indirect factors such as the lack of recent specimens, its poor representation in museum collections and increasing habitat disturbance from deforestation associated with growing human populations in the region.

Etymology. The name *xiphoidus* is derived from the Greek word 'xiphoid', a combination of 'xiphos' (straight sword) and 'eidos' (like), meaning 'like a straight sword'. This is a reference to the distinctive sword-like shape of the terminal article of the first gonopod of this species.

FAMILY DECKENIIDAE Ortmann, 1897

Type genus. *Deckenia* Hilgendorf, 1869, by original designation.

Diagnosis. Carapace sub-circular, texture smooth, postfrontal crest lacking; front with protruding medial lobe; antennules folding vertically. Paired efferent respiratory channel openings at tips of long upwardly-directed tubes, openings level with the frontal margin, either side of medial frontal lobe; respiratory tubes formed by partly rolled elongated endopod of first maxilliped applied to corresponding grooved channels in endostome. Medial part of lower orbital margin deflected diagonally to meet edge of elongated endopod of first maxilliped close to frontal margin. Merus of third maxilliped with broadly-rounded anterolateral margin; mandibular palp 2-segmented, terminal segment simple; anterior sternum slim, sternite s4 narrow; abdominal segment a1 completely concealed by posterior margin of carapace (visible abdomen appearing to have only 6 parts: a2–a6 plus telson (a7) ; terminal article of gonopod 2 extremely long, flagellum-like, equal in length to subterminal article of gonopod 2.

Distribution. Somalia, Kenya, Tanzania. An updated account of the distribution of *Deckenia* is available in Marijnissen *et al*. (2005).

Remarks. This unusual East African family comprises a single genus with two species. Bott (1955) mistakenly attributed authorship of this family to Bott (1955) that was corrected to Ortmann (1897) by Ng *et al*. (1995). This family was revised by Ng *et al*. (1995) who provided detailed illustrations of the carapace and gonopods of both species.

For this reason these characters have not been redrawn here, but photographs of both species have been included (Plates XV and XVI).

Natural history and conservation status. The Deckeniidae are semi-terrestrial crabs that dig burrows into the banks of rivers, ponds and marshes (S. Marijnissen, pers. comm.). The highly arched, untoothed carapace and modified anterior respiratory openings of *Deckenia* are the hallmarks of those species of semi-terrestrial freshwater crabs that regularly breathe air (Ng *et al*. 1995).

***Deckenia* Hilgendorf, 1869** (Figs. 187–188, plates XV, XVI)

Type species. *Deckenia imitatrix* Hilgendorf, 1869.

Deckenia Hilgendorf, 1869a: 2; 1869b: 77; 1898: 23; Rathbun, 1906: 69; 1921: 434; Balss, 1929: 353; Chace, 1942: 225; Ng *et al*., 1995: 582–583.

Diagnosis. As for family.

Distribution. Somalia, Kenya, Tanzania.

Remarks. This genus was recently reviewed by Ng *et al*. (1995) who provided detailed comparisons between the two species. Bott (1955) separated *D. imitatrix* from *D. mitis* by differences in five characters: the form of the exorbital tooth, the armature of the ischium, merus and carpus of the cheliped, and the shape of the terminal segment of gonopod 1. Bott (1955) provided whole animal photographs of both species and sketches of their first gonopods. Differences between the two species were tabulated by Ng *et al*. (1995) who added new characters and provided illustrations of the gonopods, the mandibles and the mouthparts of the two species.

Key to the species of *Deckenia*

1 Infraorbital margin lined with long sharp spines; epibranchial tooth sharp spine; ischium of cheliped with sharp spine; inferior margins of merus of cheliped lined with sharp spines; upper margin of merus of cheliped with row of pointed teeth, distal tooth longest; outer margin of carpus of cheliped with two sharp spines (Pl. XV) ..... ***D. imitatrix***

- Infraorbital margin lined with short, blunt-tipped, flat peg-like teeth; epibranchial tooth low, rounded; ischium of cheliped with low blunt tooth; margin of merus of cheliped with low teeth; outer margin of carpus of cheliped with two low teeth (Pl. XVI) ..... ***D. mitis***

15. Deckenia imitatrix Hilgendorf, 1869 (Fig. 187, plate XV)

Deckenia imitatrix Hilgendorf, 1869a: 2; Ortmann, 1902: 306; Bott, 1955: 219, fig. 6, pl. 1 fig. 1a–d; Pretzmann, 1977: figs 17–20; Ng *et al.*, 1995: 583, tables 1,2; Cumberlidge, 1997: 574; 1998: 194–195.

Type material examined: TANZANIA: Zanzibar, female cw 35.4, cl 29.2 mm (lectotype, designated by Bott 1955: 220) (von der Decken) (ZMB 3216). There is reason to believe that the type locality is actually in Kadiaro, Kenya (Marijnissen *et al*. 2005).

Additional material examined: TANZANIA: South Pare Mountains, Bumba, near Gonja, from rice fields, 29.v.1968 (J. N. Raybould) (NMU TRW1968.04). **KENYA:** Malindi, male, vi.1934 (A. Loveridge) (USNM 70915); Mombasa, from temporary rainwater pool in the center of town, male, vii.1903 (Ch. Alluaud) (USNM 32298); Mombasa, (Joy) (NMU 23.02.1972.1); Simakeni Dam, west of Rabai, 15 km northwest of Mombasa, rain-fed water body, no inlet or outlet, about 30 m wide, 1.7 m deep, highly turbid, crabs caught by sweep net from depths of 30 cm or more, some crabs seen swimming, 16.vii.1980 (A. W. R. McCrae) (NMU 1980.03); Mombasa, (Joy) (NMU 07.2001.e.1); Coast Province, Kilifi District, Arabuko-Sokoke Forest, 1998 (J. Ashe *via* R. C. Drewes) (NMU 1998). **SOMALIA**: Giohar**,** adult male, vii.1968 (Lanza) (NHMW 4369).

Diagnosis. Exorbital tooth pointed; infraorbital margin lined with long sharp spines; epibranchial tooth sharp spine; ischium of cheliped with sharp spine; inferior margins of merus of cheliped lined with sharp spines; upper margin of merus of cheliped with row of pointed teeth, distal tooth longest; anterior inferior margin of merus of cheliped with large distal tooth; outer margin of carpus of cheliped with two sharp spines; first, second carpal teeth on inner margin of carpus of cheliped subsequal sharp spines; inner/outer margins of carpus of p2 lined with sharp subdistal spines; dorsal margin of merus of p2–p5 with sharp subdistal spine; interior margin of propodus of p2–p5 with row of sharp spines; terminal article of gonopod 1 clearly separated from subterminal segment by distinct line; proximal region of terminal article slim, subconical, tapering to cylindrical distal part. Chelipeds of adult males equal-sized, not markedly heterochelous.

Distribution. East African coastal region, from northeast Tanzania to Taru, Kenya, to Giohar and Eil, Somalia and inland in Kenya as far as Nairobi. Marijnissen *et al*. (2005) argued that the type locality is Kadiaro, Kenya (and not Zanzibar), and that the report of *D. imitatrix* from Zanzibar is most probably the result of a mistake arising from the replacement of a lost label.

Remarks. Bott (1955) and Pretzmann (1977) included photographs of this East African species, while Ng *et al*. (1995) provided illustrations of the gonopods, the mandibles and the unusual mouthparts. *Deckenia imitatrix* is distinguished from *D. mitis* by the teeth on the infraorbital margin (which are sharp spines in *D. imitatrix* and low, broad and blunt-tipped in *D. mitis*) and by the inner and outer margins of the carpus of the cheliped (which possess sharp spines in *D. imitatrix* and low broad, blunt-tipped teeth in *D. mitis*).

Natural history and conservation status. The conservation status of *D. imitatrix* is

currently categorized as least concern (LC) (Table 4) because it has a range of occurrence and area of occupancy well in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population levels were estimated to be stable based on indirect measures such as the fact that it has been collected recently from more than one locality and that it is well represented in museum collections. However, recent field surveys by S. Marijnissen (pers comm.) have revealed that this species may be potentially more vulnerable that previously thought. Although this species has a wide extent of occurrence that is much greater than 20,000 sq. km. (which is above the threshold for vulnerable, VU), it may have an increasingly restricted area of occupancy due to habitat disturbance that would fall into the range for vulnerable (VU). While it is difficult to estimate the population status and trends of this species, its population is estimated to possibly in decline due to the fact that its habitat is restricted to marshes and wetlands, and these are fragmented and declining in this part of East Africa (IUCN 2004; Table 4). The dependence of this species on wetland habitats that are vulnerable to human disturbance and that are associated with a growing human population in the region would argue for the upgrading of the conservation status of *D. imitatrix* from least concern to vulnerable in the light of the new data.

16. Deckenia mitis **Hilgendorf, 1898** (Fig. 188, plate XVI)

Deckenia mitis Hilgendorf, 1898: 24, fig. 8; Ortmann, 1902: 306; Bott, 1955: 221, fig. 5, pl. 1 fig. 2a–d; Ng *et al*., 1995: 583–585, figs 1A, 2, 3, tables 1, 2; Cumberlidge, 1997: 574; 1998: 195.

Type material examined: TANZANIA: Tabora, Wembere Steppe near Tabora, male (cw 48, cl 38 mm, lectotype, designated by Bott 1955: 221), 6–7.vi.1892 (F. Stuhlmann) (ZMB 9444).

Additional material examined: TANZANIA: Singi (= Zingi), Dodoma, female, 25 v.1926 (A. Loveridge, Smithsonian-Chrysler Expedition) (USNM 82330); Dodoma, female, 10 v.1926 (A. Loveridge, Smithsonian-Chrysler Expedition) (USNM 82331); Tanga, female (Jierra) (USNM 30030); Taro, adult male, (cw 40.9 mm), juvenile (cw 26.6 mm) (O. Neumann) (ZSM 1235/1); South Pare Mountains (T. R. Williams) (NMU TRW-EA 62.34); Amani, Usambara (T. R. Williams) (NMU TRW1964.04); Ruaha River, Iringa-Dodoma road (Joy) (NMU TRW1975.10); Kiono Forest, (T. R. Williams) (NMU TRWIII.1990.a). **KENYA:** Taveta (T. R. Williams) (NMU TRW1968.13); Murangía (formerly Fort Hall), (Joy) (NMU TRW07.2001.f).

Diagnosis. Exorbital tooth low, blunt; infraorbital margin lined with short, flat, peg-like teeth; epibranchial tooth small, blunt-tipped; ischium of cheliped with low blunt tooth; lower margin of merus of cheliped lined with rounded teeth/granules; upper margin of merus of cheliped with blunt tooth; anterior inferior margin of merus of cheliped with small, rounded, distal tooth; outer margin of carpus of cheliped with two low teeth; first and second carpal teeth on inner margin of carpus of cheliped subsequal rounded teeth;

inner/outer margins of carpus of p2 lined with low subdistal granules; dorsal margin of merus of p2–p5 with blunt subdistal tooth; interior margin of propodus of p2–p5 with row of small, blunt teeth; terminal article of gonopod 1 clearly separated from subterminal segment by distinct line; proximal region of terminal article slim, subconical, tapering to cylindrical distal part. Chelipeds of adult males equal-sized, not markedly heterochelous.

Distribution. Tanzania and Kenya. The type locality is Wembere Steppe near Tabora (5°02'S, 32°50'E) in Tanzania, and Ng *et al*. (1995) reported on material from Kilimantinde (5°52'S, 34°55'E), Dar es Salaam, and at a non-specific locality in southern Tanzania near Lake Malawi (as Nyassa Lake). The combination of all known localities for *D. mitis* (Marijnissen *et al*. 2005) indicates that this species is found in both inland and coastal localities in Tanzania (Dodoma, Tanga, Iringa, Mount Meru, Amani, South Pare Mountains, Kibno, Kilimantinde and Dar es Salaam) and in Kenya (Murangía, Taveta and Mombasa).

Remarks. Photographs of the whole animal are available in Bott (1955), and illustrations of the gonopods, the mandibles and the unusual mouthparts of *Deckenia mitis* are available in Ng *et al*. (1995).

Natural history and conservation status. *Deckenia mitis* prefers marshes and low-lying wetlands, and is an air-breathing amphibious species. Williams *et al*. (1964) provided some observations on the habitat of *D. mitis* caught in an arid area of northern Tanzania close to Mount Meru. Specimens of *D. mitis* were collected in warm stagnant surface waters, and never in the cooler streams flowing down mountain slopes. *Deckenia mitis* and *P. obesus* share the same habitat and burrow deeply into the soil at the waters edge, often causing extensive damage to drainage ditches. The conservation status of *D. mitis* is categorized as vulnerable (VU) (Table 4) because despite its wide range of occurrence well above the threshold for vulnerable (VU), it may have an increasingly restricted area of occupancy due to declining wetlands in the region that would qualify for vulnerable (VU) status. It is difficult to estimate the population status and trends of this species, but it is likely that its population is declining based on indirect factors such as the lack of recent specimens from many parts of its range, its poor representation in museum collections and increasing habitat disturbance from loss of wetlands associated with growing human populations in the region (IUCN 2004). Marijinissen *et al*. (2005) argued for the upgrading of the conservation status of *D. mitis* to VU based on new field studies and new population estimates.

FAMILY PLATYTHELPHUSIDAE Colosi, 1920

Platythelphusinae Colosi, 1920: 9.
Potamonidae—Capart, 1952: 43–45.
Potamonidae—Bott, 1955: 221–222
Potamonautidae—Bott, 1970: 327–344; Coulter, 1991: 253 Cumberlidge, 1999: 119–120; Cumberlidge *et al*., 1999: 1489–1492; Marijnissen *et al*., 2004: 514–515.

Type genus. *Platythelphusa* A. Milne-Edwards, 1887.

Diagnosis. Carapace outline subhexagonal, rounded; frontal margin lined by small teeth or distinct granules; external angles of front either marked by sharp spines or by small granules; stout triangular process (which may be produced into a small tooth, the descending frontal tooth) beneath external angles descending into orbital hiatus; anterolateral margin of carapace behind exorbital tooth with an epibranchial tooth plus from two or three large forward-directed pointed teeth. Suborbital margin lined by small teeth or small granules, medial end marked by either distinct spine or small tooth. Postfrontal crest distinct but incomplete, never meeting anterolateral margins. Anterolateral margin always lacking intermediate tooth between exorbital and epibranchial teeth.

Distribution. Lake Tanganyika, East Africa.

Remarks. The platythelphusids were originally established as a subfamily by Colosi (1920). Although this distinctive group of freshwater crabs was later treated as a subgenus of *Potamonautes* by Bott (1955), it was recognized as a distinct family by Cumberlidge (1999), Cumberlidge *et al.* (1999) and Marijnissen *et al.* (2004). In the present work, the Platythelphusidae includes a single genus (*Platythelphusa*) with nine species, all of which are endemic to Lake Tanganyika. Capart (1952) included *Platythelphusa* in the family Potamonidae Ortmann, 1896, which was later emended to the Potamidae (Opinion 712, *Bull. Zool. Nomenclature*, 21, 1964). Bott (1955) originally assigned *Potamonautes (Platythelphusa)* to the Potamonidae (= Potamidae); later, Bott (1970) transferred this genus to the Potamonautidae Bott, 1970 and this arrangement was accepted by Coulter (1991). Cumberlidge (1999) raised the monotypic subfamily Platythelphusinae Colosi, 1920 to the rank of a full family, the Platythelphusidae, which included the genus *Platythelphusa* and this arrangement has been accepted by most subsequent authors (Martin & Davis 2001; Marijnissen *et al*. 2004). These three families are viewed here as separate phylogenetic entities, based on the results of the cladistic analyses of the relationships between the platythelphusids, potamonautids and deckeniids by Sternberg *et al*. (1999), Cumberlidge & Sternberg (1999) and Sternberg & Cumberlidge (1999, 2001). This family was revised by Cumberlidge *et al.* (1999) and Marijnissen *et al.* (2004) and these works together provide detailed illustrations of the carapace and gonopods of all species. For this reason these characters have not been redrawn here, although photographs of all nine species of *Platythelphusa* are included (Plates XVII to XXV).

Natural history and conservation status. The platythelphusids are completely aquatic crabs. They have never been observed out of water and they die after a few hours in dry air (S. Marijnissen, pers. comm.).

***Platythelphusa* A. Milne-Edwards, 1887** (Figs. 189–197, plates XVII–XXV)

Platythelphusa A. Milne-Edwards, 1887: 146; Hilgendorf, 1898: 21; Moore, 1903: 286; Rathbun,

1905: 268; Cunnington, 1907: 266–268; 1920: 557; Alcock, 1910: 253–261; Colosi, 1920: 9–10; Cunnington, Balss, 1936: 196; Chace, 1942: 224; Cumberlidge, 1999: 16, 17, 25, 36, 37, 42, 45, 66–69, 74, 76–79, 100–113, 116, 317; Cumberlidge *et al.*, 1999: 1491–1493; Marijnissen *et al*. 2004: 515.

Limnothelphusa Cunnington, 1899: 698; Moore, 1903: 280; Rathbun, 1905: 269.

Hydrothelphusa (Platythelphusa) Bouvier, 1917a: 615–621; 1917b: 657–659; 1921: 41.

Potamonautes (Platythelphusa) Bott, 1955: 226–229; Coulter, 1991: 253–257.

Type species. *Platythelphusa armata* A. Milne-Edwards, 1887, by monotypy.

Diagnosis. As for family.

Distribution. Known only from Lake Tanganyika, East Africa. Most (but not all) of the species of *Platythelphusa* have been collected from Tanzanian waters. Nevertheless, for completeness the genus is included in the present work in its entirety.

Remarks. Nine species of *Platythelphusa* are recognized here: *P. armata* A. Milne-Edwards, 1887, *P. maculata* (Cunnington, 1899), *P. conculcata* Cunnington, 1907, *P. denticulata* Capart, 1952, *P. tuberculata* Capart, 1952, *P. polita* Capart, 1952, *P. echinata* Capart, 1952, *P. immaculata* Marijnissen, Schram, Cumberlidge & Michel, 2004, and *P. praelongata* Marijnissen, Schram, Cumberlidge & Michel, 2004.

Key to the species of *Platythelphusa*

1 Anterior margin of front deflexed, lacking well-defined teeth on external corners..... **2**
- Anterior margin of front almost horizontal, with well-defined sharp teeth on external corners **3**
2 External angles of front rounded, frontal margin granular. Small epibranchial tooth, one larger tooth on anterolateral margin in mesogastric region (Pl. XXIV)..... ***P. praelongata***
- External angles of front square-shaped 4
3 Frontal margin lined with tooth-like tubercles **7**
- Frontal margin lined by granules **8**
4 Merus of p5 shorter than front width. One tooth on the anterolateral tooth behind the epibranchial tooth, equal in size to the epibranchial tooth (Pl. XXIII)..... ***P. polita***
- Merus of p5 either longer than, or almost equal to, front width **5**
5 Epibranchial lobes distinctly raised. Inferior margin of ischium of p1–p5 with distal spine (Pl. XXV)..... ***P. tuberculata***
- Epibranchial lobes indistinct. Distal spine on inferior margin of ischium of p1–p5 lacking **6**
6 Inferior margins of meri and propodi of p2–p4 each with a row of distinct spines (Pl. XX)
..... ***P. echinata***

- Inferior margins of meri of p2–p4 granulate, inferior margins of propodus of p2 with several minute spines, inferior margins of propodus of p3–p4 smooth (Pl. XXII)..... ..... ***P. maculata***

7 Distal tooth of meri of p2–p4 pointed spine (Pl. XVIII)..... ***P. conculcata***

- Distal tooth of meri of p2–p4 either low or lacking..... **8**

8 Subdistal tooth of meri of p2–p4 either low or lacking (Pl. XVII)..... ***P. armata***

- Subdistal tooth of meri of p2–p4 a sharp spine..... **9**

9 Carapace flattened (ch/fw <1.0) (Pl. XXI)..... ***P. immaculata***

- Carapace high (ch/fw ≥1.0) (Pl. XVII) ..... ***P. denticulata***

17. Platythelphusa armata A. Milne-Edwards, 1887 (Fig. 189, plate XVII)

Potamonautes (Platythelphusa) armata armata—Bott, 1955: 226–227, pl. 2, fig. 1a–d, 9a–b; Coulter, 1991: 253–255, tables 9.XX, 9.XXI, fig. 2, 3.

Platythelphusa armata—Cumberlidge, 1997: 584; 1998: 208; 1999: figs. 8A,C, 9A, 10A, 11A,AA, 12 A,F, 13, A,AA; Cumberlidge *et al*., 1999: 1493–1498, figs. 1, 7a–b, 8a,g–h, 9a, 10a–d; Marijnissen *et al*., 2004: 528–530, Tables 1, 2.

Type material: Lake Tanganyika, female type (cw 64.5, cl 52.7 mm) (M. Joubert) (MNHN).

Additional material examined: TANZANIA: Lake Tanganyika, 2 males (W. A. Cunnington) (USNM 39470).

Diagnosis. Carapace subhexagonal, rounded, medium height (ch/fw 1.07). Frontal margin granulated, with large forward pointing tooth at each external corner. Epibranchial tooth large, pointed. Three teeth (two large and one smaller) on anterolateral margin behind epibranchial tooth. Suborbital margin lined by small pointed teeth, distinct spine at medial end. Margins of inferior surface of merus of cheliped both smooth or only faintly granulated, single large pointed distal tooth at distal end of medial inferior margin; superior margin of merus of p1 with rows of prominent, rough grains, short carinae. Inner margin of carpus of cheliped with two long slender pointed teeth (second as long as first); long, pointed articular tooth on carpus where it contacts propodus; outer margin of carpus with small granules. Merus of p5 longer than fw, distal tooth of superior margin low, blunt. Propodus of p4 long, thin; propodus of p5 short, broad; margins of propodi of p5 widened, smooth. Terminal article of gonopod 1 directed outward at a 45° angle to vertical; cone-shaped, tapering to pointed, upward-directed tip. Adult size range from cw 35 to cw 47.5 mm.

Distribution. *Platythelphusa armata* is endemic to Lake Tanganyika, and has been recorded from the waters of all four countries bordering the lake (Tanzania, Burundi, Zambia and D. R. Congo). This is the largest and most distinctive species in the genus and is mainly found in rocky areas, at depths between 5–30 m. The juveniles are found in the sublittoral shell zone from 1–10 m deep in places where the lake bed is rocky, or in the

empty shells of *Neothauma* sp. where they co- occur together with the adults of small-bodied species such as *P. maculata, P. echinata and P. polita* (Coulter 1991; Cumberlidge *et al*. 1999). The juveniles of *P. armata* are often found inside the empty shells of the gastropod *Neothauma tanganyicense*.

Remarks. This species was recently redescribed by Cumberlidge *et al*. (1999), who provided details of the identification, distribution and ecology of this species. The angle of the terminal article of gonopod 1 is revised here as being directed outward at a 45° angle to the vertical (rather than at a 90° angle as stated in Cumberlidge *et al*. 1999).

Natural history and conservation status. The conservation status of *P. armata* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and an area of occupancy well in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (S. Marijnissen, pers. comm.), that this species is the subject of a local commercial fishery with large numbers captured regularly and that it is well represented in museum collections.

18. Platythelphusa conculcata Cunnington, 1907 (Fig. 190, plate XVIII)

Platythelphusa conculcata Cunnington, 1907: 273, pl. 13, fig. 2,4; Chace, 1942: 225; Capart, 1952: 60.

Potamonautes (Platythelphusa) armata conculcata—Bott, 1955: 228–229, fig. 10a, b, pl. 2, 2a–d (part only); Coulter, 1991: 253–255, tables 9.XX, 9.XXI.

Platythelphusa conculcata: Cumberlidge, 1997: 584; 1999: 277; Cumberlidge *et al*., 1999: 1504–1506, fig. 3, 7e, 8c, k–l, 9c, 10i–k; Marijnissen *et al*., 2004: 528–530, Tables 1, 2.

Type material examined: ZAMBIA: Lake Tanganyika, south end, male holotype (cw 10.8 mm), (BMNH 1908.1.31.15).

Additional material examined: DEMOCRATIC REPUBLIC OF CONGO: Lake Tanganyika, Uvira, 2 males, 6 females, 21.v.1955 (W. L. Schmitt) (USNM 98921).

Diagnosis. Carapace subhexagonal, rounded, very flat (ch/fw 0.8). Frontal margin granular with distinct forward pointing tooth at each external corner. Exorbital tooth directed forward, pointed, epibranchial tooth large, pointed. Three large, subequal forward-pointing teeth on anterolateral margin behind epibranchial tooth. Suborbital margin lined by small teeth, larger tooth at medial end. Margins of inferior surface of merus of cheliped lined by small granules, single large pointed tooth on medial inferior margin. Inner margin of carpus of cheliped with two large subequal carpal teeth, articular tooth (at point of articulation with propodus) sharp, pointed; outer margin of carpus lined by row of small thin sharp spines. Merus of p5 about as long as fw, distal tooth on superior margin of p2–p5 sharp, pointed. Propodus of p4 and p5 long, thin, margins of propodus of p5 widened, smooth. Terminal article of gonopod 1 directed sharply outward at a 90° angle to the vertical, slim, cone-shaped, tapering to pointed tip.

Size. Adult size range from cw 15 to cw 21.8 mm.

Distribution. Endemic to Lake Tanganyika: Burundi, Zambia and D. R. Congo, from depths between 20–60 m.

Remarks. This species was redescribed by Cumberlidge *et al*. (1999), who provided details of its identification, distribution and ecology. Bott (1955) considered *P. conculcata* to be a subspecies of *P. armata*. *Platythelphusa conculcata* was recognized by Cumberlidge *et al*. (1999) and by Marijnissen *et al*. (2004) as a valid species following comparison of the type material of *P. armata* and *P. conculcata.*

Natural history and conservation status. The conservation status of *P. conculcata* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (S. Marijnissen, pers. comm.) and that it is well represented in museum collections

19. Platythelphusa denticulata Capart, 1952 (Fig. 191, plate XIX)

Platythelphusa denticulata Capart, 1952: 48–50, figs. 2, 7b; Marijnissen *et al*., 2004: 530.
Potamonautes (Platythelphusa) denticulata—Coulter, 1991: 253, 255, Table 9.XXI.
Platythelphusa conculcata—Cumberlidge *et al*., 1999: 1504 (part only, not figs.).

Diagnosis. Epibranchial tooth large spine; anterolateral margin of carapace behind epibranchial tooth with three sub-equal spines; carpus of cheliped with two large carpal teeth and large pointed articular tooth; external margin of carpus of cheliped with row of small teeth.

Distribution. Endemic to Lake Tanganyika, known only from Tanzanian waters.

Remarks. Capart (1952) provided a brief description and illustrations of this species based on the holotype, a single adult female specimen (cw 46 mm), but expressed uncertainty as to its identity. Later, Coulter (1991) combined Capart's (1952) taxonomy with that of Bott (1955, 1970) and treated this taxon as *Potamonautes (Platythelphusa) denticulata*, which he assigned to the family Potamonautidae, the genus *Potamonautes* and the subgenus *Platythelphusa*. Cumberlidge *et al*. (1999) treated *P. denticulata* as a junior synonym of *P. conculcata* on the basis of the figure provided by Capart (1952, fig. 2). This shows a distinctive cheliped carpus with two large subequal carpal teeth, a sharp and pointed articular tooth and an outer margin that is lined by a row of long, thin distinct spines. Marijnissen *et al*. (2004) examined the holotype of *P. denticulata* and concluded that it should be removed from synonymy with *P. conculcata*. The latter workers recognized both *P. conculcata* and *P. denticulata* as valid species.

Natural history and conservation status. The conservation status of *Platythelphusa conculcata* is categorized as vulnerable (VU) (Table 4) because of its limited geographic range (it has a narrow extent of occurrence and a narrow area of occupancy), and because

of its potentially low population levels (based on low representation in museum collections and the scarcity of recent additional material) (IUCN 2004).

20. Platythelphusa echinata Capart, 1952 (Fig. 192, plate XX)

Platythelphusa echinata Capart, 1952: 58–60, figs. 7h, i, 9; Cumberlidge, 1999: 277; Cumberlidge *et al.*, 1999: 1509–1510, fig. 6, 7 f, j–k, 8f, q, r, 9 f, 10 t–w; Marijnissen *et al.*, 2004: 528–530, Tables 1, 2.

Potamonautes (Platythelphusa) echinata—Coulter, 1991: 253–255, tables 9.XX, 9.XXI.

Type material examined: Lake Tanganyika, Station 88, 2 adult male paratypes (largest cw 15 mm), donated by A. Capart, (BMNH 1952.10.23.23–27).

Additional material examined: TANZANIA: See Cumberlidge *et al*. (1999).

Diagnosis. Carapace subhexagonal, very flat (ch/fw 0.76). Frontal margin granular, small blunt tooth at each external corner. Exorbital tooth small, pointed; epibranchial tooth large, pointed. Three teeth decreasing in size posteriorly on anterolateral margin behind the epibranchial tooth, anterolateral margin continuous with posterolateral margin. Suborbital margin lined by small granules, no small tooth at medial end. Lateral inferior margin of merus of cheliped smooth; large pointed tooth, several medium-sized teeth on medial inferior margin; superior margin with row of small granules. Inner margin of carpus of cheliped with two large subequal teeth close together, articular tooth (at point of articulation with propodus) large, pointed; outer margin of carpus with row of small granules. Coxa of p2–p5 with sharp spine on inferior medial margin. Merus of p5 as long as fw, sharp distal tooth on superior margin. Propodus of p4 long, propodus of p5 short, broad, posterior margin of propodus of p2–p5 lined by large pointed teeth. Dactyli of p2–p5 curved, rows of spines very long. Terminal article of gonopod 1 directed sharply outward at 90° angle to the vertical, slim, cone-shaped, tapering to pointed tip.

Description. See Cumberlidge *et al*. (1999) and Capart (1952).

Size. The adult size range is from cw 16 to cw 21 mm.

Distribution. Endemic to Lake Tanganyika: Burundi. For more localities see Capart (1952). This species is found in waters from 5–30 m deep, where the lake-bed is sandy or rocky, and it is sometimes found in sandy or muddy parts of the lake inside empty *Neothauma* sp. shells.

Remarks. The two rows of short spines on the inferior border of the merus and propodus of p2–p5 distinguish *P. echinata* from all other species in this genus. In addition, the large spine on the coxae of p1–p5 of *P. echinata* distinguishes it from all other species in the genus, except *P. tuberculata*. This species was redescribed by Cumberlidge *et al*. (1999), who provided details of its identification, distribution and ecology. The terminal article of gonopod 1 is directed outward at a 45° angle to the vertical, rather than at a 90° angle as stated in Cumberlidge *et al*. (1999).

Natural history and conservation status. The conservation status of *P. echinata* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and an area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a lot of material has been collected recently from more than one locality (S. Marijnissen, pers comm.).

21. Platythelphusa immaculata Marijnissen, Schram, Cumberlidge & Michel, 2004
(Fig. 193, plate XXI)

Platythelphusa immaculata Marijnissen *et al.*, 2004: 515–525, Fig. 1A–D, Tables 1, 2.

Type material examined: TANZANIA: Lake Tanganyika, Cape Mpimbwe near Katondo Point, (7°05.59'S, 30°30.00'E), male holotype (cw 18.2 mm), 7 m depth, sand and rocks, (G. Kazumbe), 9.ii.2003 (ZMA De.204594).

Additional material examined: TANZANIA: Lake Tanganyika, Mzungu Point (4°55.05'S, 29°35.73'E), adult female paratype (cw 25.7 mm) 0 m depth, cobbles and sand (S. Marijnissen pers. comm.) 23.ix.2002 (ZMA De.204599).

Diagnosis. Carapace subhexagonal, rounded, wider than long (cw/fw 2.7, cl/fw 2.2), very flat (ch/fw 0.9). Anterior margin of front granular, with square angles produced into sharp, pointed teeth. Exorbital tooth broad, directed forward. Anterolateral margin between exorbital and epibranchial teeth granulate. Epibranchial tooth broad, pointed; two large teeth on anterolateral margin behind epibranchial tooth. Suborbital margin tuberculate, with narrow, pointed tooth at medial end. Lateral superior and inferior margins of merus of cheliped granular. Inner margin of carpus of cheliped with two large subequal carpal teeth, articular tooth (at point of articulation with propodus) broad, pointed; outer margin of carpus either granulate or with several small teeth. Cheliped manus concave, propodus and dactylus with spatula-like tips. Marked sexual dimorphism in cheliped shape; males with enlarged major cheliped, propodus and dactylus with molar dentition; propodus and dactylus of minor cheliped with serrated dentition; females with almost monomorphic chelae, lined with serrated dentition. Merus of p5 almost as long as fw. Subdistal tooth on superior margin of merus p2–p4 a small spine, distal tooth either a small spine or small and low. Inferior margin propodus of p2–p4 smooth. Dactyli of p3–p4 with row of minute spines on superior margin and several larger distal spines; inferior margin smooth, with several distal spines. Terminal article of first gonopod directed sharply outward at 90° angle to vertical; slim, cone-shaped, tapering strongly to pointed tip.

Color. Dorsal carapace of living specimens grey-pink to orange-brown, without stains or spots, and the tips of the chelipeds and pereiopods are white.

Distribution. The species is known only from Lake Tanganyika, in the vicinity of Kigoma, Tanzania.

Remarks. Specimens were collected from underneath rocks and cobbles at depths ranging from 2 to 20 meters. *Platythelphusa immaculata* is sympatric with *P. conculcata*, *P. echinata* and juveniles of *P. armata*. *Platythelphusa immaculata* is morphologically close to *P. denticulata*, but the two taxa can be distinguished by the carapace height, which is flattened in *P. immaculata* and high in *P. denticulata* (Marijnissen *et al*. 2004).

Natural history and conservation status. The conservation status of *P. immaculata* is categorized as near threatened (NT) (Table 4) in view of its narrow distribution and low area of occupancy, together with the fact that it is known from a relatively few specimens (S. Marijnissen, pers comm.) (IUCN 2004).

22. Platythelphusa maculata (Cunnington, 1899) (Fig. 194, plate XXII)

Limnothelphusa maculata Cunnington, 1899: 698, pl. 38; Moore, 1903: 280; Rathbun, 1905: 269; Cunnington, 1907: 271, pl. 5–6; 1920: 557; Balss, 1936: 196; Chace, 1942: 225; Capart, 1952: 52–55, fig. 5, 6, 7f–g.

Potamonautes (Platythelphusa) armata armata—Bott, 1955: 226–229, fig 9a–b, pl. 2, fig. 1a–d (part only)*;* Coulter, 1991: 253–255.

Platythelphusa maculata—Cumberlidge, 1998: 208; 1999: 277, 279; Cumberlidge *et al*., 1999: 1498–1501, fig. 2, 7c–d, 8b, i–j, 9b, 10e–h; Marijnissen *et al*., 2004: 528–530, Tables 1, 2.

Type material examined: ZAMBIA: Lake Tanganyika; Chituta Bay, from deep water (between 20 m and 160 m), 2 male paratypes (largest cw 14.5 mm) (J. E. S. Moore) 1896 (BMNH 1899.6.14.1–2).

Additional material examined: TANZANIA: Lake Tanganyika, 2 specimens, (USNM 63295).

Diagnosis. Carapace subhexagonal, rounded, very flat (ch/fw 0.9). Frontal margin granular, small low tooth at each external corner. Exorbital tooth sharp, pointed, directed forward, epibranchial tooth large, pointed. Two large sub-equal teeth on anterolateral margin behind epibranchial tooth. Suborbital margin lined by granules, broad low tooth at medial end. Margins of inferior surface of merus of cheliped lined by small granules, single large pointed distal tooth on medial inferior margin. Inner margin of carpus of cheliped with two large teeth, second smaller than first, articular tooth (at point of articulation with propodus) small, pointed; outer margin of carpus smooth. Merus of p5 about as long as fw; inferior margin of propodus of P5 widened, toothed. Terminal article of gonopod 1 directed outward at 45° angle to longitudinal axis of subterminal segment, stout, straight, cone-like, tapering to pointed tip. Adult size range from cw 12.5 to cw 15.7 mm.

Distribution. Lake Tanganyika: Zambia and Tanzania. It occurs in waters from 1–160 m deep, on sand or rocks, sometimes inside empty *Neothauma* shells.

Remarks. This species was redescribed by Cumberlidge *et al*. (1999), who provided details of its identification, distribution and ecology. *Platythelphusa maculata* reaches maturity at an extremely small size (some adults have a cw of only 12.5 mm), which

clearly distinguishes them from *P. armata*, where adult animals range from cw 35 to cw 45 mm, and where specimens with a cw of 12.5 mm would be juveniles.

Natural history and conservation status. The conservation status of *P. maculata* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that material has been collected recently from more than one locality (S. Marijnissen, pers comm.)

23. Platythelphusa polita Capart, 1952 (Fig. 195, plate XXIII)

Platythelphusa polita Capart, 1952: 455–57, figs. 7d, e, g; Cumberlidge, 1999: 277; Cumberlidge *et al.*, 1999: 1507–1509, fig. 5, 7h, i, 8e, o, p, 9e, 10p–s; Marijnissen *et al.*, 2004: 528–530, Tables 1, 2.
Potamonautes (Platythelphusa) polita—Coulter, 1991: 253–255, tables 9.XX, 9.XXI.

Type material examined: Lake Tanganyika, paratypes, adult female, ovigerous (cw 13 mm), adult male (cw 14 mm) (BMNH 1952.10.23.34–35).

Additional material: TANZANIA: See Cumberlidge *et al*. (1999).

Diagnosis. Carapace sub-hexagonal, rounded, medium wide (cw/fw 2.4), slightly wider than long (cl/fw 2.1), high (ch/fw 1.1). Front deflexed slightly, edge smooth, each external corner marked by small, low tooth. Exorbital angle produced into broad low tooth, epibranchial tooth very small. Three teeth on anterolateral margin (small epibranchial tooth anteriormost, other two teeth large, subequal, directed forward). Sidewalls of carapace divided by epimeral sulcus into two parts, faint vertical sulcus can be detected under close examination. Suborbital margin lined by small granules, small tooth at medial end. Margins of inferior surface of merus of cheliped smooth; single large pointed distal tooth on medial inferior margin; superior margin of merus of p1 with short carinae. Inner margin of carpus of cheliped with two large subequal medial teeth, articular tooth (at point of articulation with propodus) low, blunt; outer margin of carpus smooth. Merus of p5 shorter than fw, distal tooth on superior margin of p2–p5 low. Propodus of p4 slim with smooth margins, propodus of p5 short, broad, margins of propodi of p5 flat, widened, smooth. Dactylus of p5 very short, only half as long as dactylus of p4. Dactyli of p2–p5 slim, curved, with rows of long spines. Terminal article of gonopod 1 directed sharply outward at 80° angle to the vertical, stout, cone-shaped, tapering to pointed tip.

Description. See Capart (1952) and Cumberlidge *et al*. (1999).

Size. The adult size range is from cw 12 to cw18 mm.

Distribution. Lake Tanganyika: Burundi, Tanzania and D. R. Congo. *Platythelphusa polita* occurs in waters from 5–60 m deep, where the lake bottom is either sandy or rocky and there are shell beds. This species is sometimes found inside empty *Neothauma* shells.

Remarks. This species was redescribed by Cumberlidge *et al.* (1999), who provided details of its identification, distribution and ecology. The terminal article of gonopod 1 is

directed outward at an 80° angle to the vertical, rather than at a 60° angle, as stated in Cumberlidge *et al*. (1999). *Platythelphusa polita* is morphologically close to *P. maculata* but differs in the form of the articular tooth of the carpus of p1 (which is a sharp spine in *P. maculata* and a low, blunt tooth in *P. polita*), by the carapace height (which is medium high in *P. polita* and flat in *P. maculata*) and by the size of the epibranchial tooth (which is extremely small in *P. polita* and large and pointed in *P. maculata*). There are clear differences between *P. polita* and *P. armata*. These include the body size at maturity (cw 12 to cw 13 mm in *P. polita* and cw 35 to cw 37 mm in *P. armata)*, the articular tooth of the carpus of p1 (low and blunt in *P. polita* and sharp and pointed in *P. armata*) and the terminal article of gonopod 1 (angled at 80° to the vertical in *P. polita* and at 90° to the vertical in *P. armata*). *Platythelphusa polita* is distinguished from juvenile *P. armata* by the relatively high carapace, by the dimorphism of the male chelipeds, by fewer spines on the anterolateral margin of the carapace and by the distinctly smaller epibranchial tooth of *P. polita*. Differences between *P. polita* and *P. echinata* include the carapace height (medium height in *P. polita* and very flat in *P. echinata*), the inferior margins of p2–p5 (smooth in *P. polita*, very spiny in *P. echinata*), the margin of the merus of p1 (smooth in *P. polita*, very spiny in *P. echinata*), the frontal margin (smooth in *P. polita*, very spiny in *P. echinata*) and the suborbital margin (smooth in *P. polita*, very spiny in *P. echinata*).

Natural history and conservation status. The conservation status of *P. polita* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and an area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that a material has been collected recently from more than one locality (R. Bills, pers comm.).

24. Platythelphusa praelongata Marijnissen, Schram, Cumberlidge & Michel, 2004
(Fig. 196, plate XXIV)

Platythelphusa praelongata Marijnissen *et al.*, 2004: 525–528, Fig. 2A–D, Tables 1, 2.

Type material: ZAMBIA: Lake Tanganyika, 40–80 m deep, off Kazi Beach site north of Mbita Island (08°45.226’ S, 31°05.148’ E), adult ovigerous female, holotype (cw 28.8 mm), 19.vi.2002, (local fishermen) (ZMA De.204595).

Diagnosis. Carapace subhexagonal, rounded, wider than long (cw/fw 2.7; cl/fw 2.4), very flat (ch/fw 0.9). Anterior margin of front lined by row of large granules, corners of frontal margin rounded, lacking teeth. Exorbital angle produced into broad forward-directed tooth. Epibranchial tooth small, anteerolateral margin behind epibranchial tooth with one broad tooth, lateral to mesogastric region. Suborbital margin lined with large granules; broad low tooth at medial end. Lateral inferior margin of merus of cheliped granular; superior margin of merus lined with rough granules. Inner margin of carpus of cheliped with two large subequal carpal teeth, articular tooth (at point of articulation with

propodus) broad, low; outer margin of carpus granular. Chelipeds straight, elongated, slim, teeth low and even, slight size difference between left and right cheliped. Merus of p5 1.5 times longer than fw; merus of p3–p4 extremely long (2 times longer than fw); subdistal meral tooth on superior margin of merus low, rounded, distal meral tooth not spinous. Propodi of p2–p4 long, smooth with thin margins; dactyli of p3–p4 long, slim, straight, no spines on superior margins, row of small spines on inferior margins.

Color. Carapace of recently preserved specimens (after one month) is orange-pink; tips of chelipeds and pereiopods white; propodus and dactylus of chelipeds red.

Distribution. The species is known only from the vicinity of Mbita Island, Zambia and was collected by fishermen in deep water (between 40 and 80 meters).

Remarks. For the complete description see Marijnissen *et al*. (2004). *Platythelphusa praelongata* is known only from a single specimen and from a single locality, and its conservation status is considered to be vulnerable (VU) (Table 4) (IUCN 2004).

25. Platythelphusa tuberculata Capart, 1952 (Fig. 197, plate XXV)

Platythelphusa tuberculata Capart, 1952: 50–52, figs. 4, 7c; Cumberlidge, 1999: 277; Cumberlidge *et al.*, 1999: 1506–1507, fig. 4, 7f–g, 8d, m,n, 9d, 10l–o.; Marijnissen *et al.*, 2004: 528–530, Tables 1, 2.

Potamonautes (Platythelphusa) tuberculata—Coulter, 1991: 253–255, tables 9.XX, 9.XXI.

Type material examined: DEMOCRATIC REPUBLIC OF CONGO: Lake Tanganyika, vicinity of Moba, 20 m deep (station 38), male subadult paratype (cw 16.4 mm), donated by A. Capart, 23.XI.1952 (BMNH 1952.10.23.28).

Additional material examined: BURUNDI: Ruzizi river mouth, 15–30 m deep; 2 adult males (cws 31.4, 37.3 mm), adult female (cw 30.6 mm), lake-bed soft mud, caught in gill nets, 1.vi.1993, (CAW 12A).

Diagnosis. Carapace subhexagonal, rounded, wide (cw/fw 2.95), very long (cl/fw 2.49), very high (ch/fw 1.14). Frontal margin granular, indented in middle, with distinct forward pointing tooth at each external corner. Exorbital tooth pointed, directed forward; epibranchial tooth large, pointed. Two large subequal forward-pointing teeth on anterolateral margin behind epibranchial tooth. Suborbital margin lined by small granules, large pointed tooth at medial end. Epimeral sulcus on sidewalls of carapace, vertical sulcus between epimeral sulcus and base of epibranchial tooth. Lateral inferior margin of merus of cheliped lined by series of distinct pointed teeth, single large pointed tooth on medial inferior margin; superior margin with single spine or carinae. Inner margin of carpus of cheliped with two large subequal medial teeth, articular tooth (at point of articulation with propodus) broad, pointed, low; outer margin of carpus with row of small granules and posterior spine. Ischium of cheliped with sharp spine on inferior lateral margin. Merus of p5 much longer than fw, superior margin with sharp distal tooth. Propodi of p4, p5 extremely long, thin, margins of propodi of p4, p5 smooth. Dactyli of p2–p5 very long, slim, curved,

rows of spines very reduced. Terminal article of gonopod 1 directed outward at a 60° angle to vertical, slim, cone-shaped, tapering to pointed tip.

Description. See Capart (1952), Cumberlidge *et al*. (1999) and Marijnissen *et al.* (2004).

Size. The adult size range is from cw 30.6 to cw 37.3 mm.

Distribution. Lake Tanganyika: Burundi, D. R. Congo. Collected in waters 100–50 m deep where the lakebed is muddy. The type locality is at Moba in Burundi, 20 m deep. This distinct long-legged large species is found in deeper parts of the sublittoral zone in the northern end of the lake where the lakebed is muddy. This species has also been found in the stomachs of lake fish such as *Chrysichthyes brachynema* (Capart 1952) and *C. stappersi* (Coulter 1991).

Remarks. This species was redescribed by Cumberlidge *et al*. (1999), who provided details of its identification, distribution and ecology. *Platythelphusa tuberculata* was originally described by Capart (1952) from a subadult female specimen because no males were known. The diagnosis by Cumberlidge *et al*. (1999) was based on an adult male specimen and includes the first account of the gonopods, male abdomen, sternum and chelipeds of this species. *Platythelphusa tuberculata* can be distinguished from the other species in this genus by a large number of distinctive characters. These include the accentuated sculpture of the carapace regions, the strong spines on the lateral inferior margin of the merus of the cheliped, the large spine on the superior margin of the merus of the cheliped, the large spine on the external margin of the carpus of the cheliped, the highly arched and slim dactylus of the major cheliped of adult males, the elongated slim legs (the merus of p5 is much longer than the front width), the long, thin propodus of p5 and the very long, slim and curved dactyli of p2–p5 which have rows of very reduced spines.

Natural history and conservation status. The conservation status of *P. tuberculata* is categorized as least concern (LC) (Table 4) because it has a range of occurrence and an area of occupancy in excess of the thresholds for vulnerable (VU) (IUCN 2004). Its population is estimated to be stable based on indirect measures such as the fact that material has been collected recently from more than one locality (S. Marijnissen, pers comm.)

DISCUSSION

Williams (1968) argued that the long-standing taxonomic problems associated with the identification of freshwater crabs arise from the high intraspecific variability of characters of the carapace, sternum, pereiopods and third maxilliped, but that these problems could largely be resolved by reference to the first gonopod of males. This idea has been developed in the present study with the introduction of characters of the first gonopod that have not be applied before to African freshwater crabs. We conclude that the most reliable method of identification of African freshwater crabs requires examination of an adult male specimen, and that the gonopods (especially gonopod 1) should be used as primary taxo-

nomic characters, but that they should be used in conjunction with other characters of the carapace, sternum, pereiopods and third maxilliped. In those cases where gonopod characters are unavailable (such as subadult, juvenile and female specimens, and damaged males), non-gonopod characters can often be used to aid in identification.

For each species of *Potamonautes*, *Platythelphusa* and *Deckenia* from Tanzania the shape of the terminal article of gonopod 1 was found to be distinct and exhibit very low intraspecific variability (Capart 1952, 1954; Bott 1955; Ng *et al*. 1995; Cumberlidge 1999; Cumberlidge *et al*. 1999; Marijnissen *et al*. 2004). The characters of the terminal article of gonopod 1 of species of *Potamonautes* from Tanzania can be grouped into three broad categories: (a) long, slim, needle-like and smooth (e.g., *P. suprasulcatus*); (b) short, cone-like, and setose (e.g., *P. infravallatus*); and (c) long, outwardly-curved and with distinctly raised medial and lateral lobes (e.g., *P. loveridgei*). Within these three categories, other characters of the terminal article also vary (e.g., the length, the degree of curvature and the relative size of the medial and lateral lobes), producing a unique combination of characters for each species.

In addition, characters of the dorsal membrane of gonopod one were found to be useful to distinguish between species of Tanzanian freshwater crabs, as was shown to be the case for species of *Potamon* (Brandis & Türkay 2000). These characters include: (1) the shape of the dorsal membrane; (2) the shape of the distal margin of the subterminal segment where it meets the dorsal membrane; and (3) the shape of the basal margin of the dorsal face of the terminal article where it meets the dorsal membrane. Characters of the dorsal membrane can be subdivided by overall shape and size into four main groups: (a) slim and narrow; (b) broadly sub-rectangular; (c) sub-oval; and (d) sub-triangular. Furthermore, the shape of the distal margin of the subterminal segment of gonopod 1 can be subdivided grouped into three groups: (a) horizontal and straight; (b) concave or u-shaped; and (c) deeply v-shaped. The shape of the basal margin of the terminal segment can be subdivided into two groups: (a) horizontal and straight; or (b) concave or u-shaped.

Morphometric characters of the carapace were found to be useful for species identification, but these should not be relied upon alone in the absence of other diagnostic characters. The morphometric analysis of the freshwater crabs of West Africa conducted by Cumberlidge (1999) tabulated carapace proportions by species, and established broad categories for carapace width (cw/fw), length (cl/fw), height (ch/fw) and front width (fw/cw). Cumberlidge (1999) found that trends in carapace proportions, particularly relative height (whether flat, medium high, or high), correlated loosely with lifestyle and habitat. For example, those species with a flat carapace (ch/fw 0.8–1.0) tend to lead a completely aquatic life within lakes or rivers (Cumberlidge 1999), which was found to be the case here for *P. platynotus*, the aquatic endemic species found in Lake Tanganyika. Freshwater crabs with a medium-high carapace (ch/fw 1.1–1.3), or a high carapace (ch/fw 1.31–2.5), tend to be either semi-terrestrial or terrestrial (Cumberlidge 1999), with the increased carapace height reflecting increased branchial chamber size associated with aerial respiration.

This was found to be the case here for the semi-terrestrial tree-hole crab *P. raybouldi* (ch/fw 1.4) (Bayliss 2002; Cumberlidge & Vannini 2004).

DISTRIBUTION PATTERNS OF FRESHWATER CRABS

Figures 173–186 summarize the distribution patterns of the 14 species of *Potamonautes* in Tanzania based on combined distribution data from the present study and from the recent literature (Cumberlidge 1997; 1998; Cumberlidge & Vannini 2004). The species list for the freshwater crabs of Tanzania presented here indicates that this country hosts a distinct freshwater crab fauna that differs significantly from the species lists for neighboring countries such as Kenya, Burundi, D. R. Congo, Zambia, Malawi and Mozambique.

None of the three genera and three families of freshwater crabs found in Tanzania is endemic to that country, but two of these families and genera are regional endemics. For example, the Platythelphusidae is endemic to Lake Tanganyika and the Deckeniidae is endemic to the East African region, and both of these families are endemic to the African continent. In contrast, the cosmopolitan freshwater crab family Potamonautidae is found throughout the African continent but is endemic to Africa and Madagascar.

Only three species out of 25 (12.5%) (*P. infravallatus, P. unisulcatus and P. xiphoidus*), are strictly endemic to Tanzania, but this number rises to 13 out of 25 (52%) if the Lake Tanganyika endemics (the nine species of *Platythelphusa* plus *Potamonautes platynotus*) are included (because the distribution of these species may include one or more of the four countries bordering the lake (Tanzania, D. R. Congo, Burundi and Zambia). Eight species *(Potamonautes gerdalensis, P. pilosus, P. johnstoni, P. platycentron, P. obesus* and *P. raybouldi*, plus *D. imitatrix* and *D. mitis*) are found only in the East African region along the border between Tanzania and Kenya. Four species *(Potamonautes emini, P. suprasulcatus, P. loveridgei and P. lirrangensis)* are found in Tanzania and in the D. R. Congo. Three species *(P. suprasulcatus, P. obesus and P. lirrangensis)* are found in Tanzania and in Malawi, one species (*P. emini*) is found in Tanzania and in Burundi, and one species (*P. obesus*) is found in Tanzania and in Mozambique. There are at present no species of freshwater crabs known to occur in both Tanzania and Zambia (apart from those found in Lake Tanganyika). Finally, only two of the 25 Tanzanian species of freshwater crabs (*P. lirrangensis* and *P. suprasulcatus*) occur outside of the East African region (in the D. R. Congo and Malawi).

In Tanzania, species of *Potamonautes* occur in five of the eleven Global 200 ecoregions identified in that country that share a similar combination of climate, vegetation, geology, altitude and biological communities (Skelton 1993). *Potamonautes emini* is found in the Albertine Rift Montane Forests, *P. obesus, D. mitis* and *D. imitatrix* are found in the East African Coastal Forests, *P. lirrangensis, P. suprasulcatus, P. infravallatus, P. pilosus, P. raybouldi, P. unisulcatus*) are found in the Eastern Arc Mountains, *Platythelphusa spp.* and *P. platynotus* are found in the Rift Valley Lake ecoregion, and *P. loveridgei*

and *P. suprasulcatus* are found in the Southern Rift Montane Forest ecoregion.

Species richness in a number of animal and plant groups in Tanzania is highest in the northern highland areas such as Kilimanjaro, the Usambaras, the Pares and the Ulugurus, and is lowest in the southern highlands (Carcasson 1964). Three species of freshwater crabs (*P. johnstoni*, *P. suprasulcatus* and *P. pilosus*) are found in the rivers that drain the montane forests on the Tanzanian side of Mt. Kilimanjaro, while Lake Chala (a crater lake on the slopes of this mountain) is home to both *P. johnstoni* and *P. platycentron*, the latter of which is endemic to this lake. The rivers of the East and West Usambara Mountains and the Uluguru Mountains support *P. suprasulcatus*, *P. johnstoni*, *P. infravallatus*, *P. xiphoidus* and *P. unisulcatus*, while *P. raybouldi* is found in tree holes in the montane forests (Bayliss 2002; Cumberlidge & Vannini 2004). Further to the south, *P. loveridgei* is found on the slopes of the Rungwe Mountains (Rathbun 1933). In the coastal forests of Tanzania, the high levels of endemism that have been reported in other plant and animal groups (Burgess *et al.* 1992) are not seen in the freshwater crabs, where three cosmopolitan East African species (*P. obesus*, *D. mitis* and *D. imitatrix*) are found (Williams *et al*. 1964; Ng *et al*. 1995; Marijnissen et al. 2005).

The savanna grasslands represent a large proportion of the vegetation in Tanzania but their low annual rainfall (less than 76 cm of rain a year) supports only a few perennial rivers (Williams *et al*. 1964) and this lack of permanent freshwater habitat limits the distribution of most species of freshwater crabs. Nevertheless, the dry Serengeti grasslands in the Mara Province of northwest Tanzania support three species of freshwater crabs, *P. suprasulcatus, P. gerdalensis* and *D. mitis*.

The three great lakes found in Tanzania (Lake Victoria, Lake Tanganyika and Lake Malawi) all support species of *Potamonautes* (*P. niloticus, P. platynotus* and *P. lirrangensis* respectively). Only *P. platynotus* is endemic to its lake, while *P. niloticus* and *P. lirrangensis* are both widespread cosmopolitan species. In Tanzania, several species of freshwater crabs have been reported to occur in the rivers draining into the southern and southeastern shorelines of Lake Victoria, including *P. emini*, *P. johnstoni*, *P. gerdalensis* and *P. suprasulcatus*. The fauna and flora of Lake Tanganyika have experienced a long period of isolation (at least 6 million years) and as a result, endemic species in the lake now outnumber nonendemic species (Michel *et al.* 1992). For example, Lake Tanganyika is the oldest and the deepest of the three great lakes found in Tanzania and is unique because it supports an endemic genus and family of freshwater crabs (*Platythelphusa* in the Platythelphusidae with nine endemic species) and an endemic species of *Potamonautes* (*P. platynotus*) (Cumberlidge *et al.* 1999; Marijnissen *et al*. 2004). In addition, several species of *Potamonautes* (including *P. emini*, *P. lirrangensis, P. loveridgei and P. suprasulcatus*) are associated with Lake Tanganyika or its surrounding rivers (Coulter 1991; Cumberlidge & Sternberg 1999). *Potamonautes lirrangensis* is found in the Malagarasi River flowing into the lake, while *P. loveridgei* and *P. suprasulcatus* are found in the Luiche and Mwerasi Rivers which both flow into Lake Tanganyika.

Lake Nyasa (Lake Malawi) has a shoreline that forms part of the southwestern border

of Tanzania, and despite being the second largest of the rift valley lakes it does not support any endemic species of freshwater crabs. The commonest species of freshwater crab in Lake Malawi is *P. lirrangensis*, while *P. suprasulcatus* occurs in the Kipoke and Kiwira Rivers that drain into this lake. *Potamonautes lirrangensis* is also found in the rivers that flow into this lake, while *P. obesus* and *D. mitis* have been found in swamps close to the shores of the lake.

On the basis of current information and levels of exploration in Tanzania, we recognize two localized areas that are characterized by the overlapping distributions of endemic taxa each with a narrow range. The areas where these overlaps occur represent centers of endemism (biodiversity hotspots) for freshwater crabs in Tanzania. The two centers identified here are the northeastern highland ecoregion between Kilimanjaro and the Eastern Arc mountains (for *P. platycentron, P. infravallatus, P. unisulcatus* and *P. xiphoidus*) and Lake Tanganyika (for the nine species of *Platythelphusa* plus *Potamonautes platynotus*). It is important to note that the present assessment of freshwater crab biodiversity in Tanzania is likely to be an underestimate, because the absence of records for freshwater crabs in many parts of Tanzania may be the result of uneven collecting efforts (so far most have been in Kilimanjaro and the Eastern Arc mountains, the Coastal Forests, the Rift Valleys and Lake Tanganyika), and there are only sporadic records from many other parts of the country, that remain largely unsurveyed. Therefore it cannot be discounted that some of the distributional patterns observed in this work may be an artifact of uneven collecting throughout Tanzania.

The long spans of time between works dealing with the Tanzanian freshwater crab fauna (Hilgendorf 1898; Rathbun 1933; Bott 1955) reflect the relative neglect of this group in that country. This is unfortunate because the freshwater crabs of Tanzania have a complicated taxonomic history, and we are only now beginning to understand their true diversity. The steady increase in the number of taxa over the years is due in part to greater taxonomic discrimination, and in part to recent collection efforts, and underlines the importance of the need to collect in the more remote regions of the country. Tanzania is home to some eleven taxa whose conservation status warrants their inclusion in the IUCN Red List (IUCN 2004) as either near threatened, vulnerable or endangered (Table 4). Although great advances have been made in our knowledge of Tanzanian freshwater crabs in general, our present state of knowledge of the distribution of freshwater crabs in Tanzania makes it difficult to draw firm conclusions about the meaning of the absence of records for the large areas of the country that have not yet been surveyed, especially the more inaccessible places that lie well away from population centers and roads.

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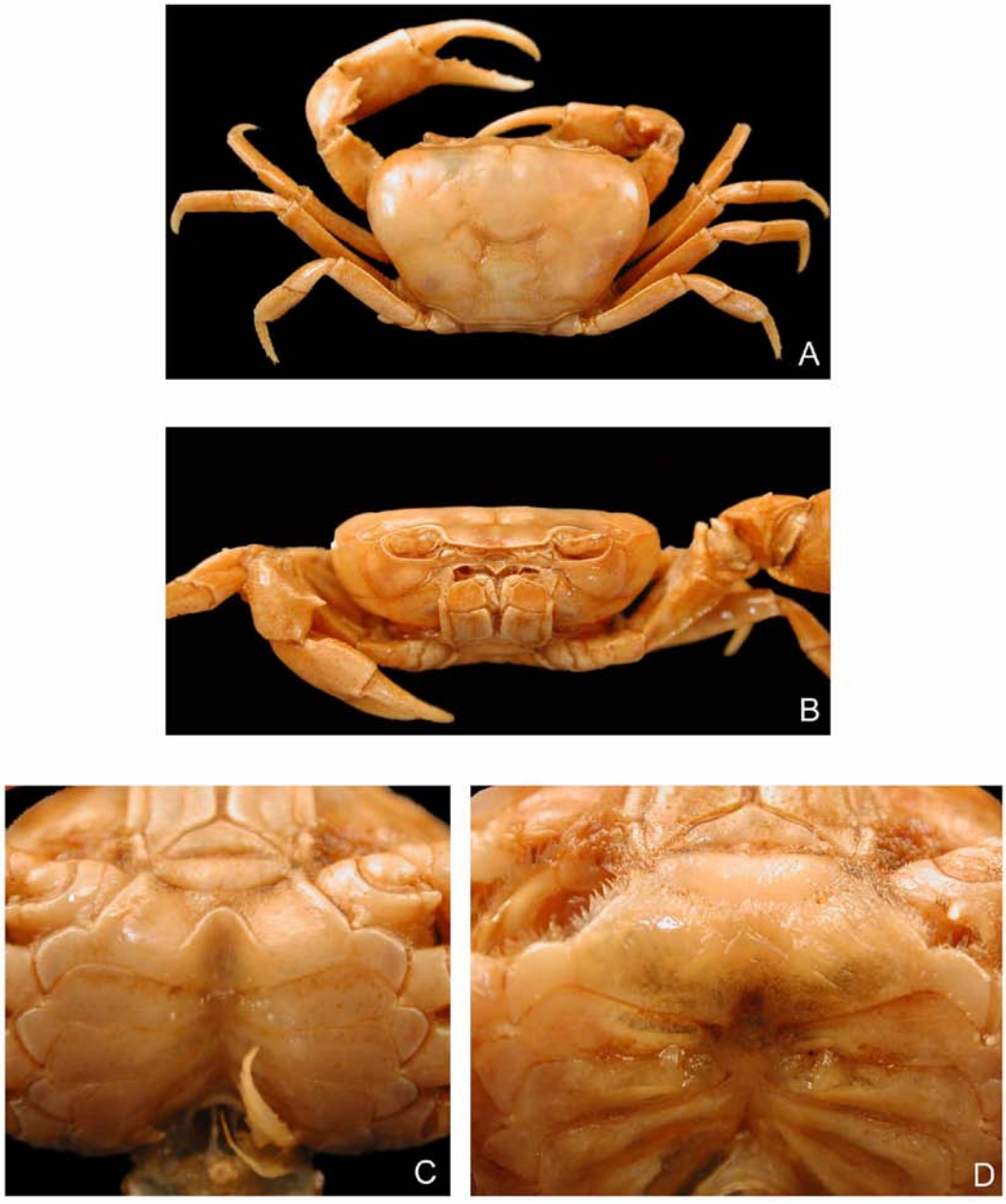


PLATE I. *Potamonautes emini* (Hilgendorf, 1892), (NMU TRW1966.16) from the Upper Waki River, Nyantonzi area, Bunyaro District, Tanzania, A-C = adult male (cw 25.9 mm), D = adult female (cw 27 mm). A, dorsal view; B, frontal view; C, ventral view of male sternum; D, ventral view of female sternum.

PLATE II. *Potamonautes gerdalensis* Bott, 1955, (NMU TRW1960.05), A-C = adult male (cw 36.3, cl 24.2, ch 10.8, fw 10.5 mm), D = subadult female (cw 34 mm), from the upper reaches of the Kitare River (0°41'S, 34°46'E), Kisii, Nyanza Province, Kenya. A, dorsal view; B, frontal view; C, ventral view of male sternum; D, ventral view of female sternum.

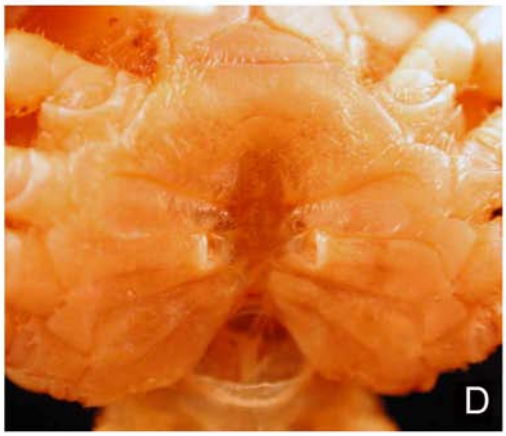


PLATE III. *Potamonautes infravallatus* from Tanzania. A-C = adult male, D = adult female. A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

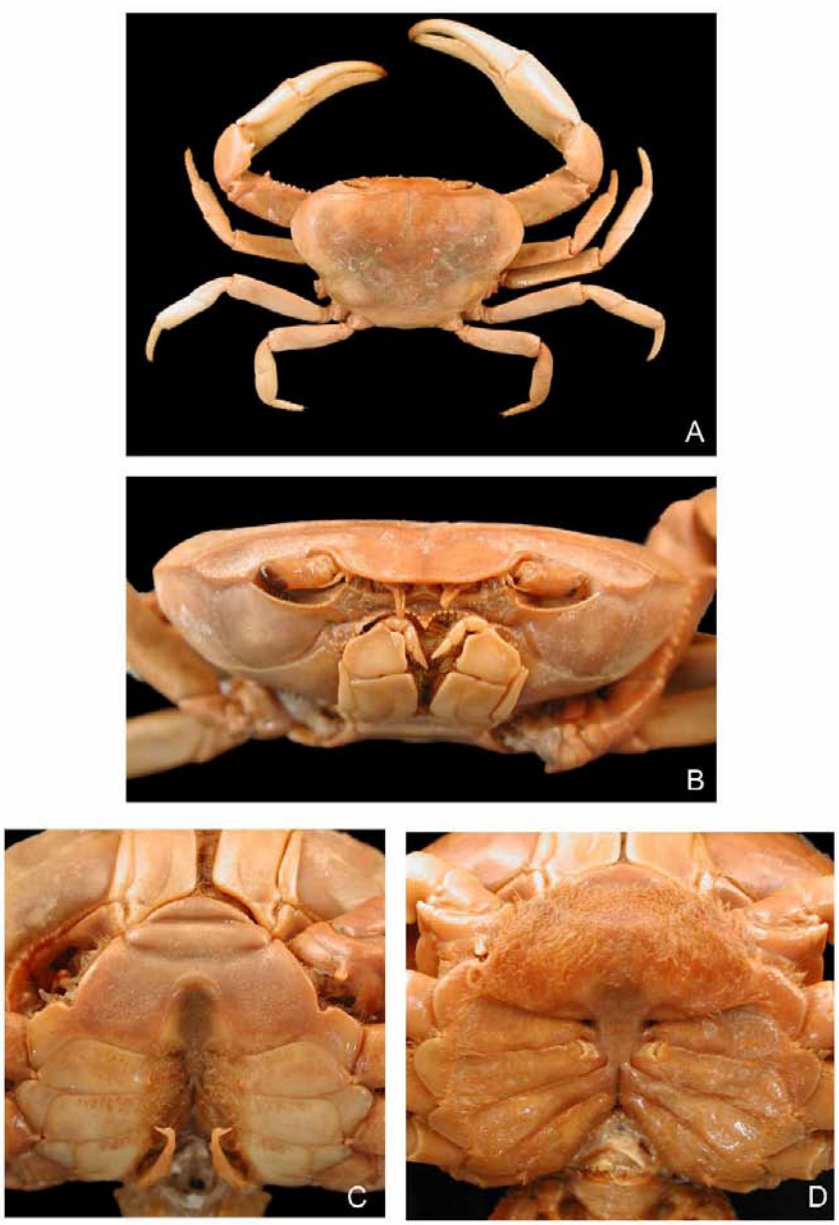


PLATE IV. *Potamonautes johnstoni* (Miers, 1885), (NMU TRW1971.11) from a canal near Taveta, Kenya, A-C = adult male (cw 65.6 mm), D = adult female (cw 69.4 mm). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

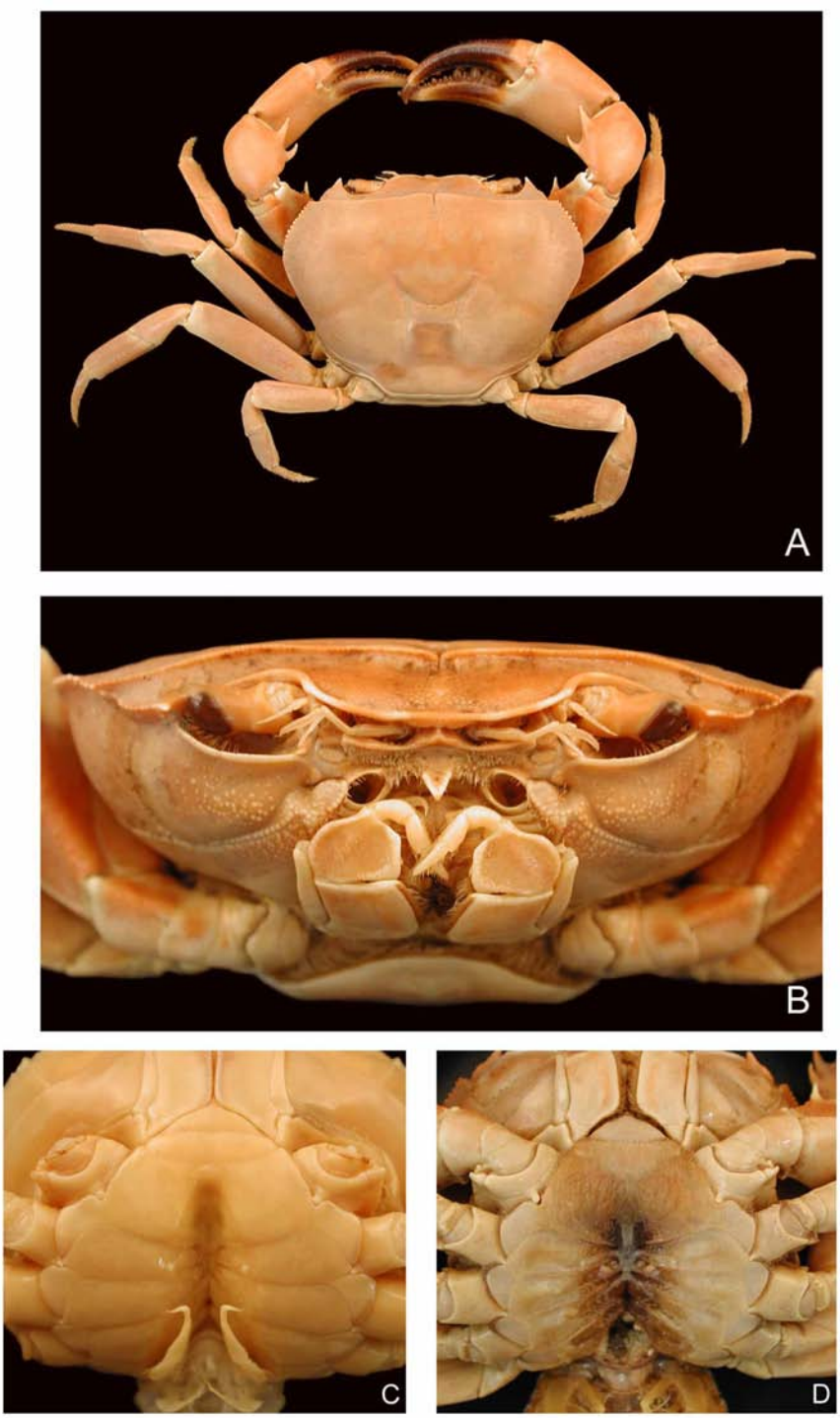


PLATE V. *Potamonautes lirrangensis* (Rathbun, 1904), (NMU TRW1971.15), A-B, D = adult female (cw 80.7 mm), C = adult male (cw 56.6 mm). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

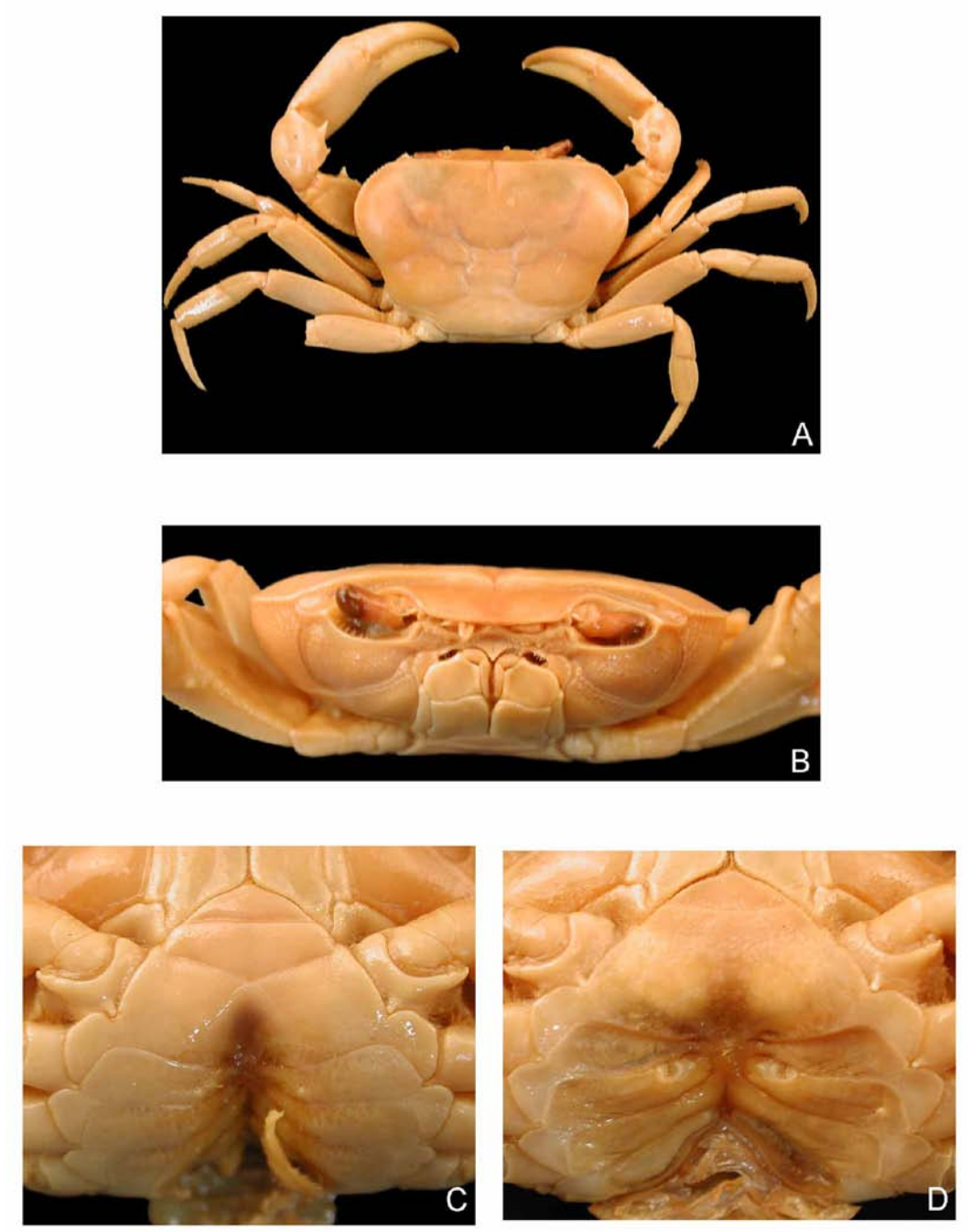


PLATE VI. *Potamonautes loveridgei* (Rathbun, 1933), (NMU TRW1971.07) from small stream 32 km from Kigoma road to Kasulu, A-C = adult male (cw 43.5 mm), D = adult female (cw 52.4 mm). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

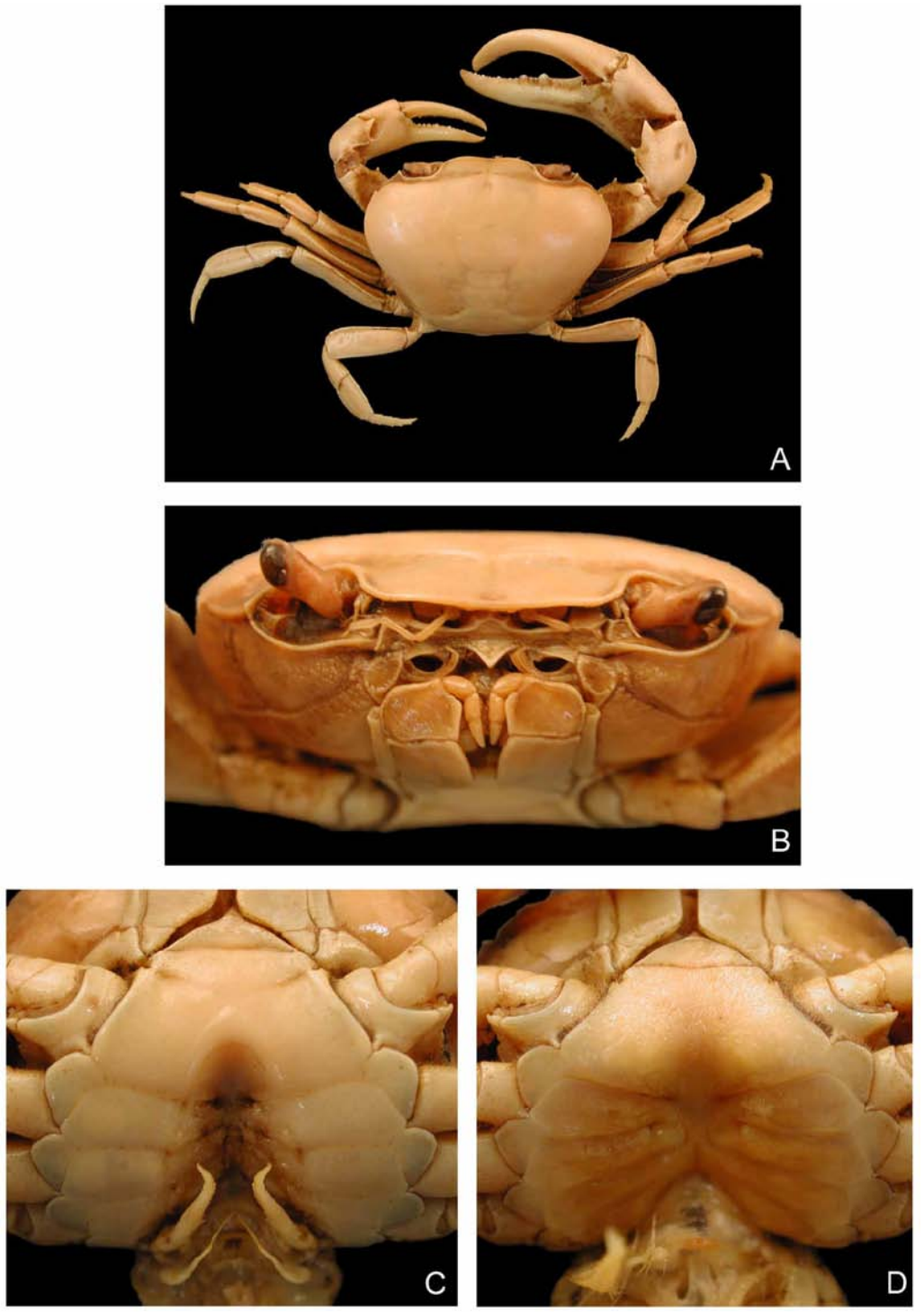


PLATE VII. *Potamonautes obesus* (A. Milne-Edwards, 1868), (NMU TRW1968.06) from Mlali, near Morogoro, Uluguru Mountains, Tanzania, A-C = adult male, form II (cw 49.1 mm), D = adult female (cw 41.3). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

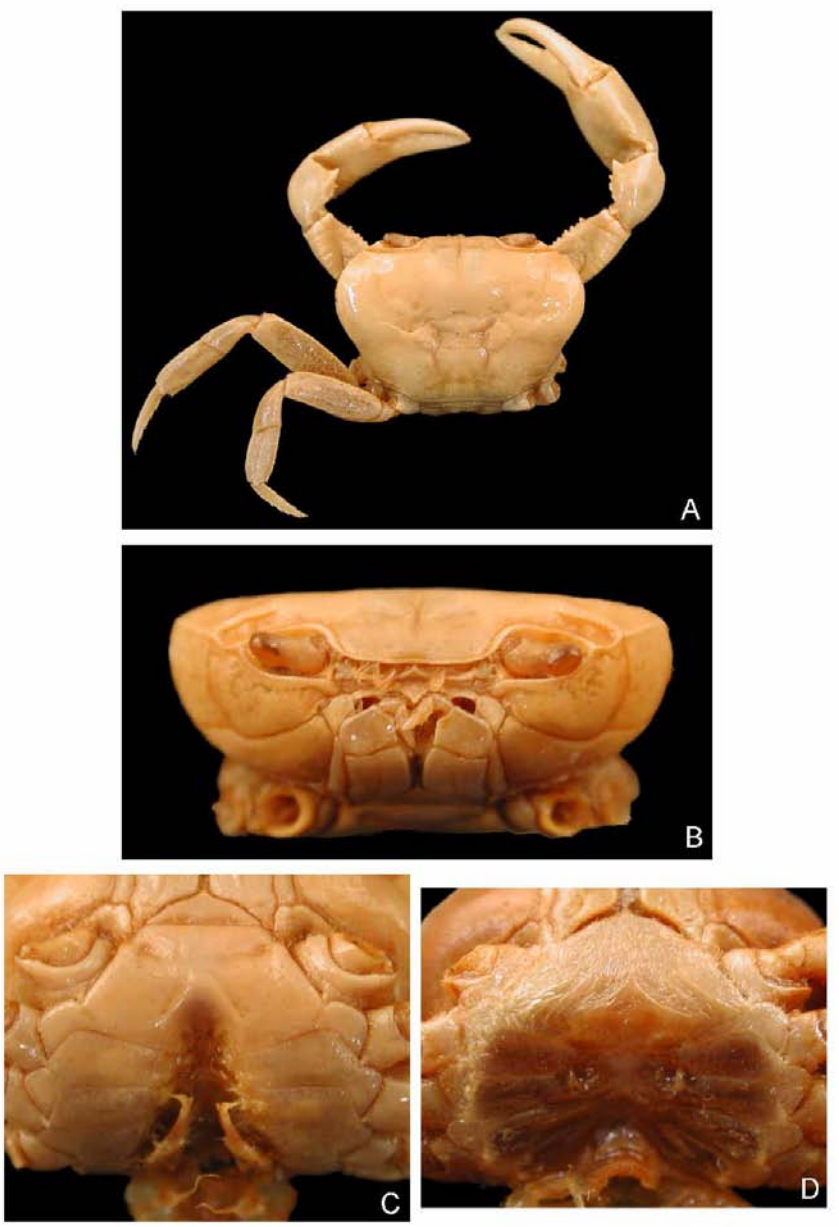


PLATE VIII. *Potamonautes pilosus* (Hilgendorf, 1898), from Ruirualza River, Limuru, Aberdare Mountains, Kenya, A-C = adult male (cw 25.5 mm), D = adult female (cw 24.7 mm). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

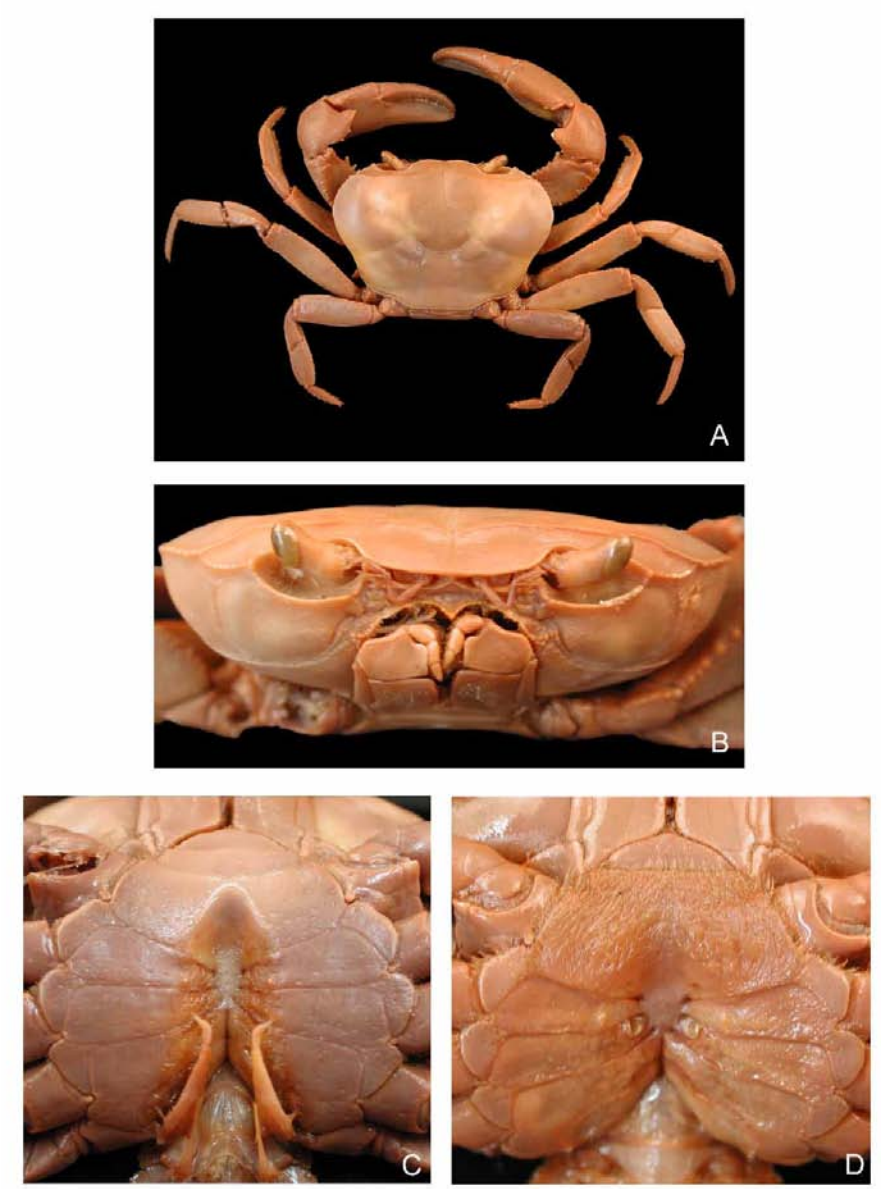


PLATE IX. *Potamonautes platycentron* (Hilgendorf, 1897), (NMU TRW1991.12) from Lake Chala, Kenya, A-C = adult male (cw 50.8 mm), D = adult female (cw 52.5 mm). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

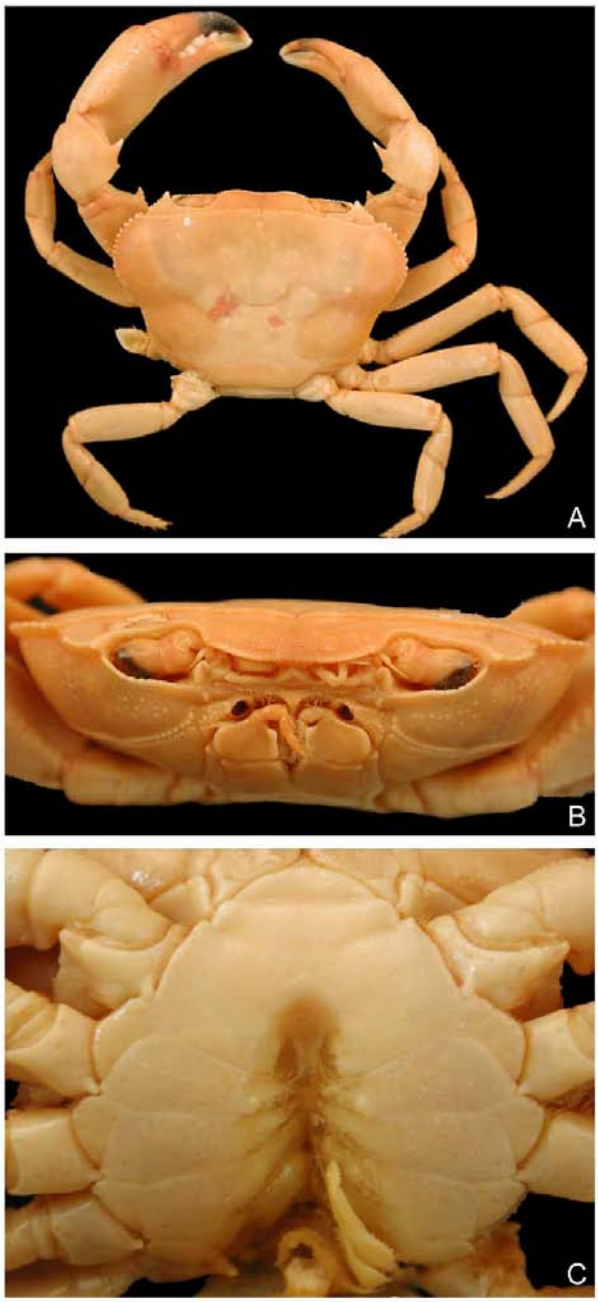


PLATE X. *Potamonautes platynotus* (Cunnington, 1907), (NMU TRW1971.08) from Lake Tanganyika, Kigoma, Tanzania, A-C = adult male (cw 39.1 mm) A, dorsal view; B, frontal view; C, ventral view of sternum.

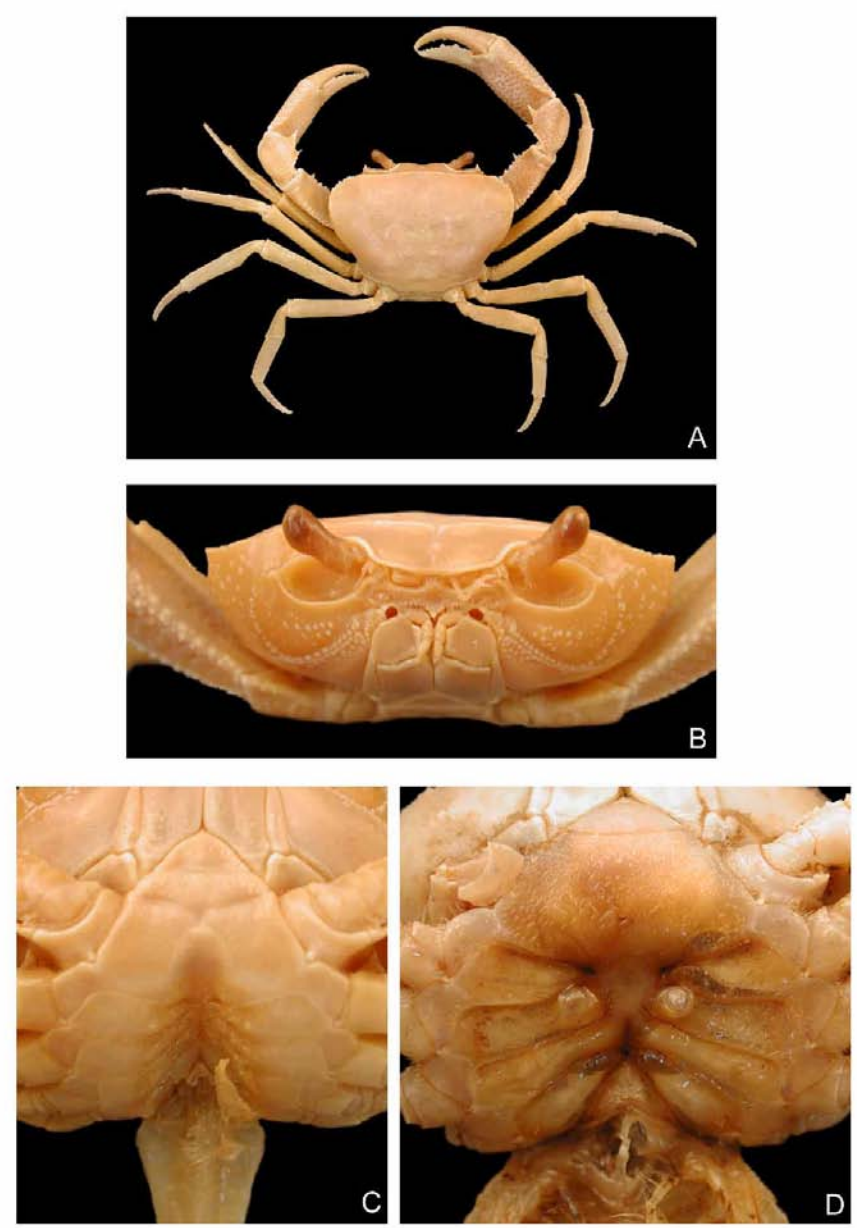


PLATE XI. *Potamonautes raybouldi* Cumberlidge & Vannini 2004, A-C = adult male (cw 51.5 mm) (NMU TRW1970.8.B.1) from Amani, East Usambara Mountains. A, dorsal view; B, frontal view; C, ventral view of sternum. Adult female (cw 39.3 mm) (NMU TRW01.12.1984.C.1) from Shimba Hills National Park, Kwala District, Kenya. D, ventral view of sternum.

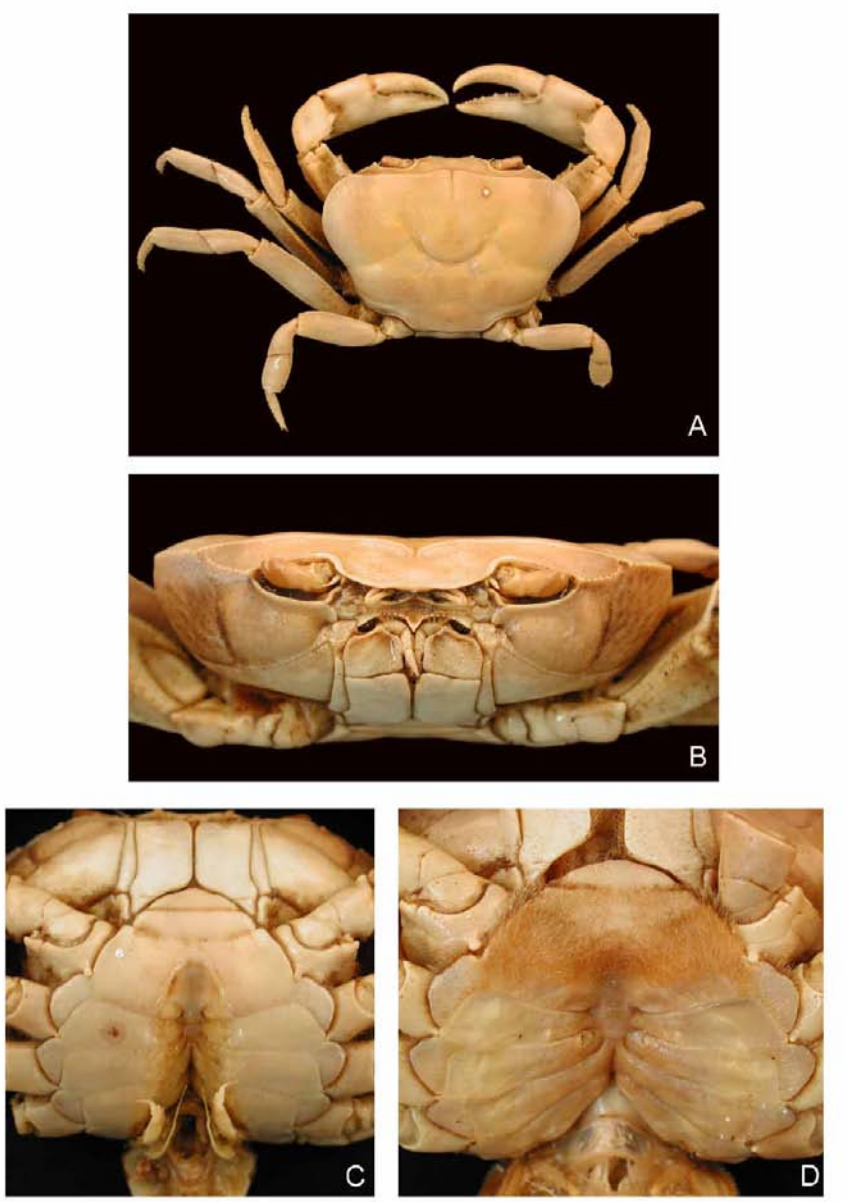


PLATE XII. *Potamonautes suprasulcatus* (Hilgendorf, 1898), A-C = adult male (cw 64.1 mm) (NMU TRW1971.10). A, dorsal view; B, frontal view; C, ventral view of sternum. D = adult female (cw 75.1) (NMU TRW1967.14). D, ventral view of sternum.

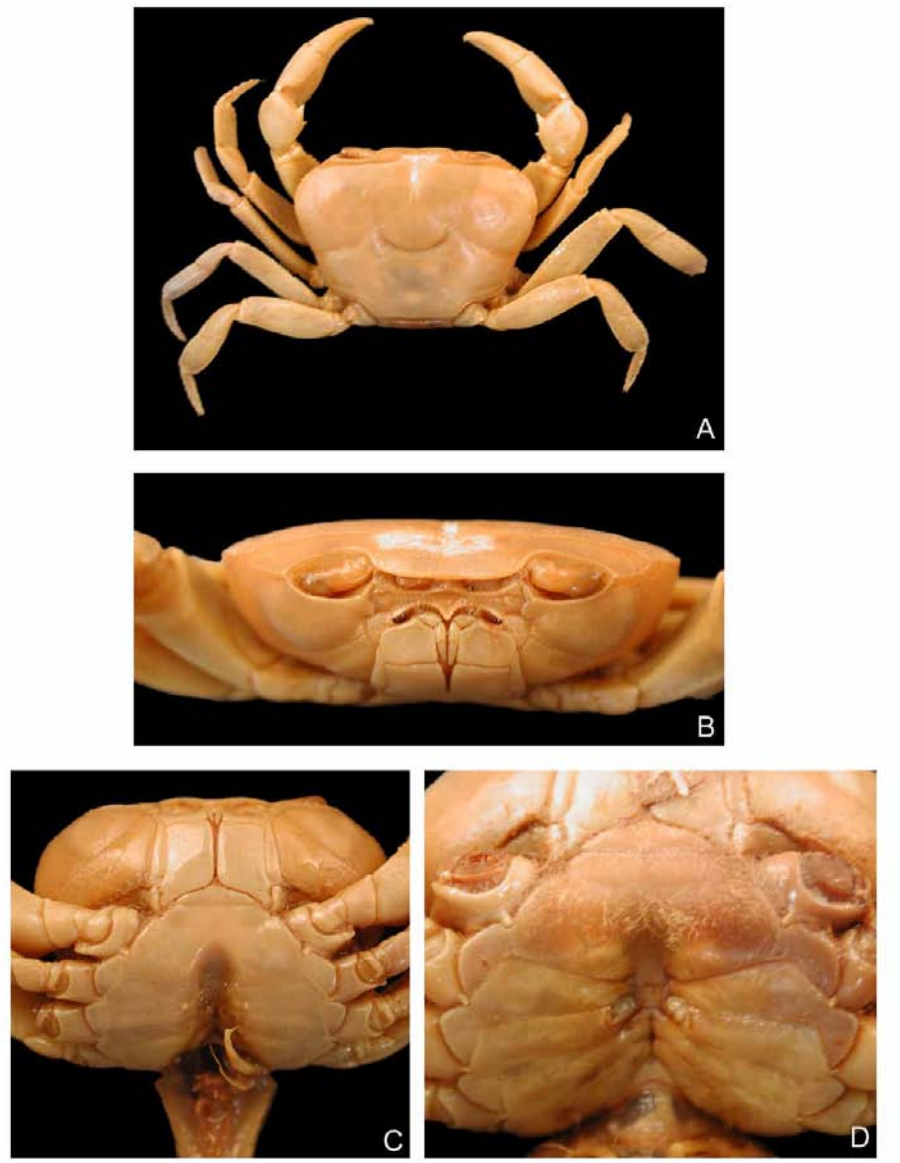


PLATE XIII. *Potamonautes unisulcatus* (Rathbun, 1933), (NMU EA62.45) from the Kitange-Tange River, Bunduki, Uluguru Mountains, Tanzania. A-C = adult male (cw 31.5 mm), D = adult female (cw 41.4 mm). A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

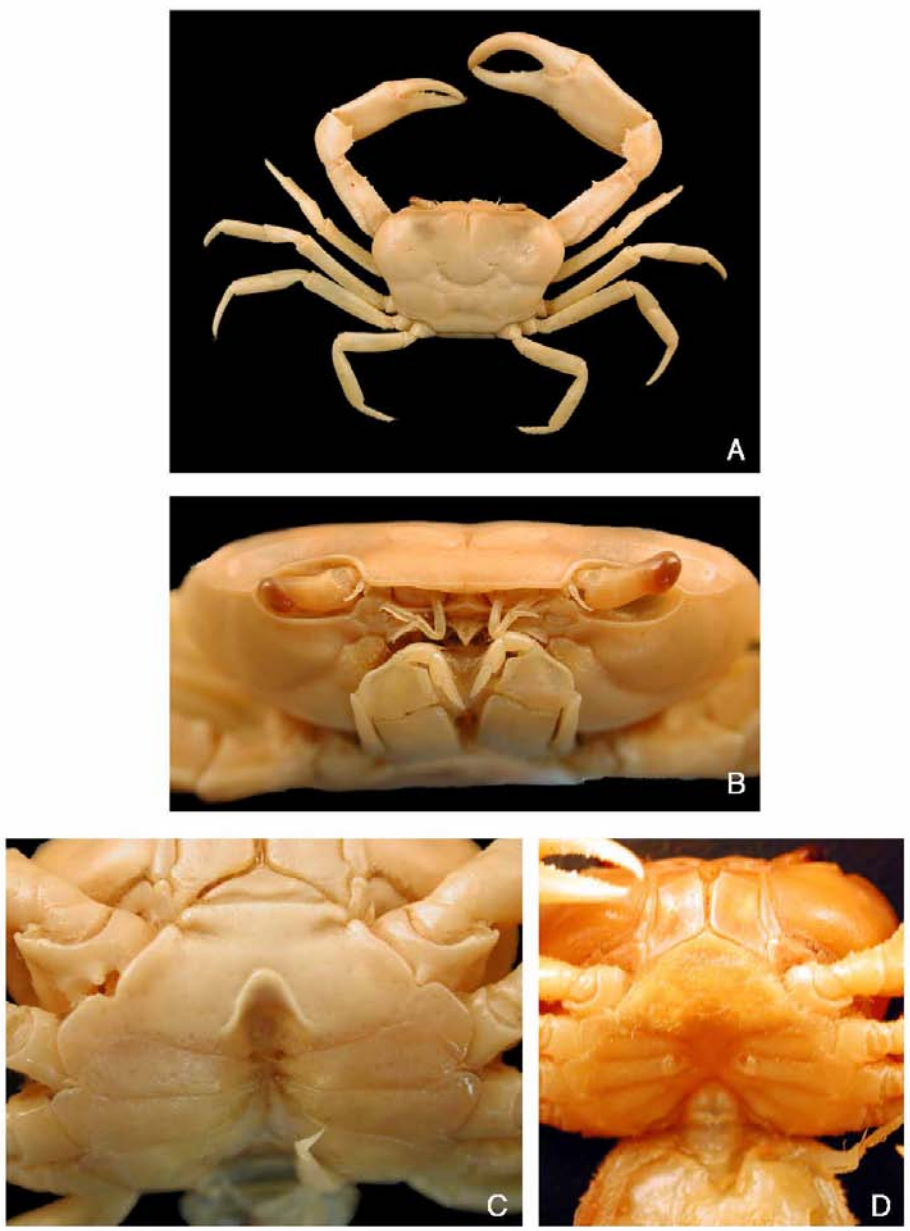


PLATE XIV. *Potamonautes xiphoidus* **n. sp.,** adult male holotype (cw 38.3, cl 26.1, ch 15.6, fw 11.4 mm) (NMU TRW1966.06b), West Usambara Mountains, Tanzania. A, dorsal view; B, ventral view of sternum.

PLATE XV. *Deckenia imitatrix*, from Kenya. A-C = adult male, D = adult female. A, dorsal view; B, frontal view; C, ventral view of sternum; D, ventral view of sternum.

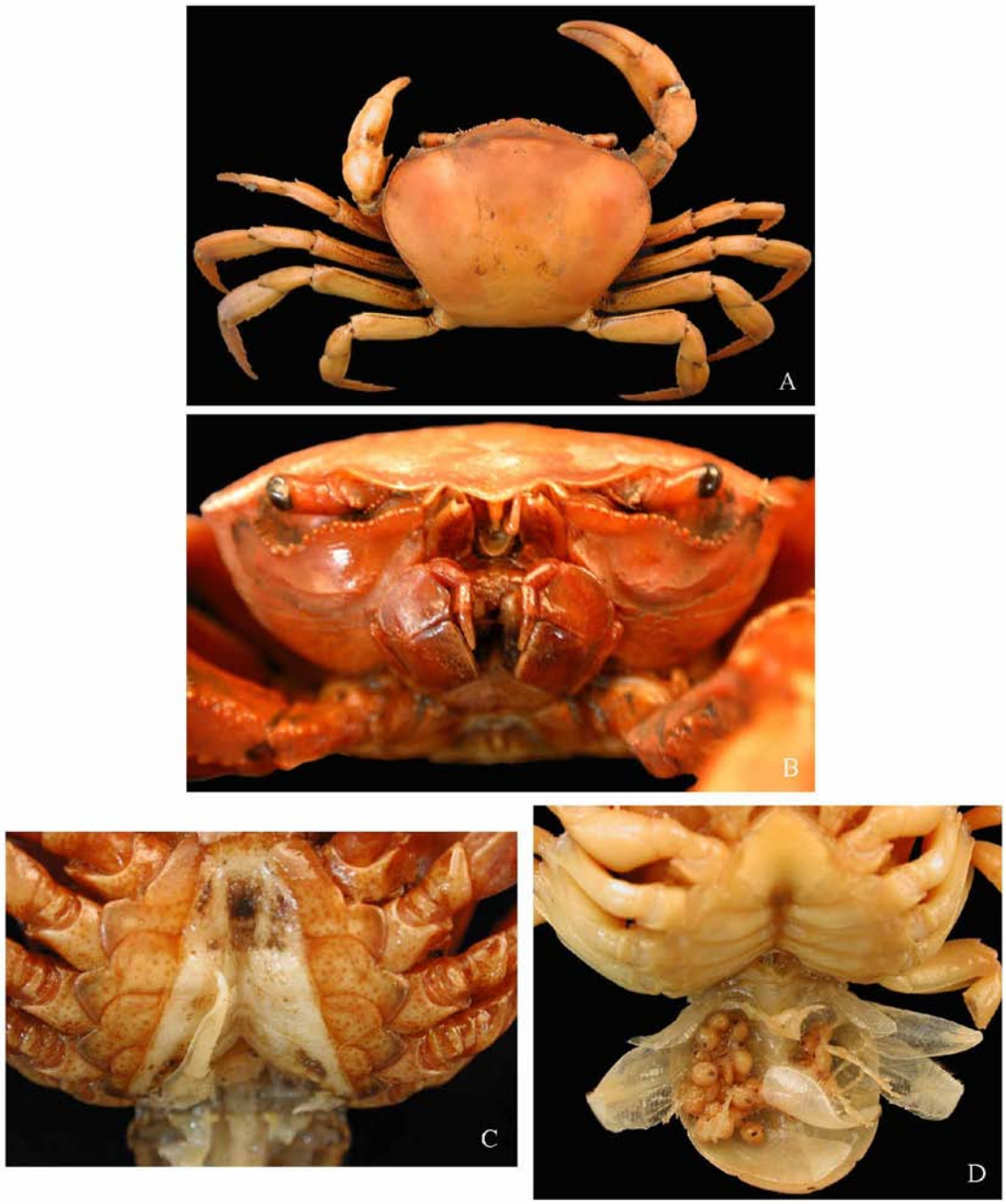


PLATE XVI. *Deckenia mitis*, West Usambara Mountains, Tanzania. A-C = adult male, D = adult female. A, dorsal view; B, frontal view; C, ventral view of sternum with abdomen pulled back; D, ventral view of sternum with abdomen in resting position.

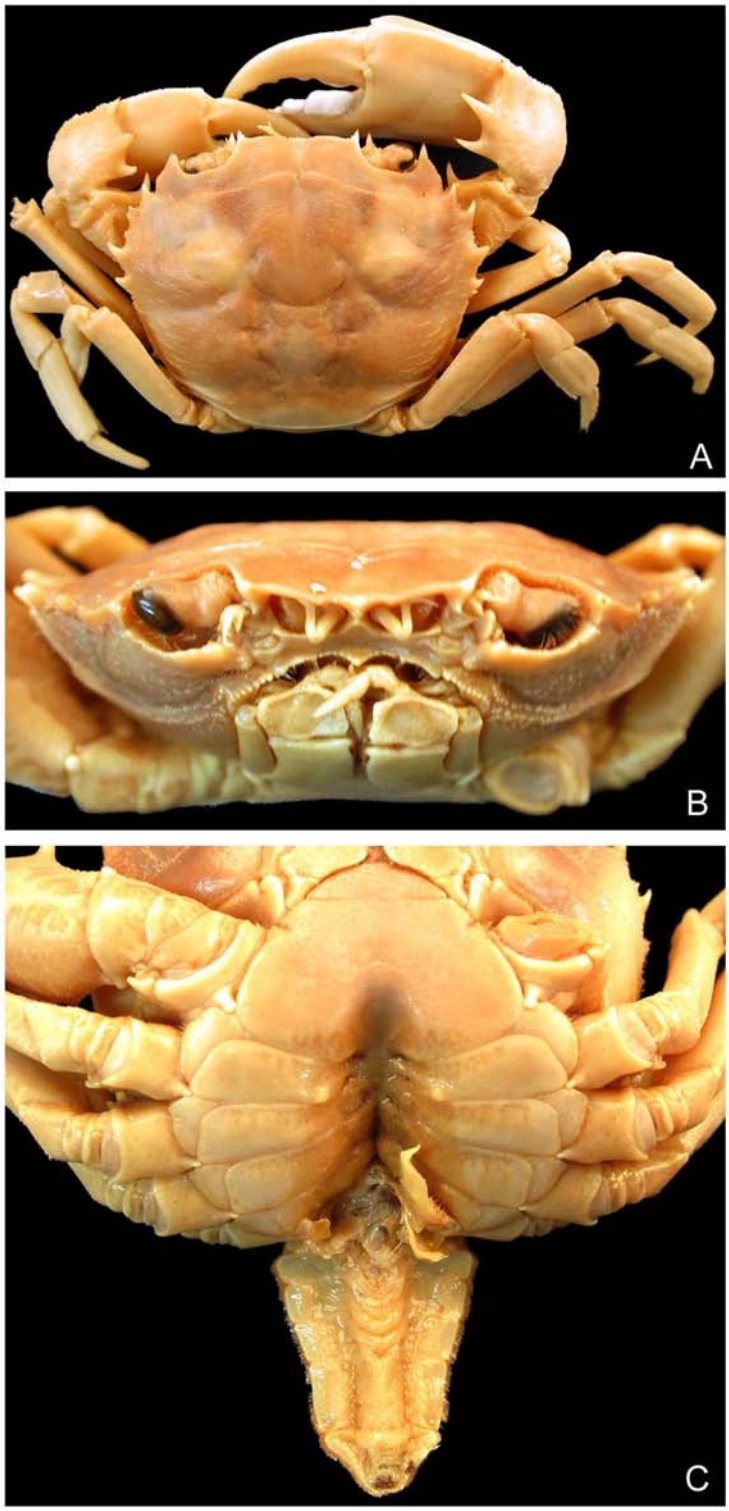


PLATE XVII. *Platythelphusa armata* (NMU TRW) from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view of sternu

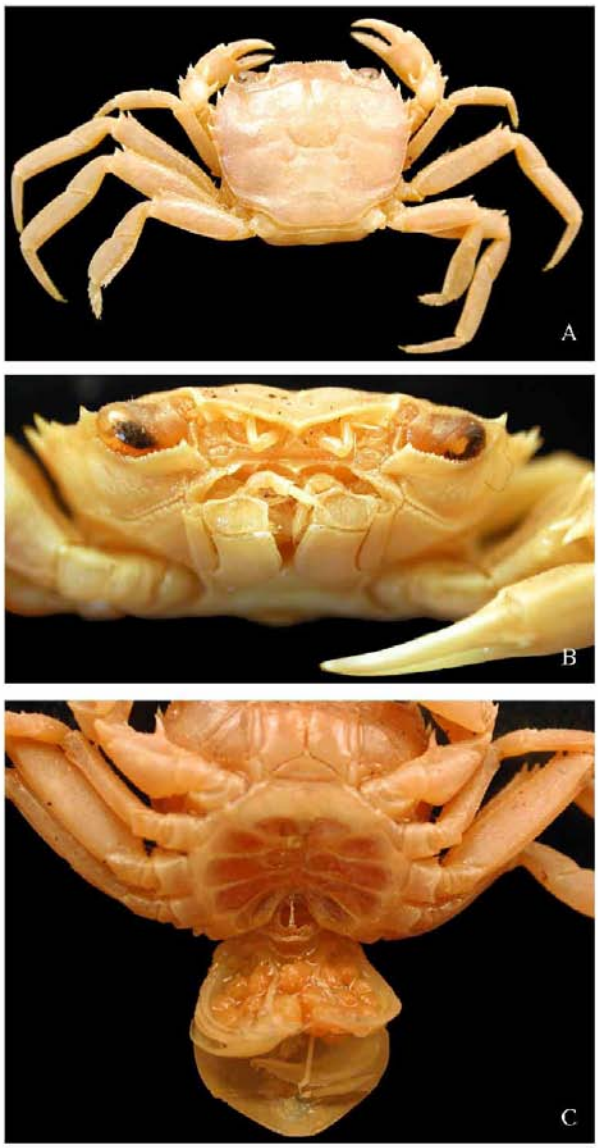


PLATE XVIII. *Platythelphusa conculcata (*CAW 62A) from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view of sternum.

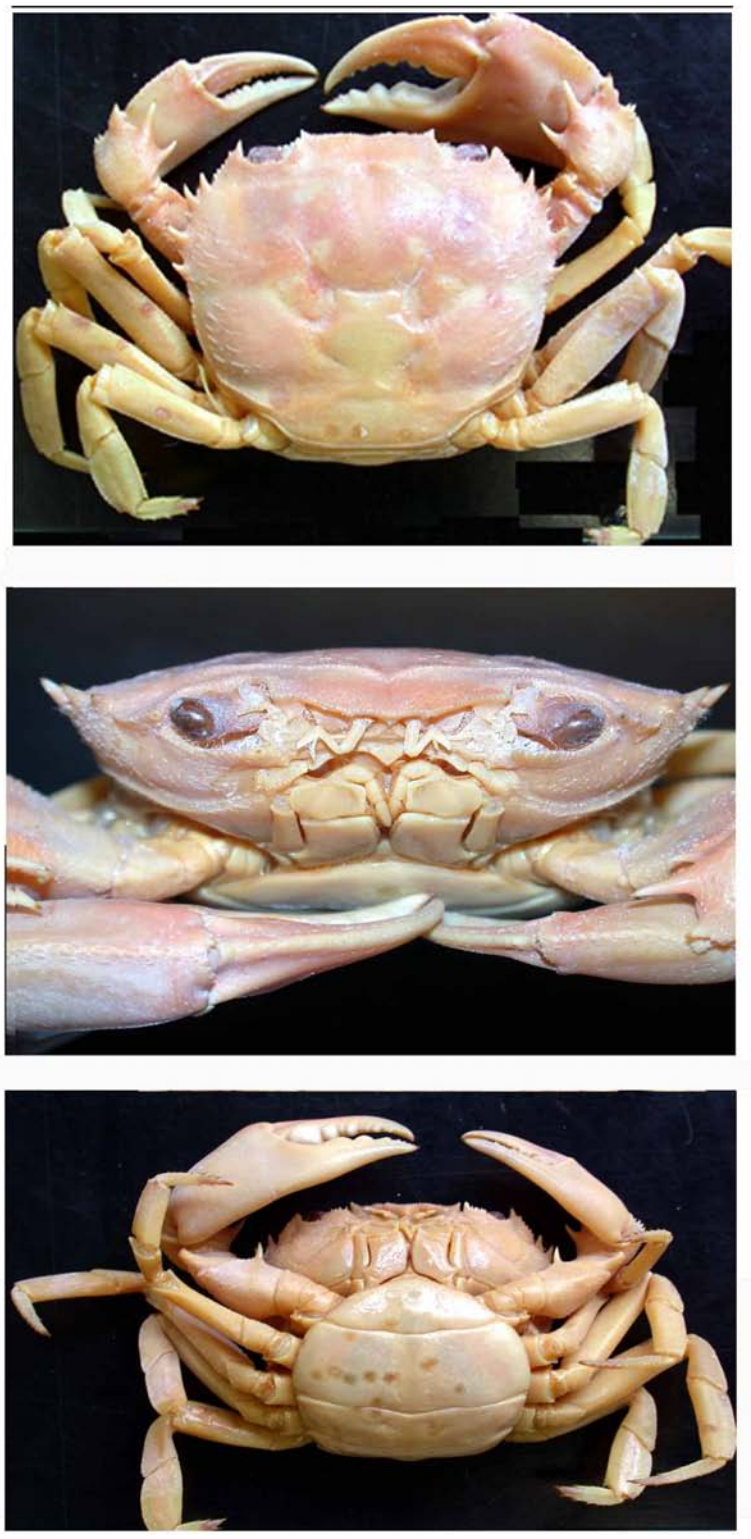


PLATE XIX. *Platythelphusa denticulata* from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view.

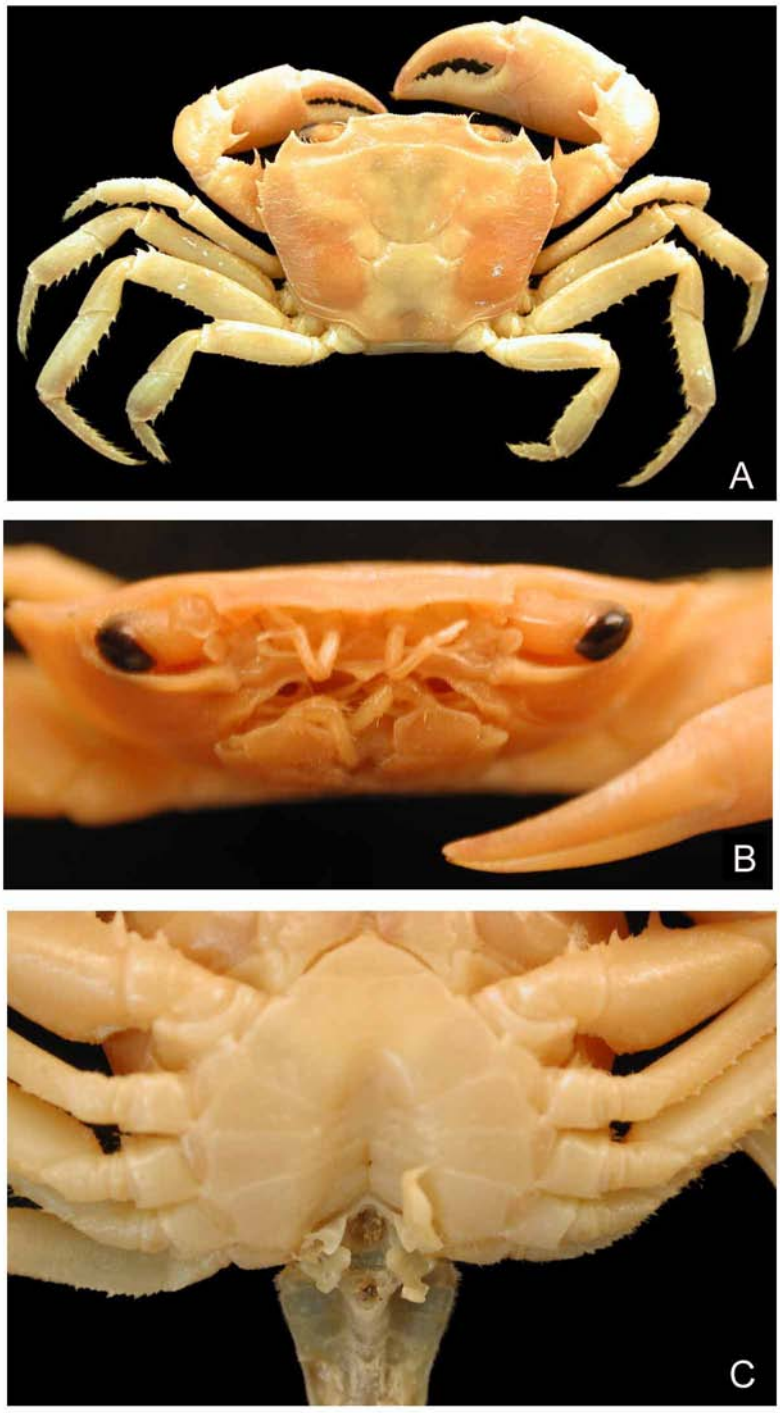


PLATE XX. *Platythelphusa echinata* (CAW 11A) from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view of sternum.

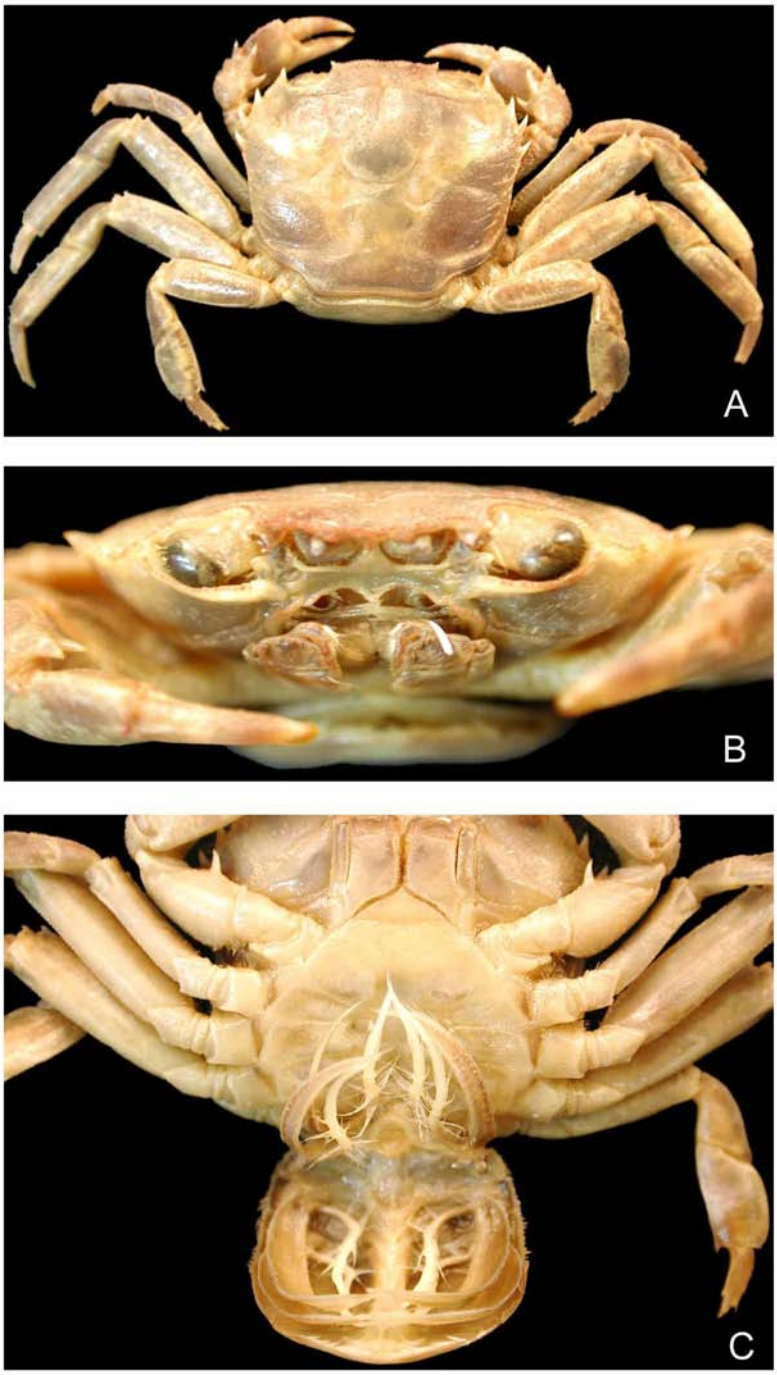


PLATE XXI. *Platythelphusa immaculata* (ZMA) from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view of sternum.

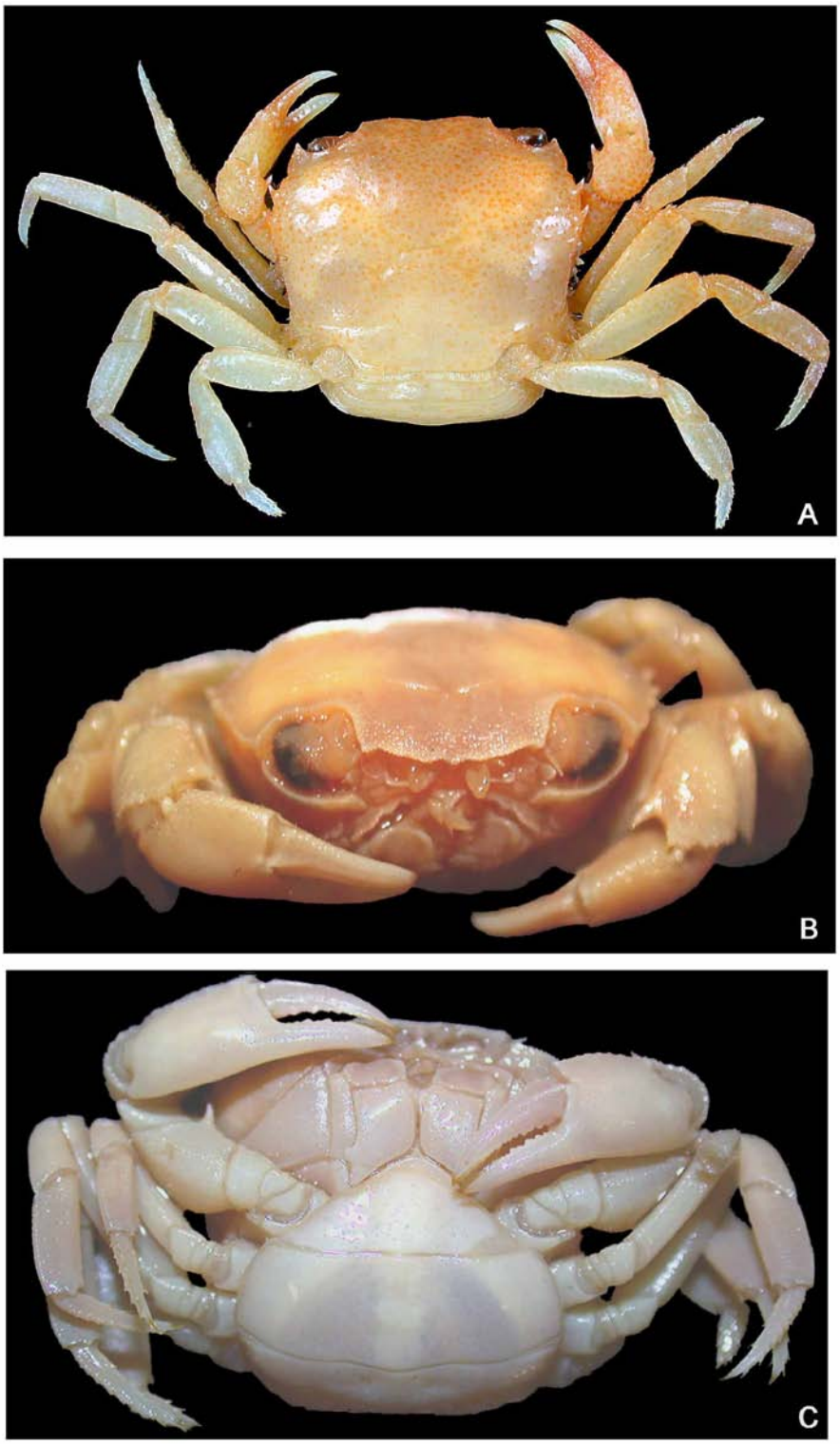


PLATE XXII. *Platythelphusa maculata* (CAW 11) from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view of sternum.

PLATE XXIII. *Platythelphusa polita* (CAW 88) from Lake Tanganyika, Tanzania. A, dorsal view; B, frontal view; C, ventral view of sternum.

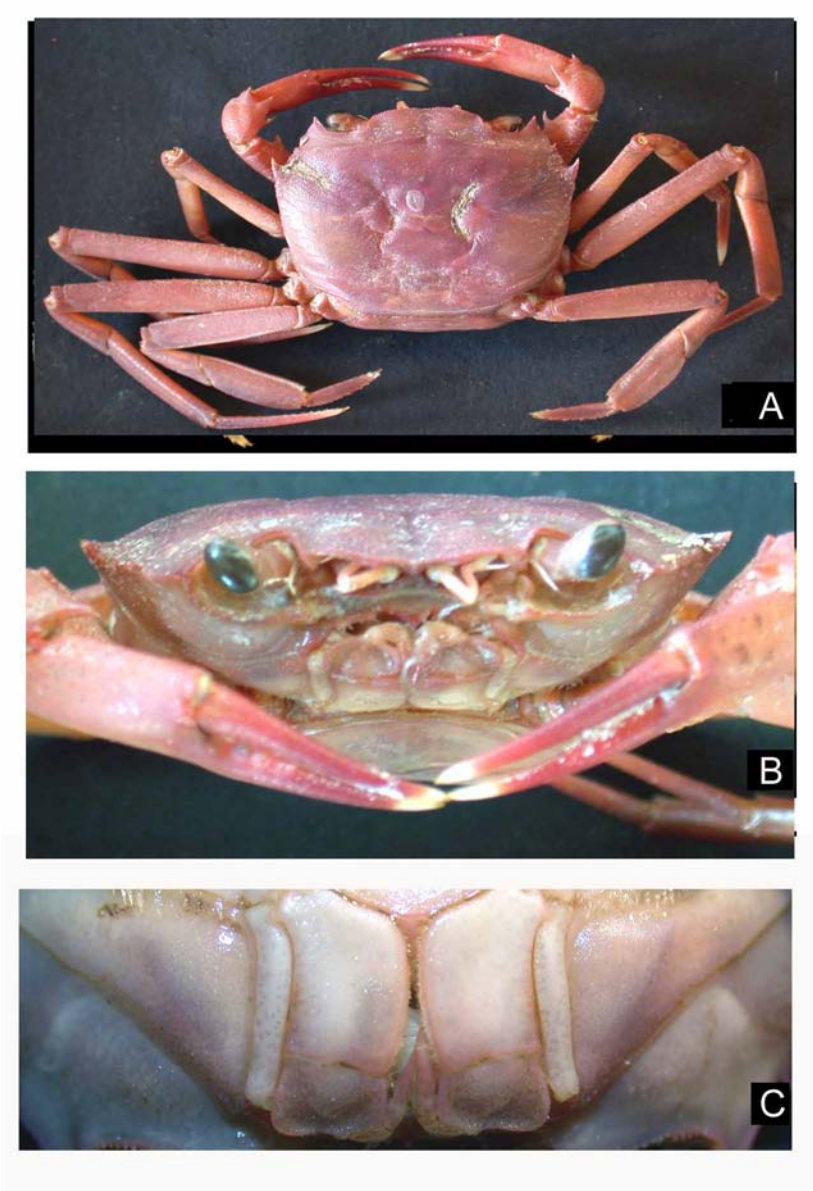


PLATE XXIV. *Platythelphusa praelongata* (ZMA) from Lake Tanganyika, Zambia. A, dorsal view; B, frontal view.

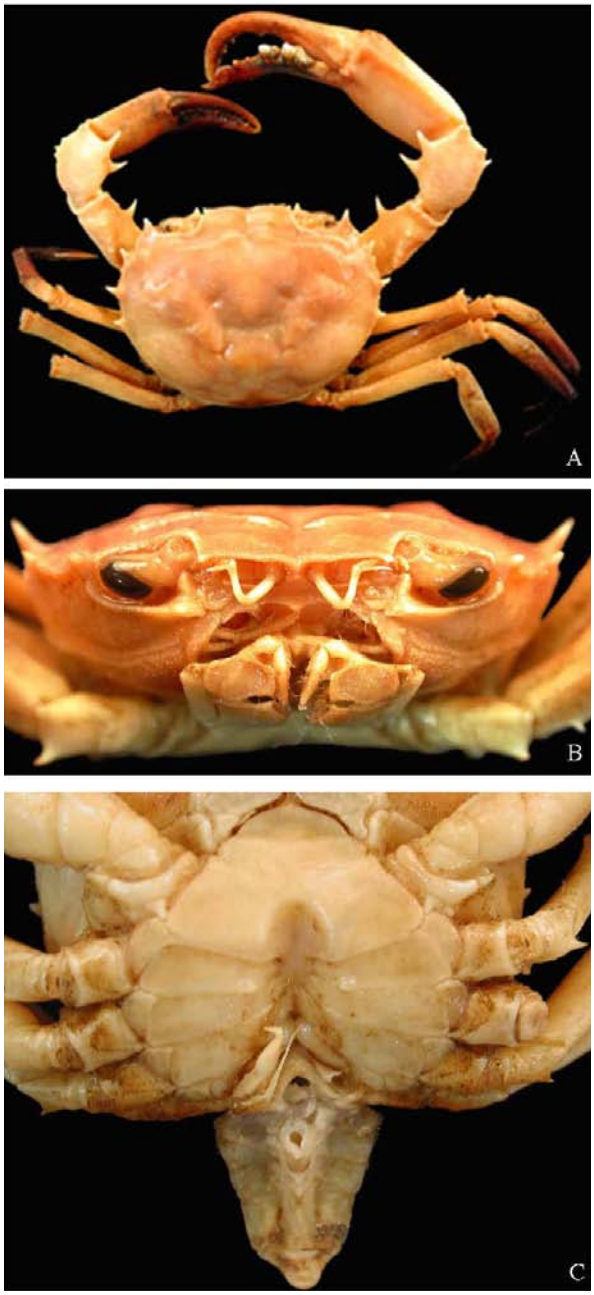
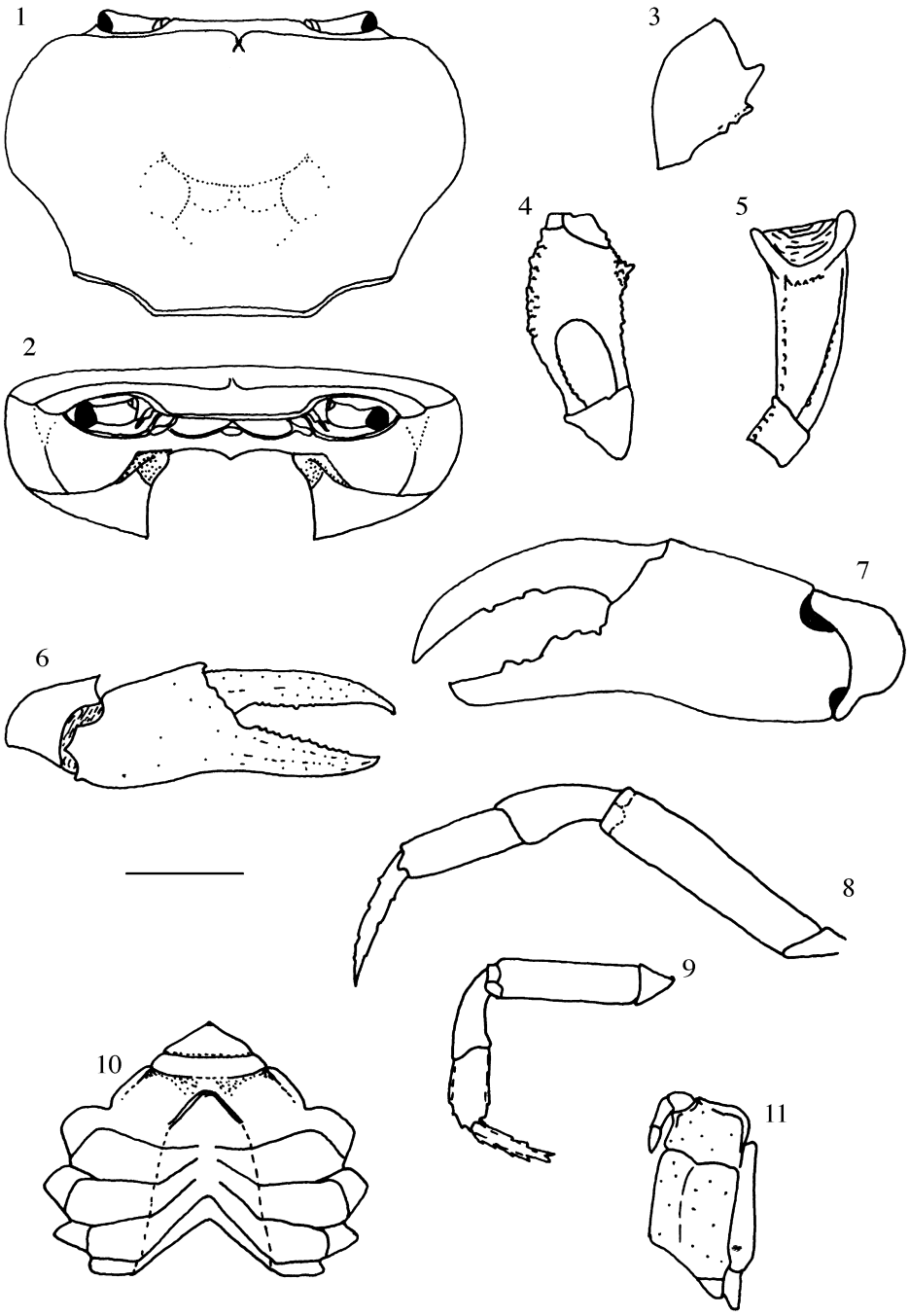
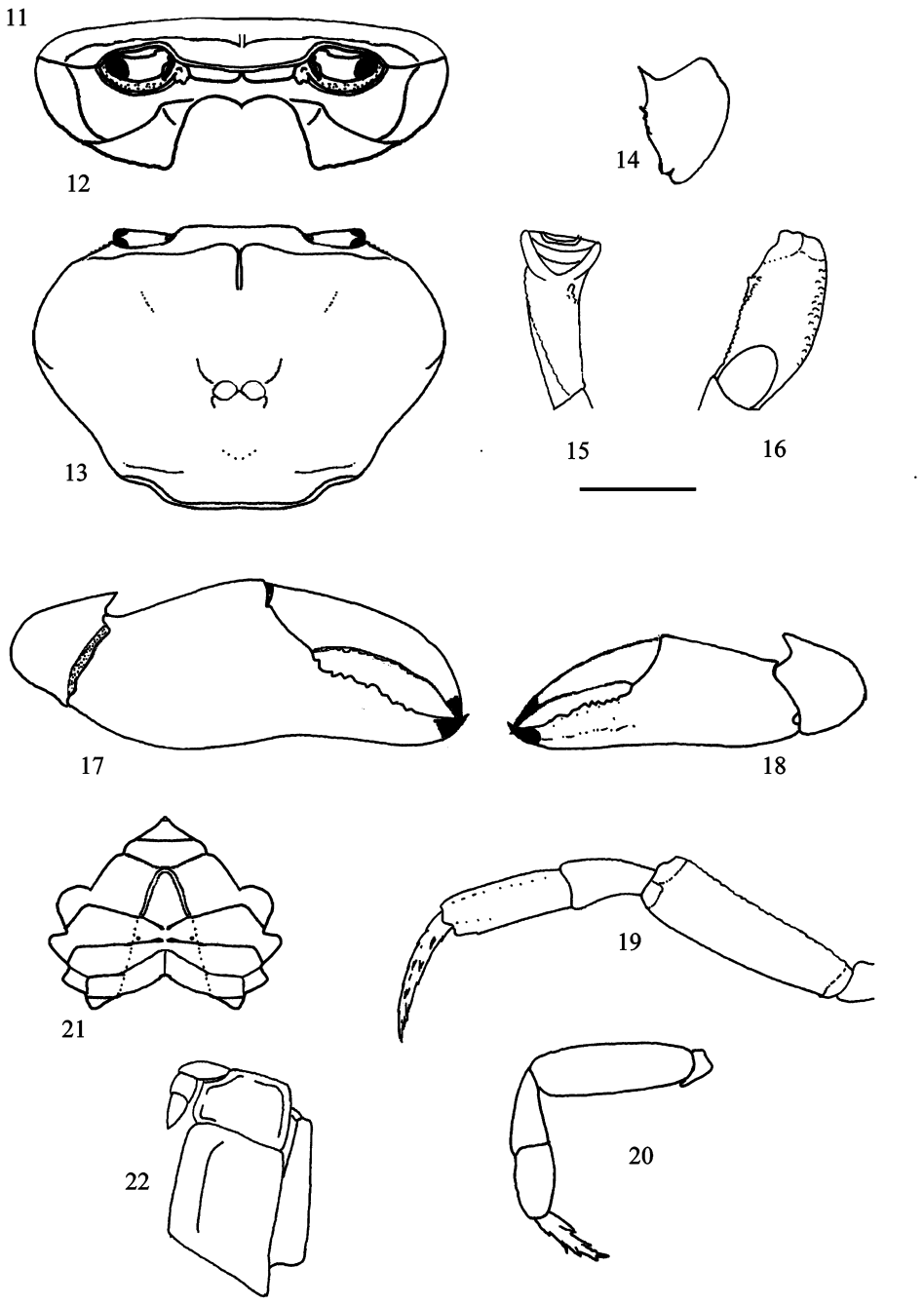


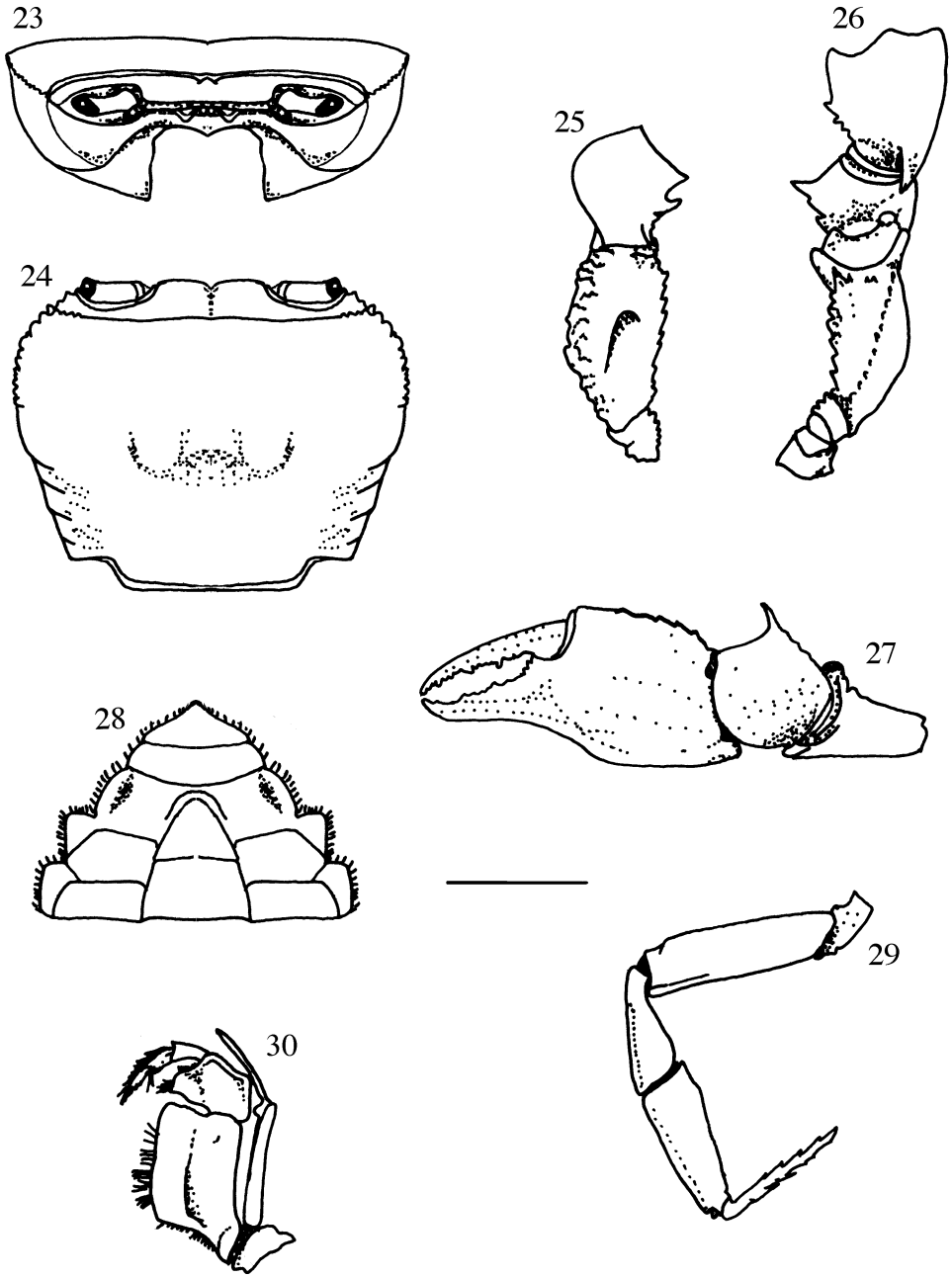
PLATE XXV. *Platythelphusa tuberculata* (CAW 12A) from Lake Tanganyika, Burundi. A, dorsal view; B, frontal view; C, ventral view of sternum.



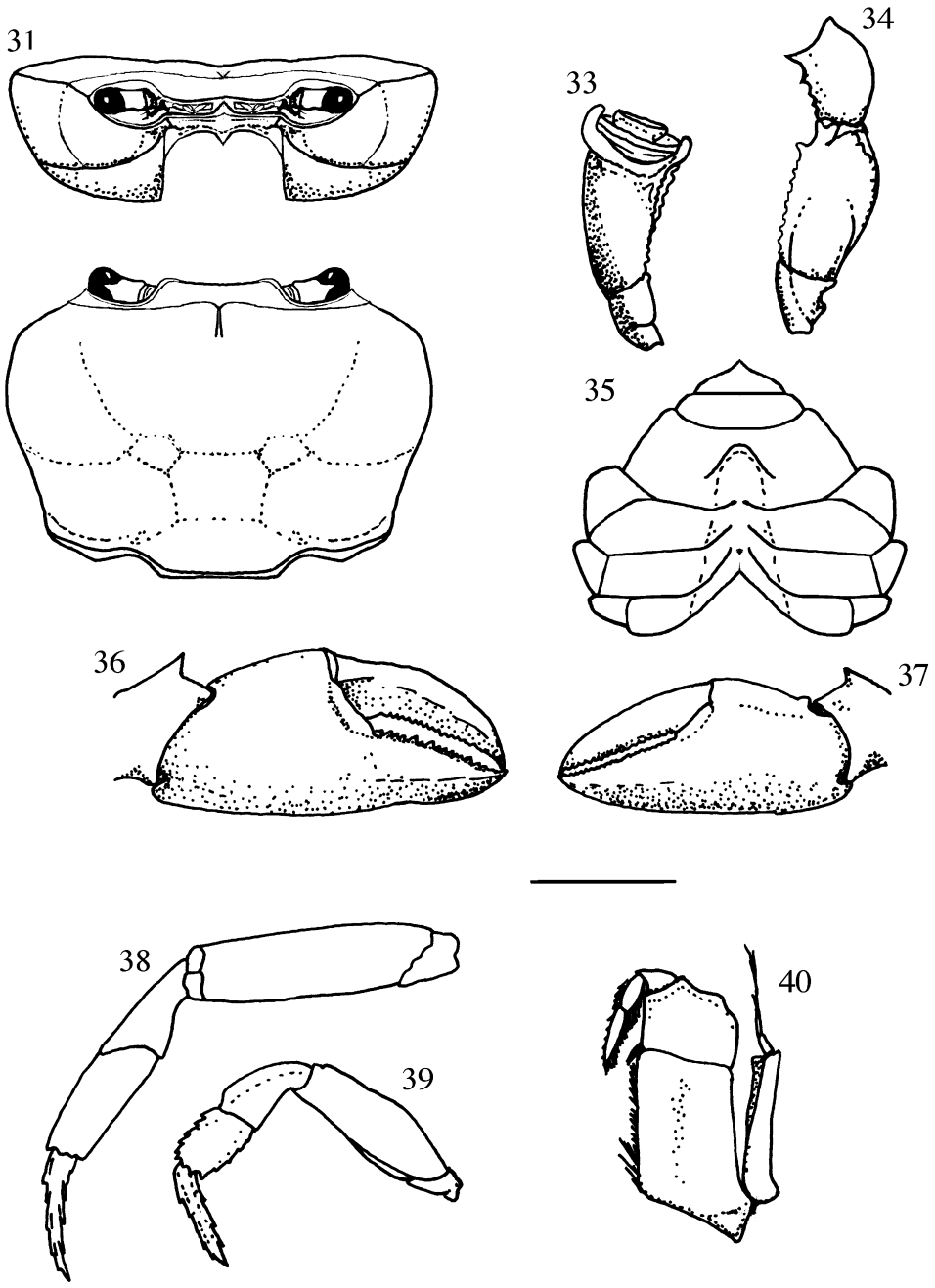
FIGURES 1–11. *Potamonautes emini* (Hilgendorf, 1892), adult male (cw 25.9, cl 17.4, ch 10.5, fw 8.0 mm) (NMU TRW1966.16), Nyantonzi area, Bunyaro District, Tanzania. 1, carapace and eyes, dorsal view; 2, cephalothorax, carapace and eyes, frontal view; 3, carpus of the left cheliped, dorsal view; 4, merus of the left cheliped, dorsal view; 5, merus of the left cheliped, inferior view; 6; right cheliped, frontal view; 7, left cheliped, frontal view; 8, left third pereiopod; 9, left fifth pereiopod; 10, sternum; 11, left third maxilliped. Scale = 6.3 mm (1–10), not to scale (11).



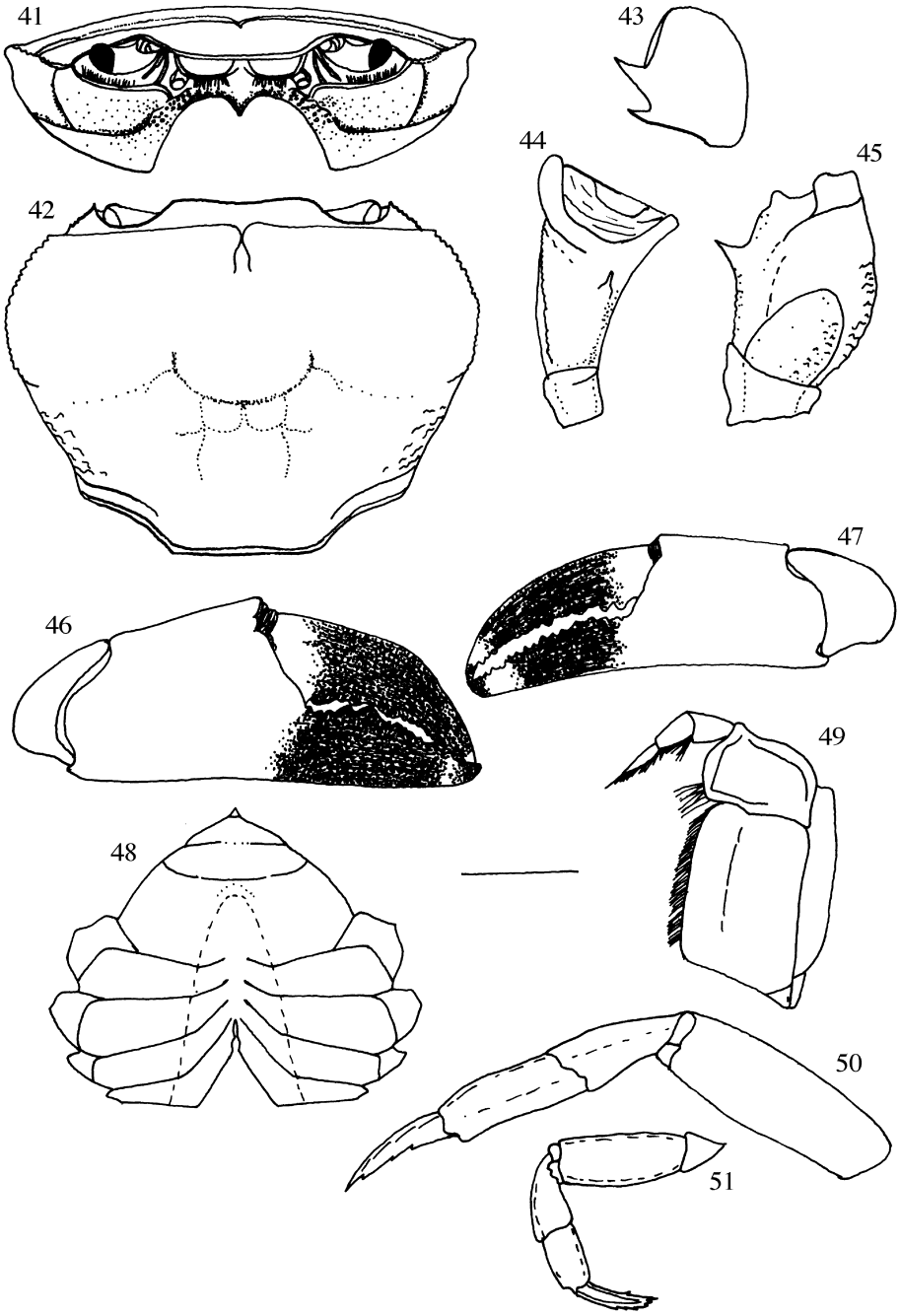
FIGURES 12–22. *Potamonautes gerdalensis* Bott, 1955, adult male (cw 36.3, cl 24.2, ch 10.8, fw 10.5 mm) (NMU TRW1960.05), Kisii, Nyanza Province, Kenya. 12, carapace and eyes, dorsal view; 13, cephalothorax, carapace and eyes, frontal view; 14, carpus of the right cheliped, dorsal view; 15, merus of the right cheliped, dorsal view; 16, merus of the right cheliped, inferior view; 17; right cheliped, frontal view; 18, left cheliped, frontal view; 19, left third pereiopod; 20, left fifth pereiopod; 21, sternum; 22, left third maxilliped. Scale = 13 mm (18–27); 6 mm (28).



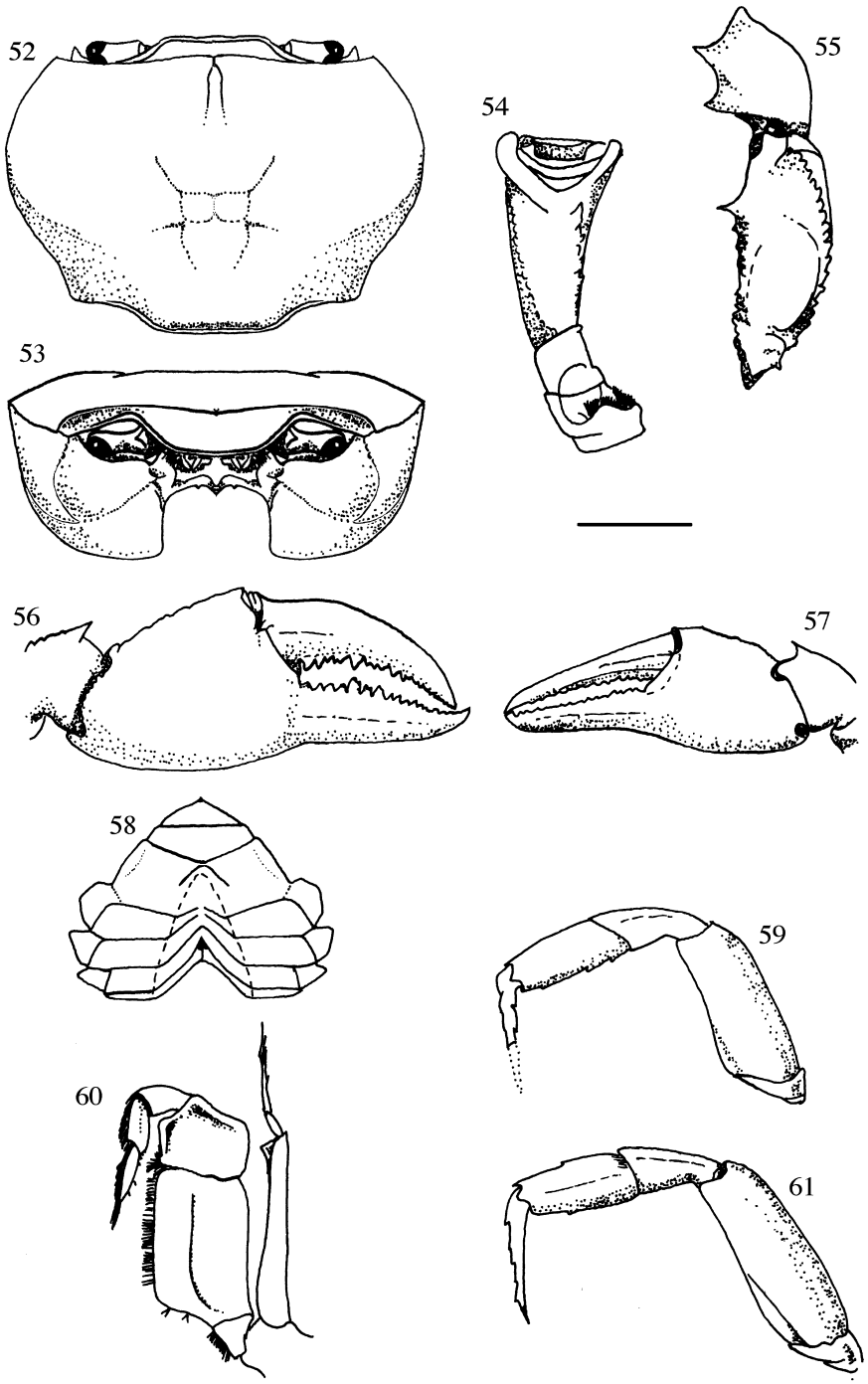
FIGURES 23–30. *Potamonautes infravallatus* (Hilgendorf, 1898), adult male cotype of *P. usambarae* (cw 22.4, cl 17.6, ch 10, fw 6.8 mm) (MCZ 7680), Usambara Mountains, Tanzania. 23, carapace and eyes, dorsal view; 24, cephalothorax, carapace and eyes, frontal view25, carpus and merus of the left cheliped, dorsal view; 26, carpus and merus of the left cheliped, inferior view; 27, left cheliped, frontal view; 28, sternal segments s1–s6, including eipsternites e4 and e5; 29, left fourth pereiopod; 30, left third maxilliped. Scale = 7.4 mm (23, 24, 28, 29), not to scale (25–27, 30).



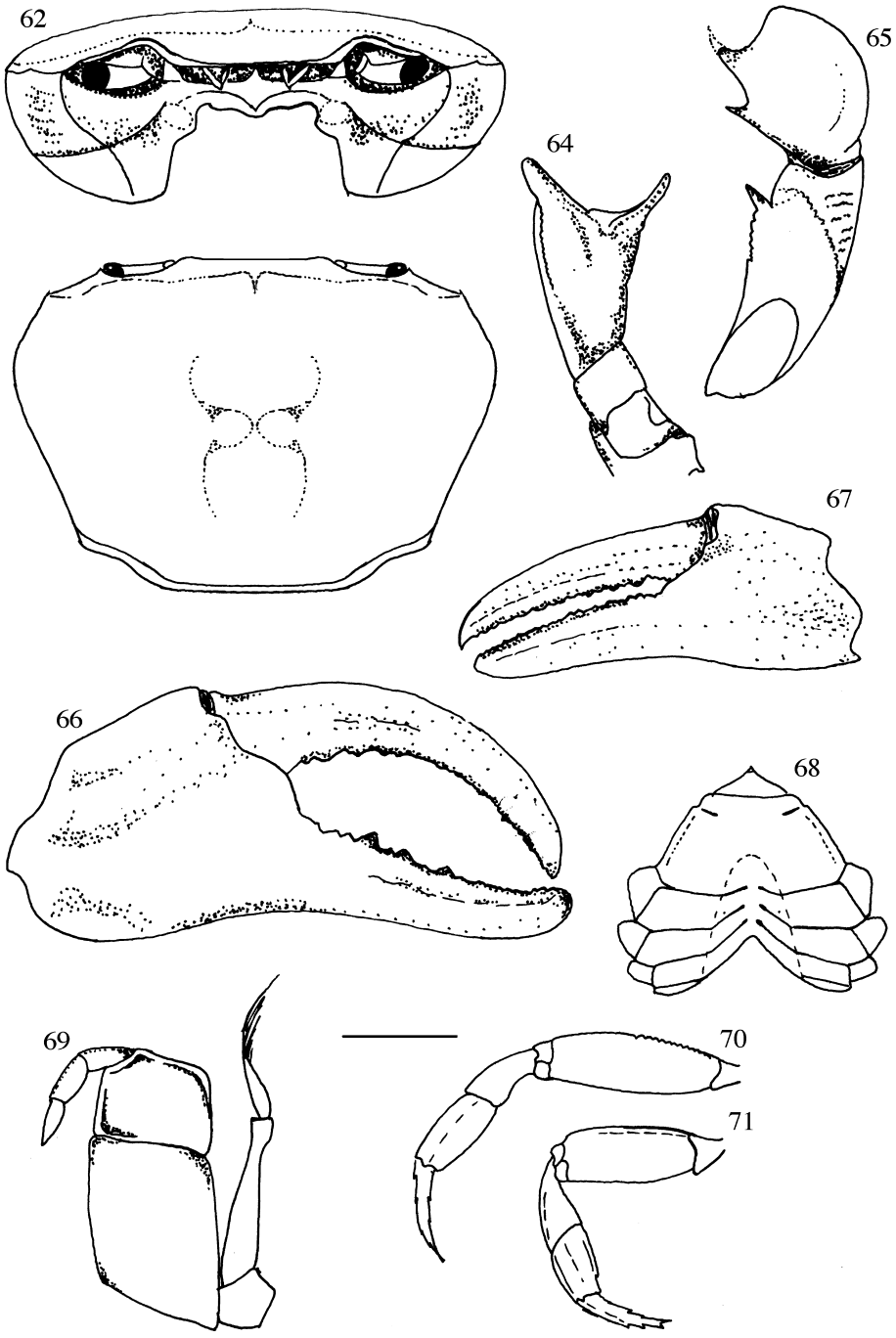
FIGURES 31–40. *Potamonautes johnstoni* (Miers, 1885), adult male (cw 39.5, cl 27, ch17, fw 11 mm) (BMNH 1906.6.11.6–7), Kilimanjaro, Tanzania. 31, cephalothorax, carapace and eyes, frontal view; 32, carapace and eyes, dorsal view; 33, merus of the right cheliped inferior view; 34, carpus and merus of the right cheliped, dorsal view; 35, sternum; 36, right cheliped, frontal view; 37, left cheliped, frontal view; 38, left third pereiopod; 39, left fifth pereiopod; 40, left third maxilliped. Scale = 13 mm (31–39), not to scale (40).



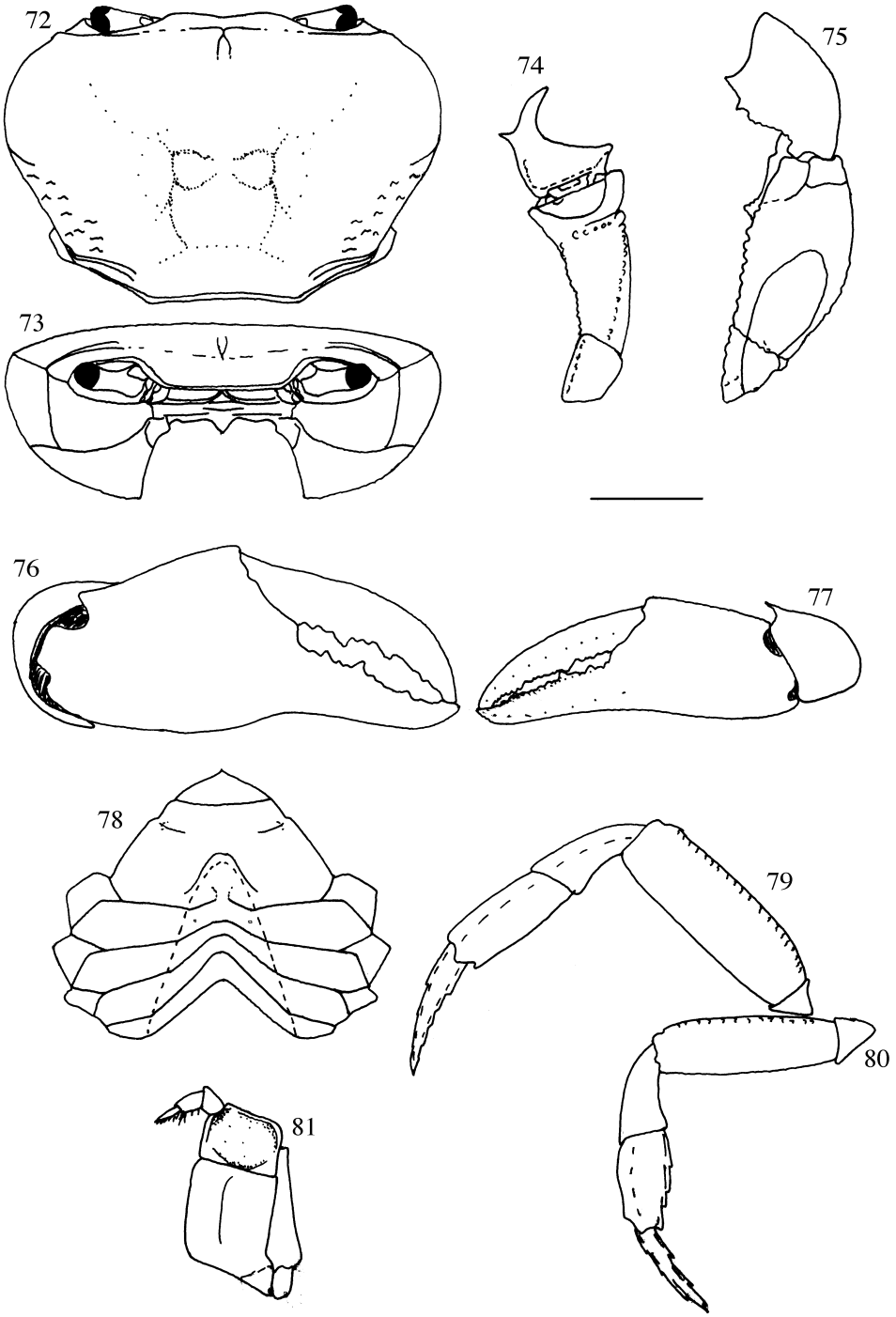
FIGURES 41–51. *Potamonautes lirrangensis* (Rathbun, 1904) (NMU TRW1971.15) adult female (cw 80.7, cl 60.9, ch 30.4, fw 25.1 mm) (47–53, 55–57), adult male (cw 56.6, cl 39.8, ch 22, fw 15.9 mm) (54). 41, cephalothorax, carapace and eyes, frontal view; 42, carapace and eyes, dorsal view; 43, carpus of the right cheliped, dorsal view; 44, merus of the right cheliped, inferior; 45, merus of the right cheliped, dorsal view; 46; right cheliped, frontal view; 47, left cheliped, frontal view; 48, sternum; 49, left third maxilliped; 50, left third pereiopod; 51, left fifth pereiopod. Scale = 20.7 cm (41–47, 50, 51), not to scale (48, 49).



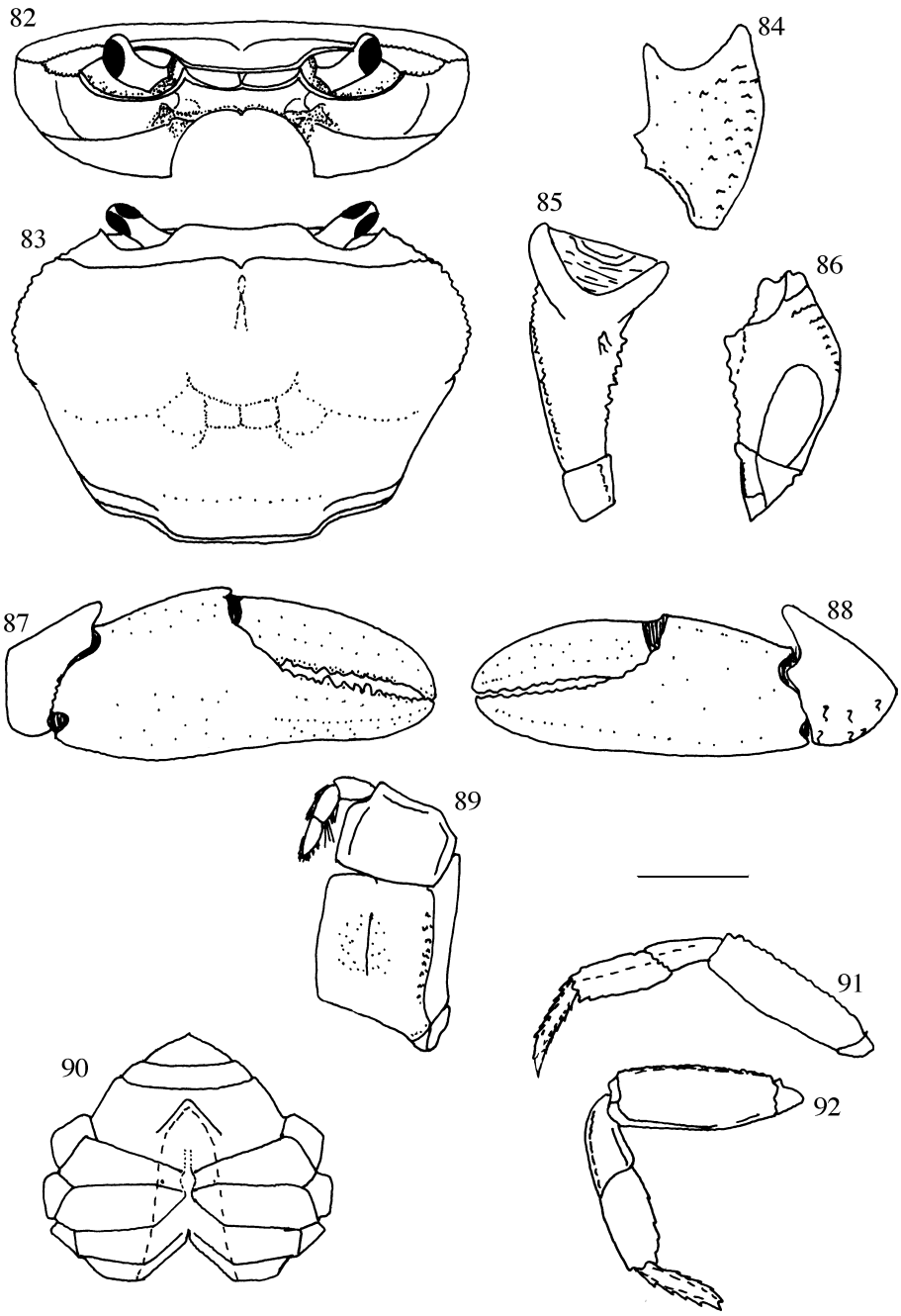
FIGURES 52–61. *Potamonautes loveridgei* (Rathbun, 1933), adult male holotype (cw 47.5, cl 33.4, ch 20.3, fw 12.0 mm) (MCZ 7676), Uzungwe Mountains, Tanzania. 52, carapace and eyes, dorsal view; 53, cephalothorax, carapace and eyes, frontal view; 54, merus of the right cheliped inferior view; 55, carpus and merus of the right cheliped, dorsal view; 56, right cheliped, frontal view; 57, left cheliped, frontal view; 58, sternum; 59, left fourth pereiopod; 60, left third maxilliped; 61, left fifth pereiopod. Scale = 12.9 mm (52, 53, 58), not to scale (54, 57, 59–61).



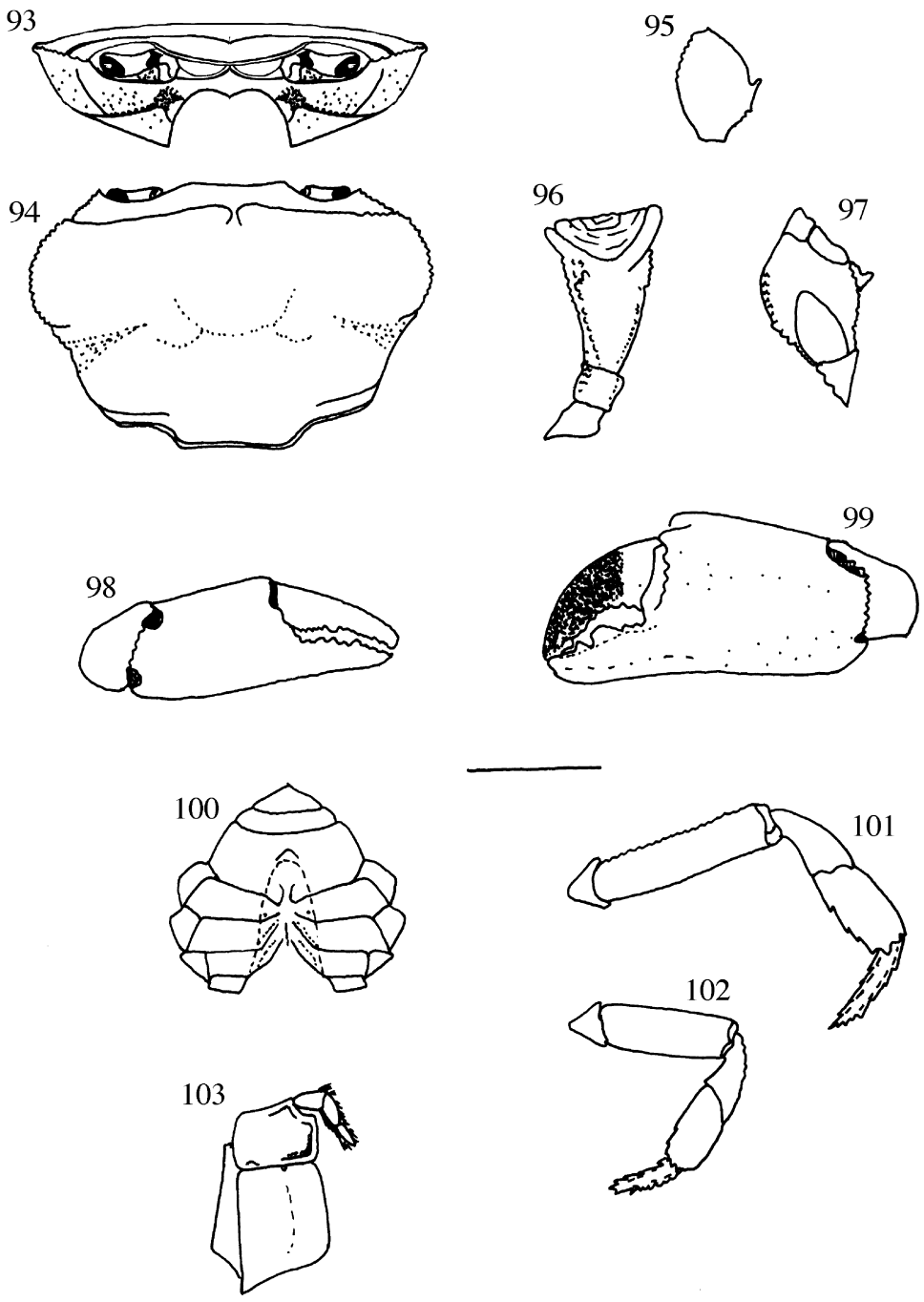
FIGURES 62–71. *Potamonautes obesus* (A. Milne-Edwards, 1868), adult male, form II (cw 49.1 mm) (NMU TRW1968.06) Uluguru Mountains, Tanzania. 62, cephalothorax, carapace and eyes, frontal view; 63, carapace and eyes, dorsal view; 64, merus of right cheliped, inferior view; 65, carpus and merus of right cheliped, dorsal view; 66, right cheliped, frontal view; 67, left cheliped, frontal view; 68, sternum; 69, left third maxilliped; 70, left third pereiopod; 71, left fifth pereiopod. Scale = 11.3 mm (62–68), not to scale (68, 70, 71).



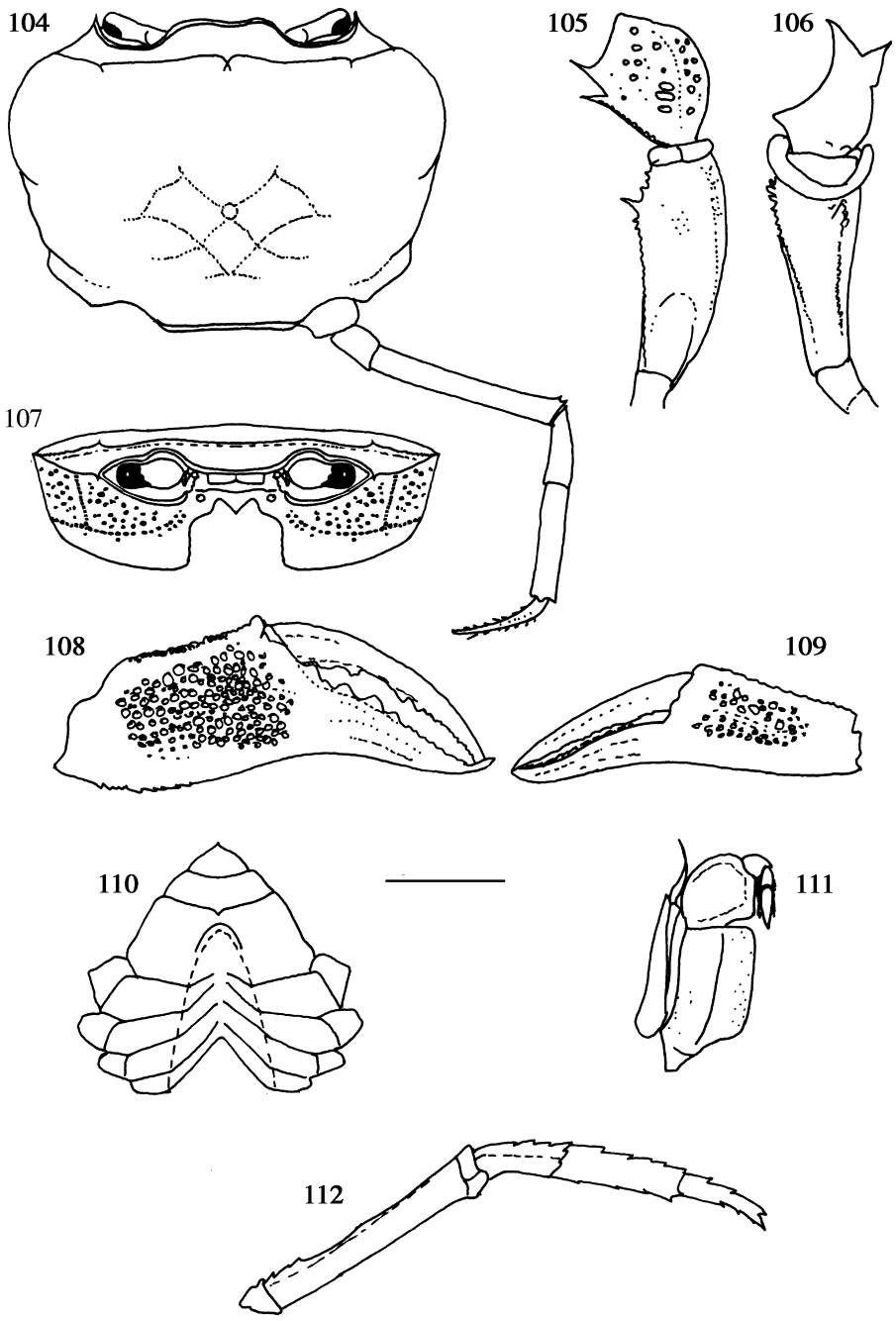
FIGURES 72–81. *Potamonautes pilosus* (Hilgendorf, 1898), adult male (cw 25.5, cl 10.6, ch 11.4, fw 7.8), (NNM), Namanga Hills, Kenya. 72, carapace and eyes, dorsal view; 73, cephalothorax, carapace and eyes, frontal view; 74, merus of the right cheliped, inferior view; 75, carpus and merus of the right cheliped, dorsal view; 76, right cheliped, frontal view77, left cheliped, frontal view; 78, sternum; 79, left fourth pereiopod; 80, left fifth pereiopod; 81, left third maxilliped. Scale = 6.4 mm (72–80), not to scale (81).



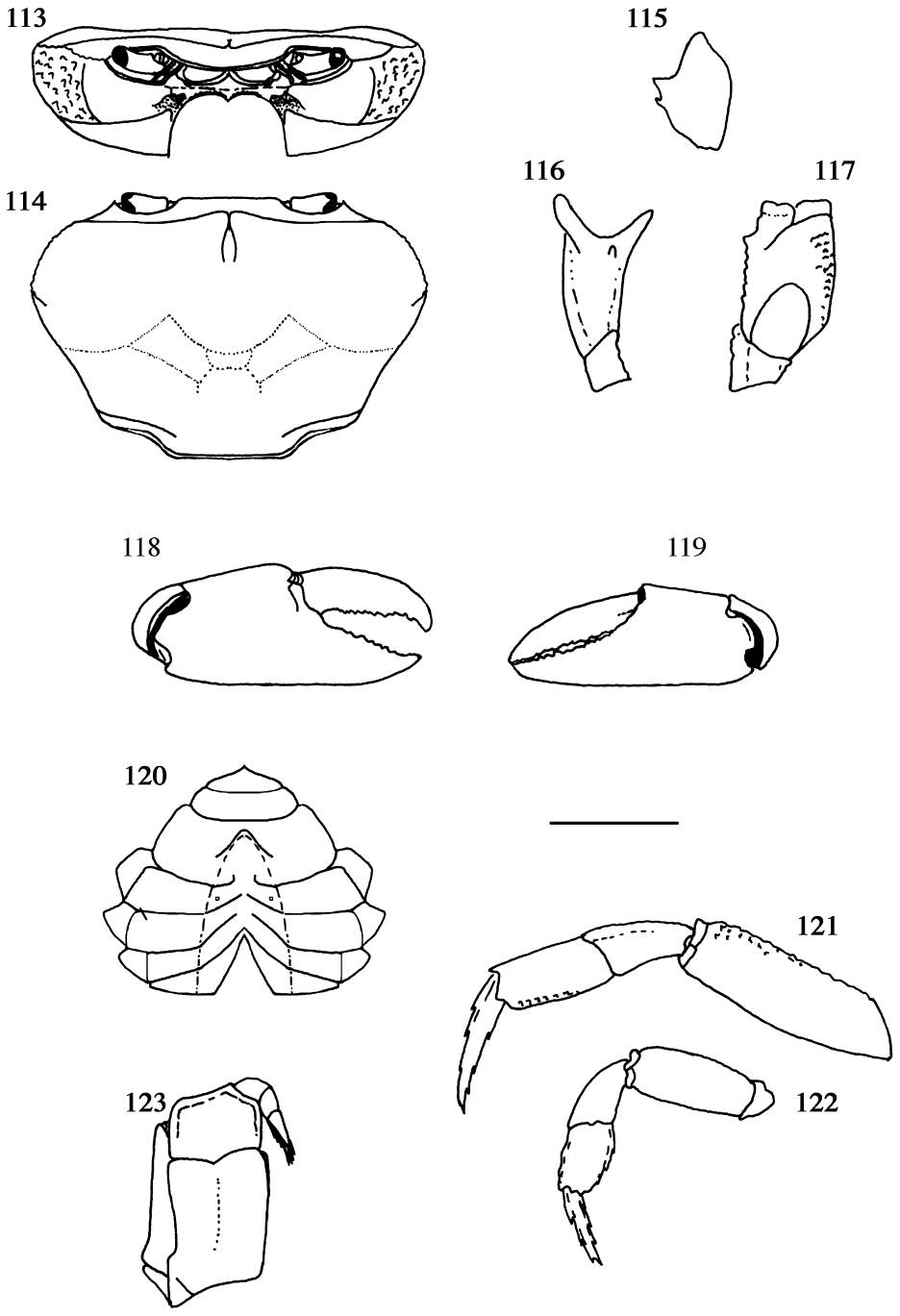
FIGURES 82–92. *Potamonautes platycentron* (Hilgendorf, 1897), adult male (cw 50.8, cl 35.1, ch 18.8, fw 14.8 mm) (NMU TRW1991.12), Lake Chala, Kenya. 82, cephalothorax, carapace and eyes, frontal view; 83, carapace and eyes, dorsal view; 84, carpus of the right cheliped, dorsal view; 85, merus of the right cheliped, inferior view; 86, merus of the right cheliped, dorsal view87, right cheliped, frontal view; 88, left cheliped, frontal view; 89, left third maxilliped; 90, sternum; 91, left third pereiopod; 92, left fifth pereiopod. Scale = 12.7 mm (82–88, 90–92), not to scale (89).



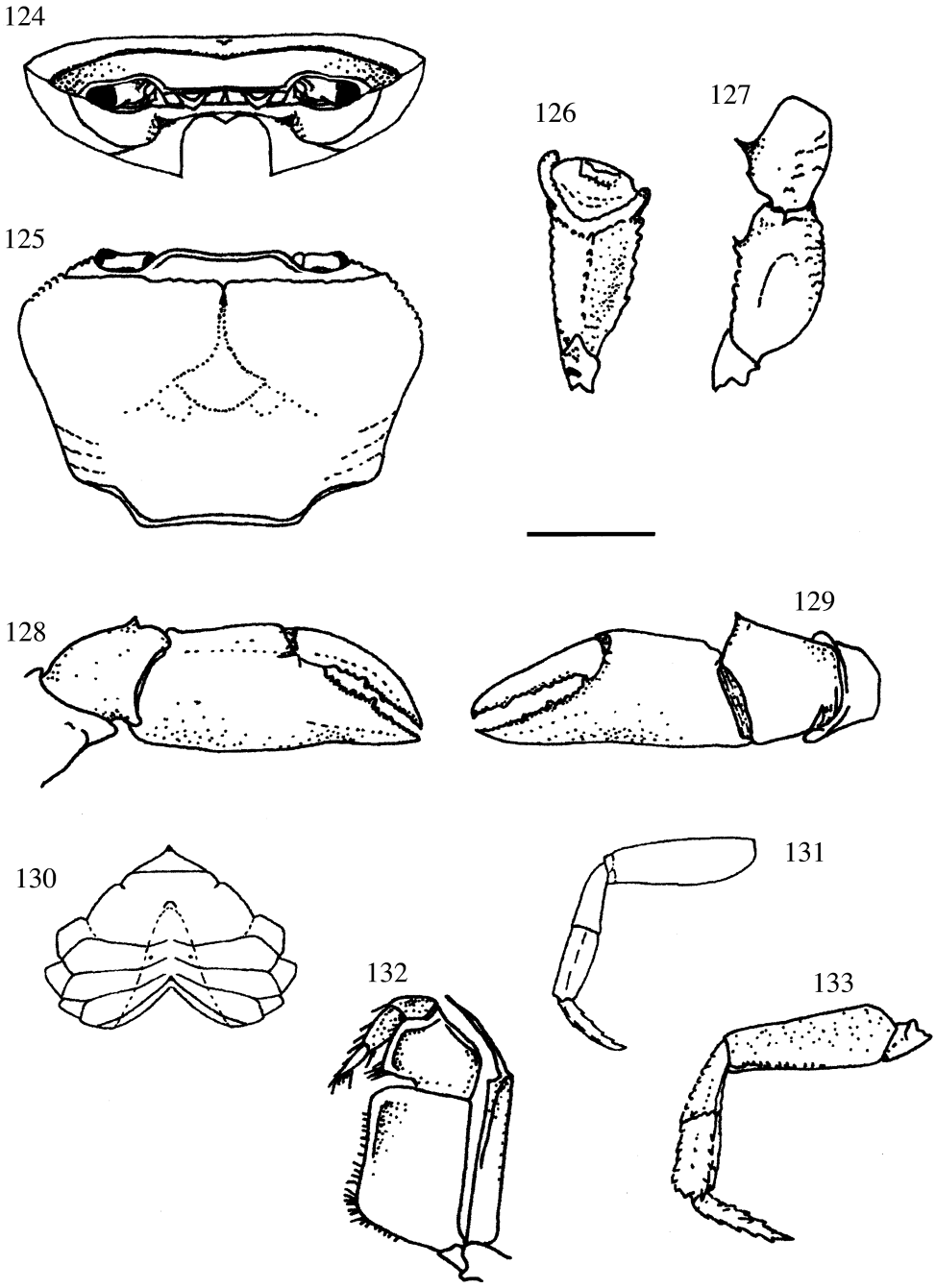
FIGURES 93–103. *Potamonautes platynotus* (Cunnington, 1907), adult male (cw 39.1, cl 26, ch 14.1, fw 11.4 mm) (NMU TRW1971.08), Lake Tanganyika, Kigoma, Tanzania. 93, cephalothorax, carapace and eyes, frontal view; 94, carapace and eyes, dorsal view; 95, carpus of right cheliped, dorsal view; 96, merus of right cheliped, inferior view; 97, merus of right cheliped, dorsal view; 98, right cheliped, frontal view; 99, left cheliped, frontal view; 100, sternum; 101, left third pereiopod; 102, left fifth pereiopod; 103, left third maxilliped. Scale = 12.6 mm (93–101), not to scale (102).



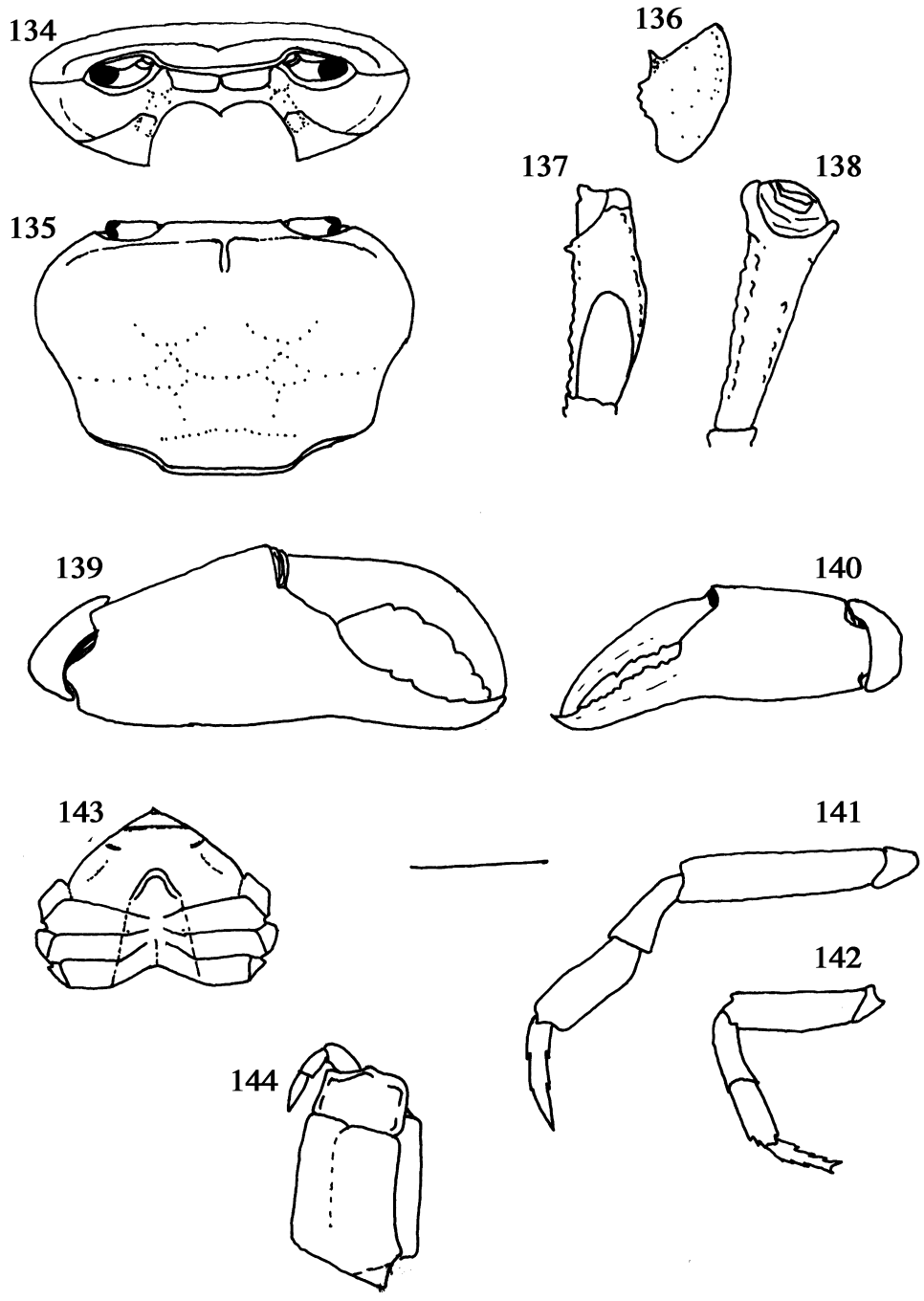
FIGURES 104–112. *Potamonautes raybouldi* Cumberlidge & Vannini, 2004, adult male holotype (cw 55.7 mm) (NMU KMH 11486), Amani, East Usambara Mountains. 104, carapace and eyes, dorsal view; 105, cephalothorax, carapace and eyes, frontal view; 106, carpus and merus of right cheliped, dorsal view; 107, carpus and merus of right cheliped, inferior view; 108, right cheliped, frontal view; 109, left cheliped, frontal view; 110, sternum; 111, left third maxilliped; 112, right third pereiopod. Scale = 14.5 mm (104–110, 112), not to scale (111).



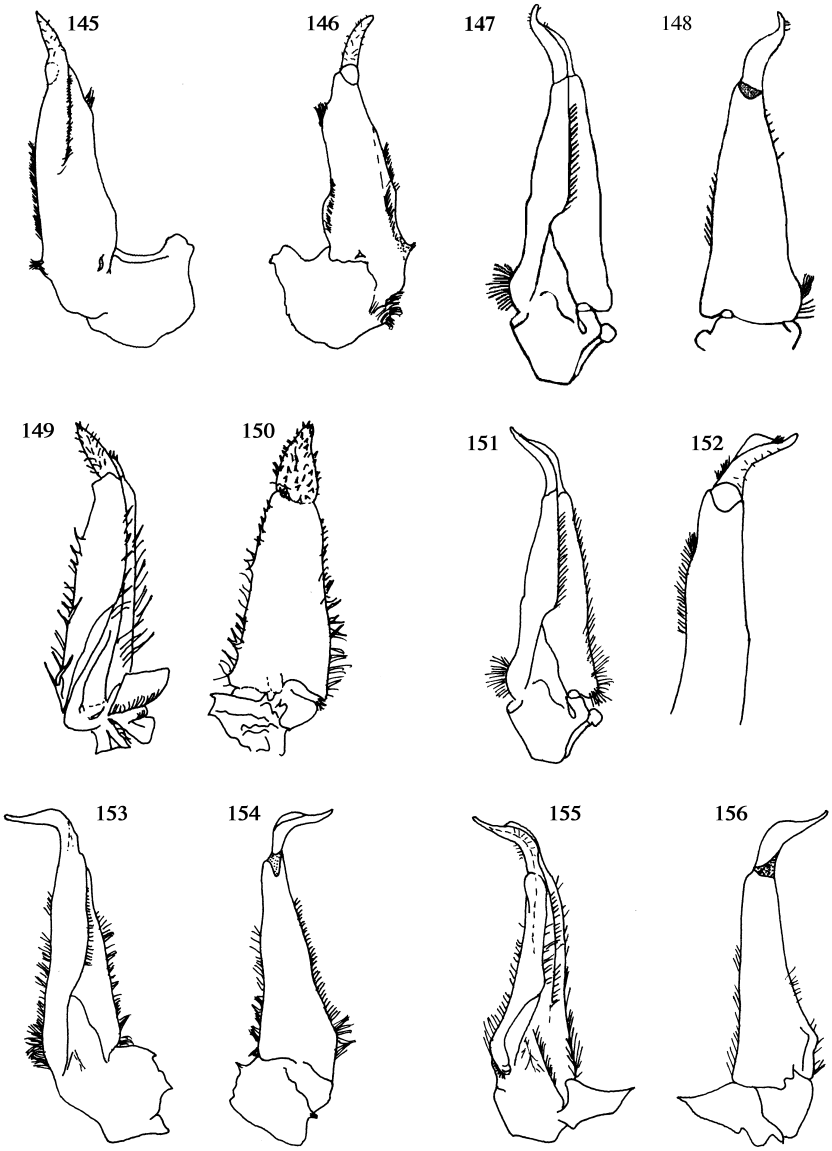
FIGURES 113–123. *Potamonautes suprasulcatus* (Hilgendorf, 1898), adult male (cw 64.1 mm) (NMU TRW1971.10). 113, cephalothorax, carapace and eyes, frontal view; 114, carapace and eyes, dorsal view; 115, carpus of right cheliped, dorsal view; 116, merus of right cheliped, inferior view; 117, merus of right cheliped, dorsal view; 118, right cheliped, frontal view; 119, left cheliped, frontal view; 120, sternum; 121, left fifth pereiopod; 122, left third pereiopod; 123, left third maxilliped. Scale = 21.4 mm (113–122), not to scale (123).



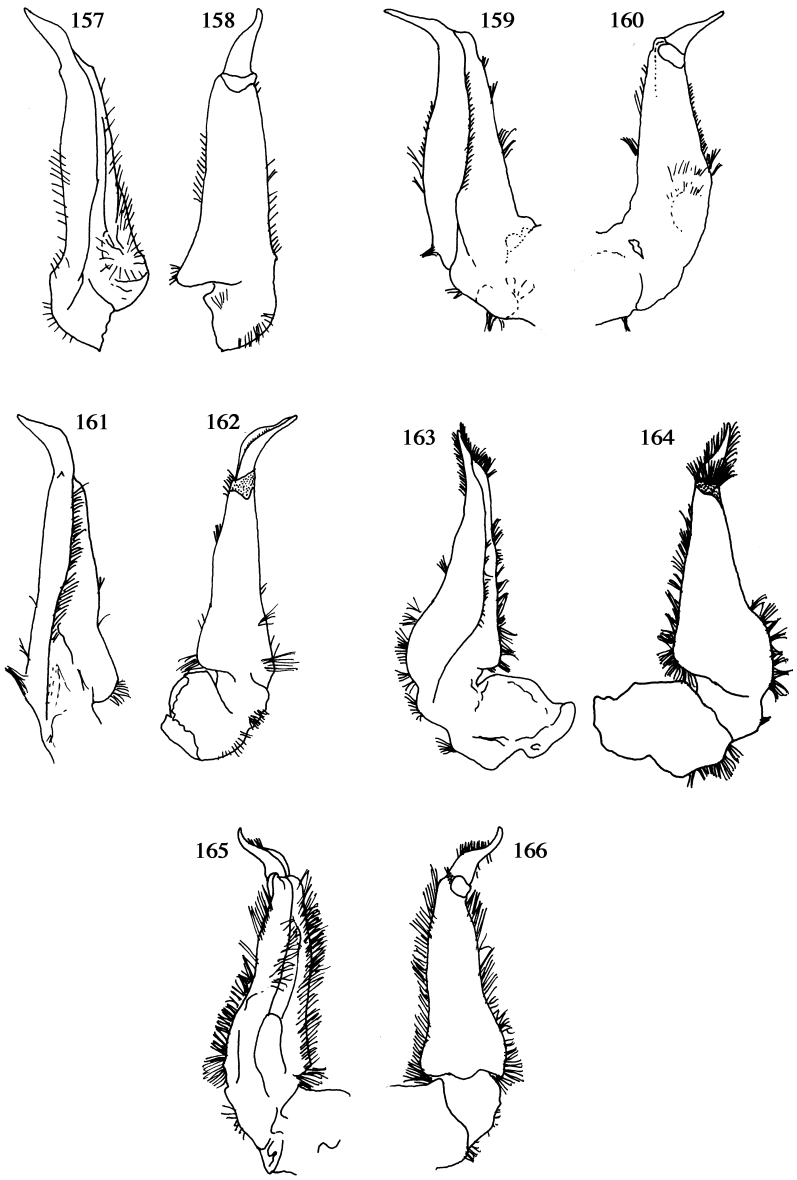
FIGURES 124–133. *Potamonautes unisulcatus* (Rathbun, 1933), adult male type (cw 33, cl 21, ch 9, fw 10 mm) (MCZ 7678a), Uluguru Mountains, Tanzania. 124, cephalothorax, carapace and eyes, frontal view; 125, carapace and eyes, dorsal view; 126 merus of right cheliped, inferior view; 127, carpus and merus of right cheliped, dorsal view; 128, right cheliped, frontal view; 129, left cheliped, frontal view; 130, sternum; 131, left third pereiopod; 132, left fifth pereiopod; 133, left third maxilliped. Scale = 9.9 mm (124–132), not to scale (133).



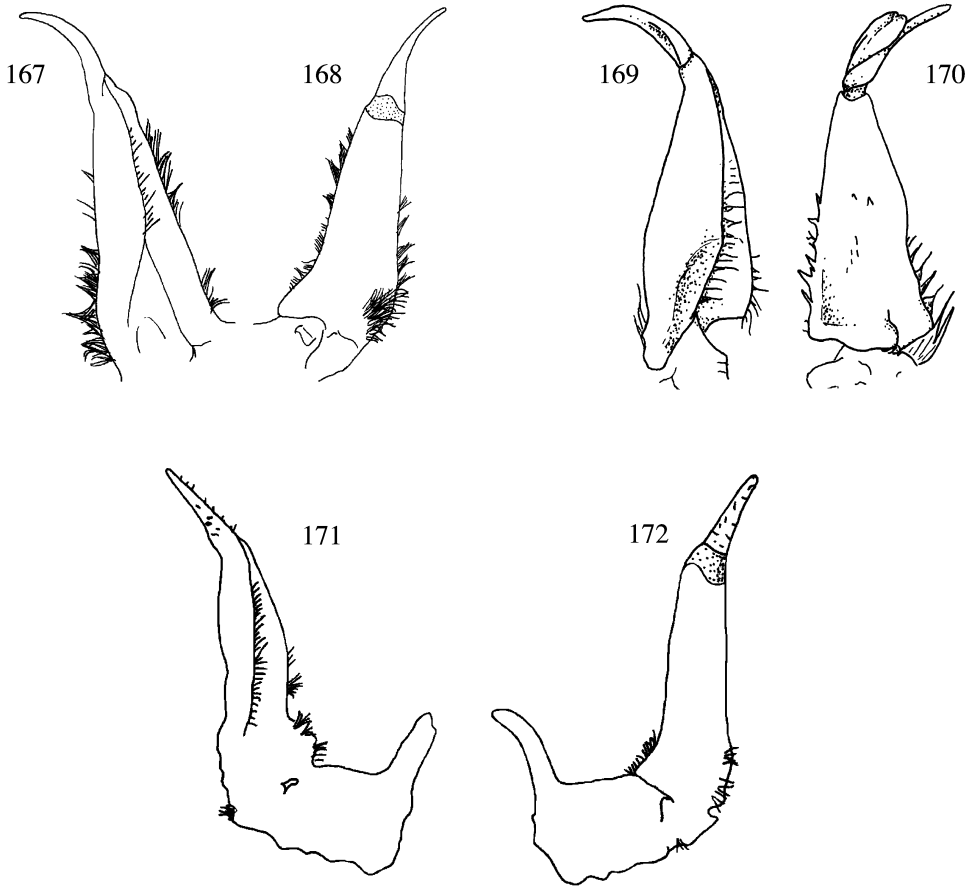
FIGURES 134–144. *Potamonautes xiphoidus* **n. sp.**, adult male holotype (cw 38.3, cl 26.1, ch 15.6, fw 11.4 mm) (NMU TRW1966.06b), West Usambara Mountains, Tanzania. 134, cephalothorax, carapace and eyes, frontal view: 135, carapace and eyes, dorsal view; 136, carpus of right cheliped, dorsal view; 137, merus of right cheliped, dorsal view; 138, merus of right cheliped, inferior view; 139, right cheliped, frontal view; 140, left cheliped, frontal view; 141, left third pereiopod; 142, left fifth pereiopod; 143, sternum; 144, left third maxilliped. Scale = 13.3 mm (134–143); not to scale (144).



FIGURES 145–156. *Potamonautes emini* (Hilgendorf, 1892), adult male (cw 25.9, cl 17.4, ch 10.5, fw 8.0 mm) (NMU TRW1966.16), Nyantonzi, Bunyaro District, Tanzania. 145, right gonopod 1, ventral aspect; 146, right gonopod 1, dorsal aspect. *Potamonautes gerdalensis* Bott, 1955, adult male (cw 36.3 mm) (NMU TRW1960.05), Kisii, Nyanza Province, Kenya, 147, right gonopod 1, ventral aspect; 148, right gonopod 1, dorsal aspect. *Potamonautes infravallatus* (Hilgendorf, 1898), adult male cotype of *P. (P.) usambarae* Rathbun, 1935 (MCZ 7680), Usambara Mountains, Tanzania. 149, right gonopod 1, ventral aspect; 150, right gonopod 1, dorsal aspect. *Potamonautes johnstoni* (Miers, 1885), adult male (BMNH 1906.6.11.6–7), Mount Kilimanjaro, Tanzania, 151, right gonopod 1, ventral aspect; 152, right gonopod 1, dorsal aspect. *Potamonautes lirrangensis* (Rathbun, 1904), adult male (cw 56.4 mm) (NMU TRW1972.04), Malagarasi River, Kigoma, Tanzania, 153, right gonopod 1, ventral aspect; 154, right gonopod 1, dorsal aspect. *Potamonautes loveridgei* (Rathbun, 1933), adult male holotype (MCZ 7676), Uzungwe Mountains, Tanzania, 155, right gonopod 1, ventral aspect; 156, right gonopod 1, dorsal aspect. For comparative purposes, the gonopods are not drawn to scale.



FIGURES 157–166. *Potamonautes obesus* (A. Milne-Edwards, 1868), adult male, form II (cw 49.1 mm) (NMU TRW1968.06), Uluguru Mountains, Tanzania, 157, right gonopod 1, ventral aspect; 158, right gonopod 1, dorsal aspect. *Potamonautes pilosus* (Hilgendorf, 1898), adult male (cw 25.5, cl 10.6, ch 11.4, fw 7.8), Namanga Hill, Kenya, 159, right gonopod 1, ventral aspect; 160, right gonopod 1, dorsal aspect. *Potamonautes platycentron* (Hilgendorf, 1897), adult male (cw 50.8, cl 35.1, ch 18.8, fw 14.8 mm) (NMU TRW1991.12), Lake Chala, Kenya, 161, right gonopod 1, ventral aspect; 162, right gonopod 1, dorsal aspect. *Potamonautes platynotus* (Cunnington, 1907), adult male (cw 39.1, cl 26, ch 14.1, fw 11.4 mm) (NMU TRW1971.08), Kigoma, Lake Tanganyika, Tanzania, 163, right gonopod 1, ventral aspect; 164, right gonopod 1, dorsal aspect. *Potamonautes raybouldi* Cumberlidge & Vannini, 2004, adult male holotype (cw 55.7 mm) (NMU KMH 11486), East Usambara Mountains, 165, right gonopod 1, ventral aspect; 166, right gonopod 1, dorsal aspect. For comparative purposes, the gonopods are not drawn to scale.



FIGURES 167–172. *Potamonautes suprasulcatus* (Hilgendorf, 1898), adult male (cw 64.1 mm) (NMU TRW1971.10), 167, right gonopod 1, ventral aspect; 168, right gonopod 1, dorsal aspect. *Potamonautes unisulcatus* (Rathbun, 1933), adult male type (MCZ 7678a), Uluguru Mountains, Tanzania, 169, right gonopod 1, ventral aspect; 170, right gonopod 1, dorsal aspect. *Potamonautes xiphoidus* n. sp., adult male holotype (cw 38.3, cl 26.1, ch 15.6, fw 11.4 mm) (NMU TRW1966.06b), West Usambara Mountains, Tanzania, 171, right gonopod 1, ventral aspect; 172, right gonopod 1, dorsal aspect.

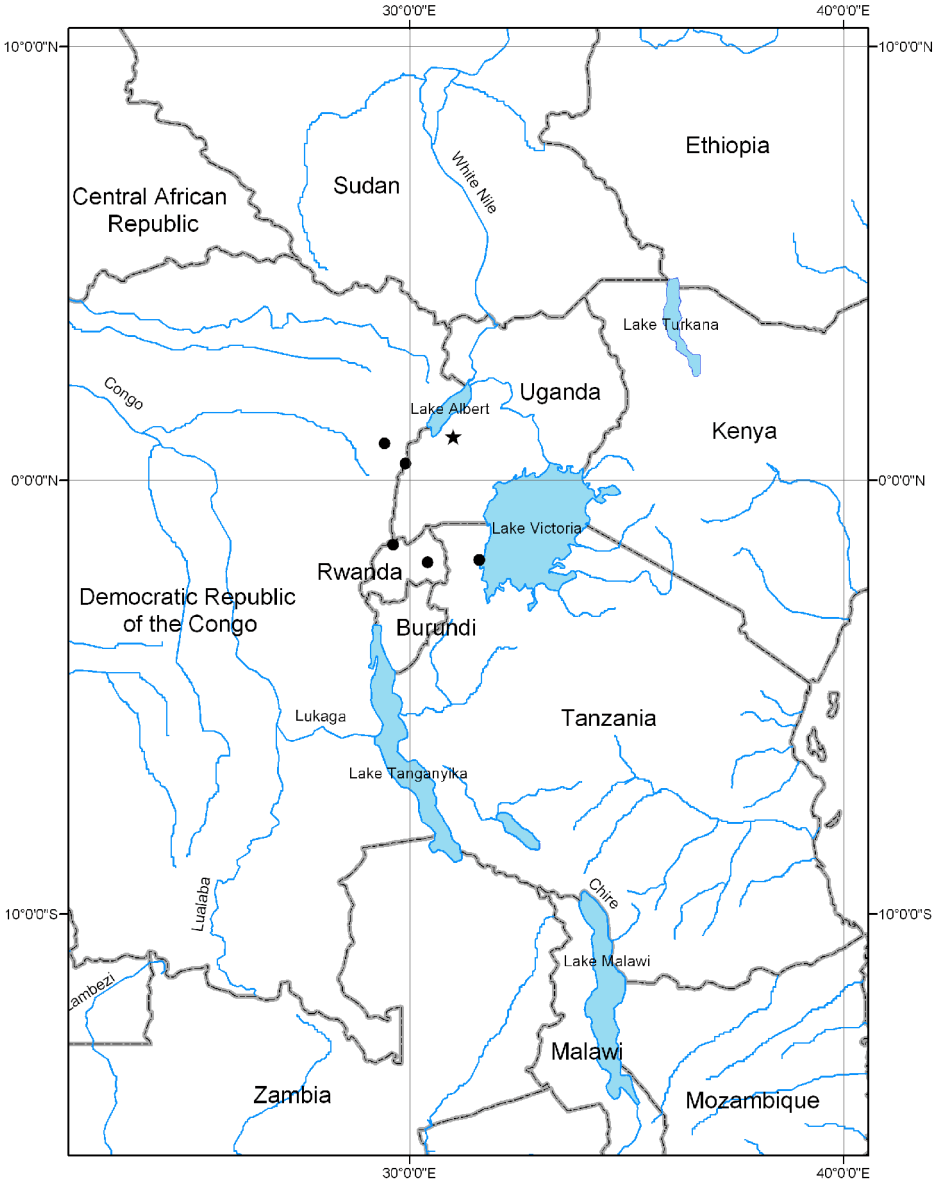


FIGURE 173. Summary of the distribution of *Potamonautes emini* (Hilgendorf, 1892) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Chace 1942, Cumberlidge 1997). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

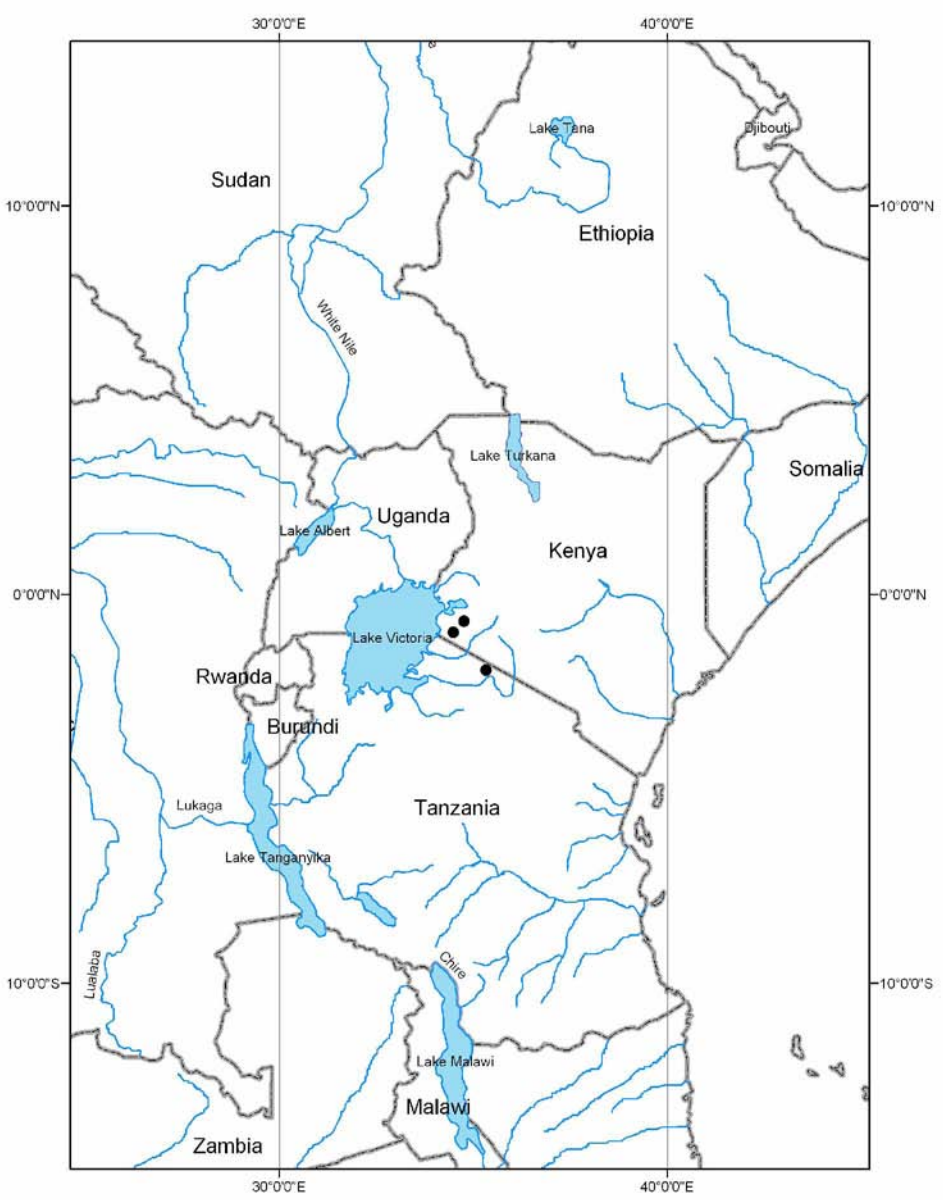


FIGURE 174. Summary of the distribution of *Potamonautes gerdalensis* Bott, 1955 (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Cumberlidge 1998). Country boundaries are shown with a shaded, dashed line. Solid lines represent permanent waters of the region.

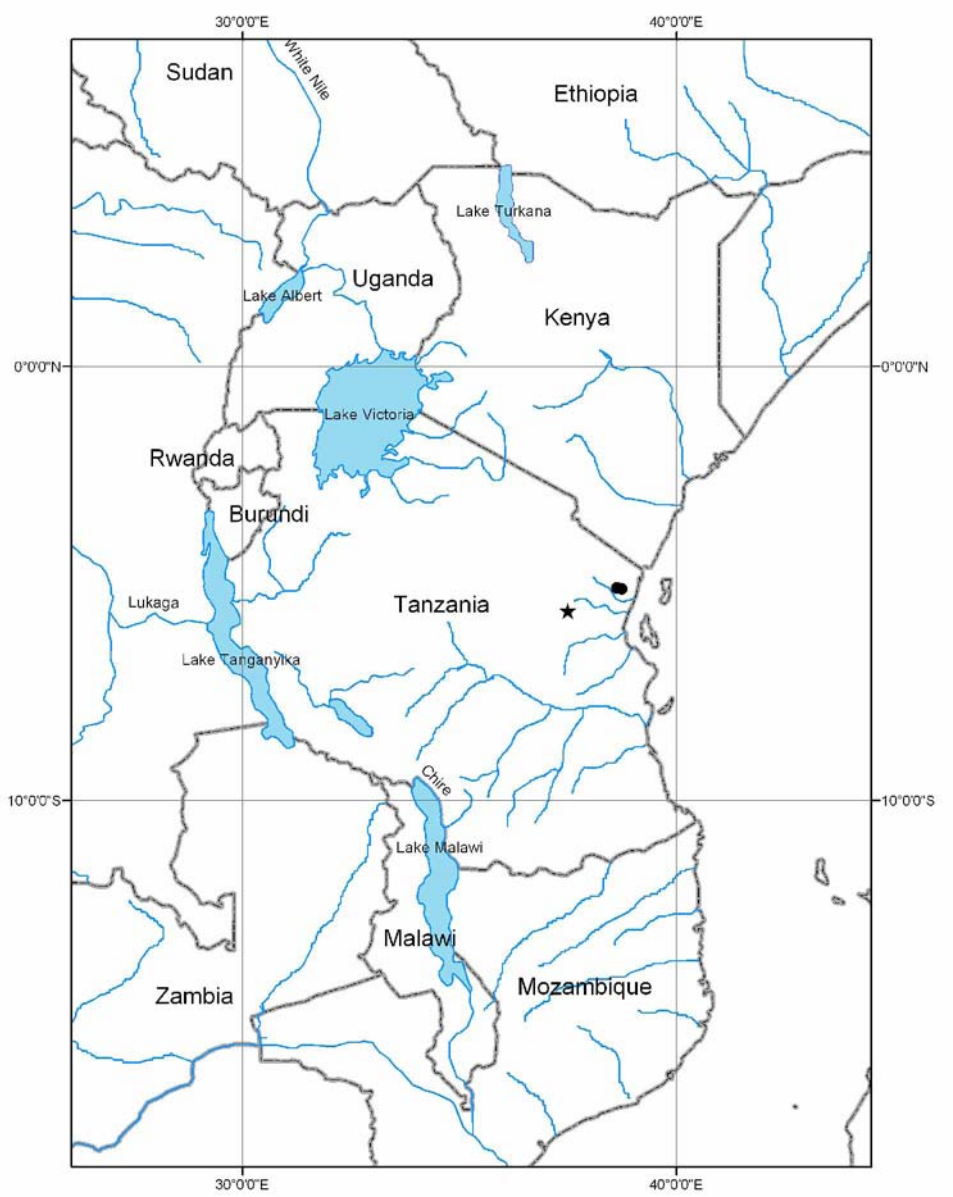


FIGURE 175. Summary of the distribution of *Potamonautes infravallatus* (Hilgendorf, 1898) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Rathbun 1933; Chace 1942). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

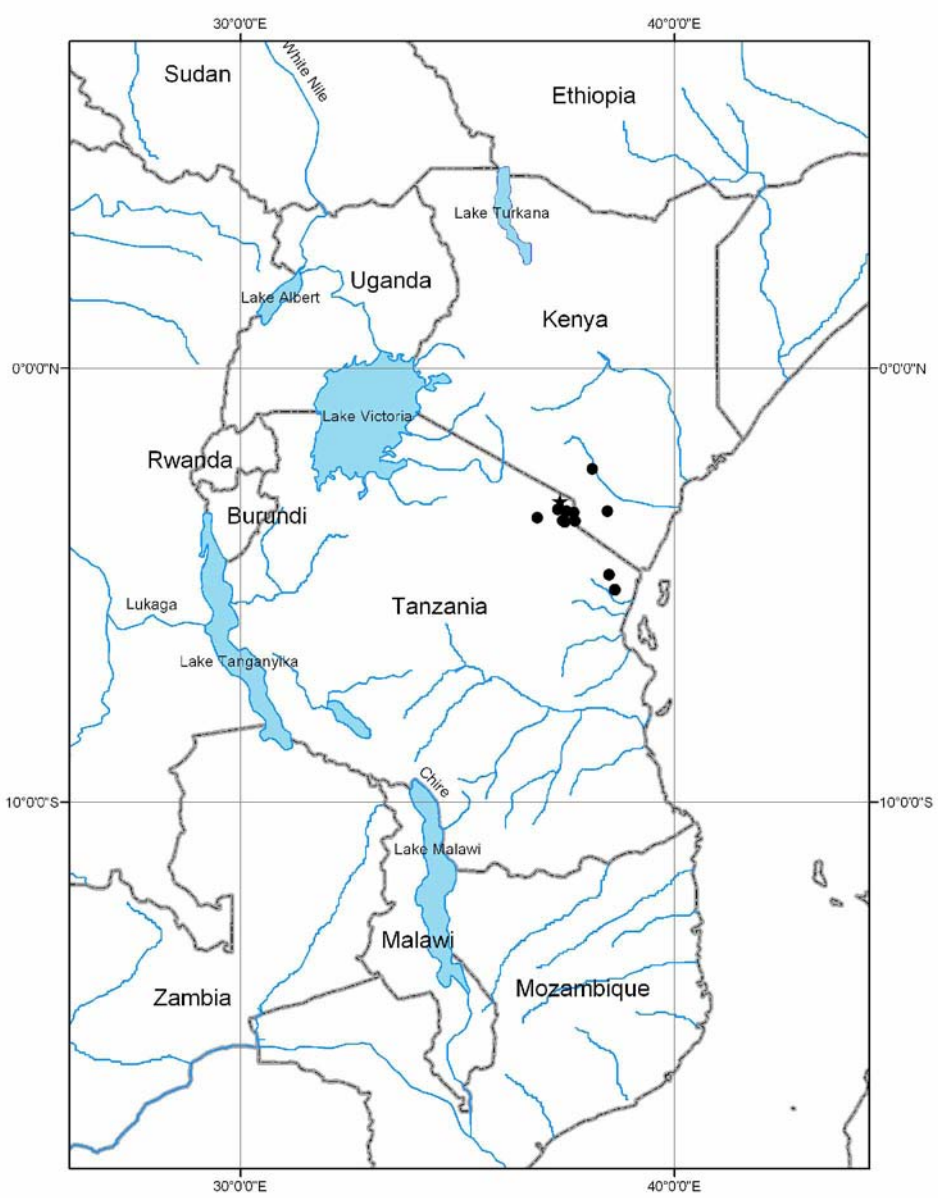


FIGURE 176. Summary of the distribution of *Potamonautes johnstoni* (Miers, 1885) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Cumberlidge 1997). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

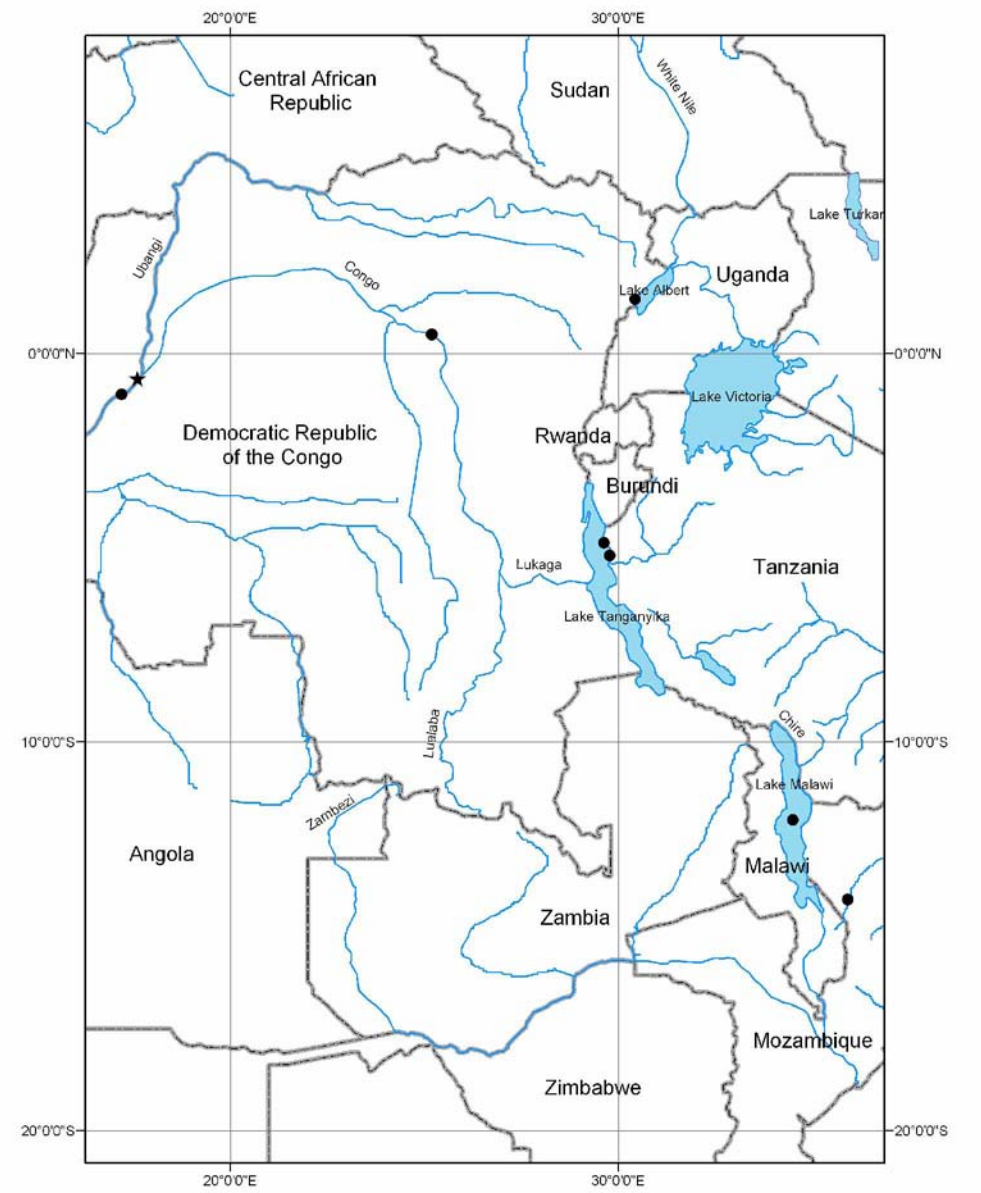


FIGURE 177. Summary of the distribution of *Potamonautes lirrangensis* (Rathbun, 1904) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Chace 1942; Cumberlidge 1998). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

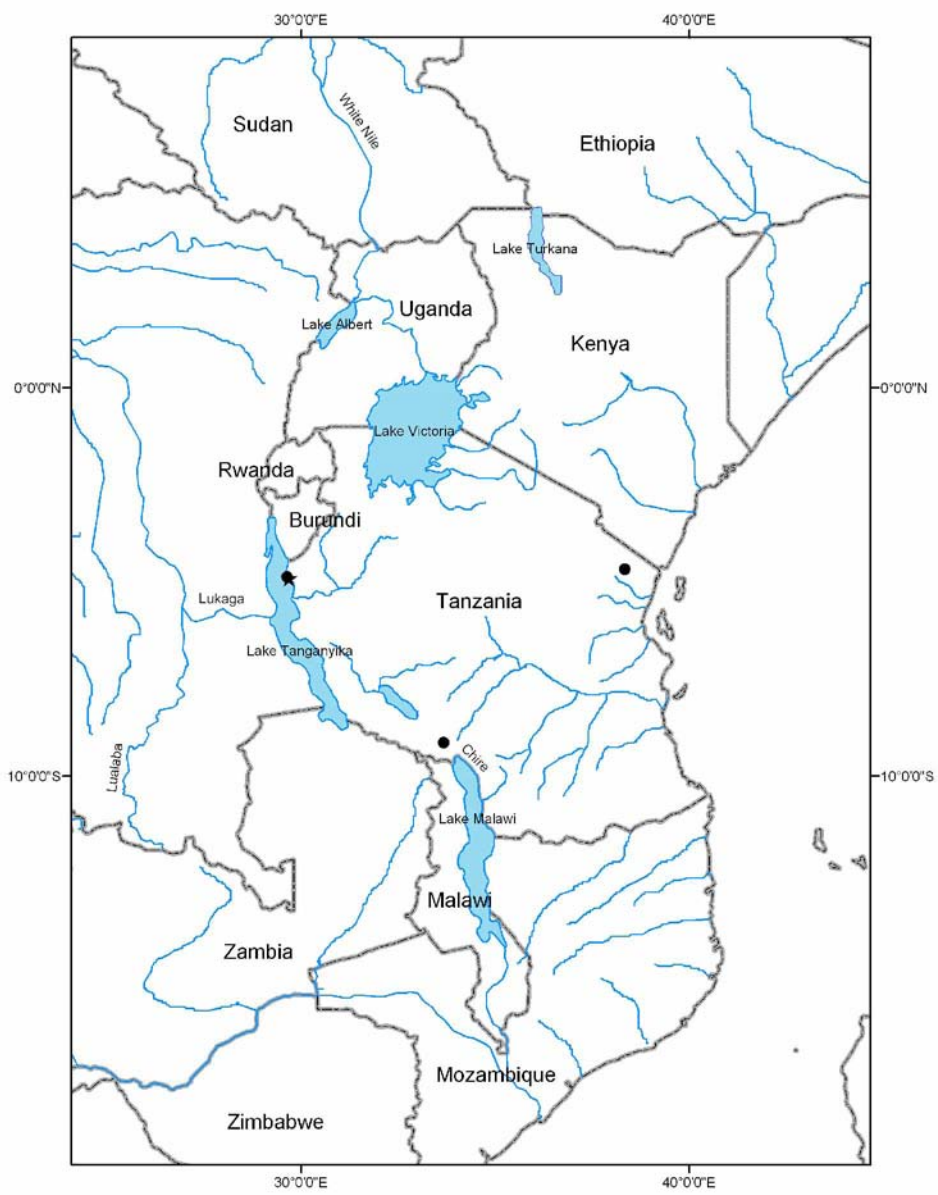


FIGURE 178. Summary of the distribution of *Potamonautes loveridgei* (Rathbun, 1933) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Cumberlidge 1997). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

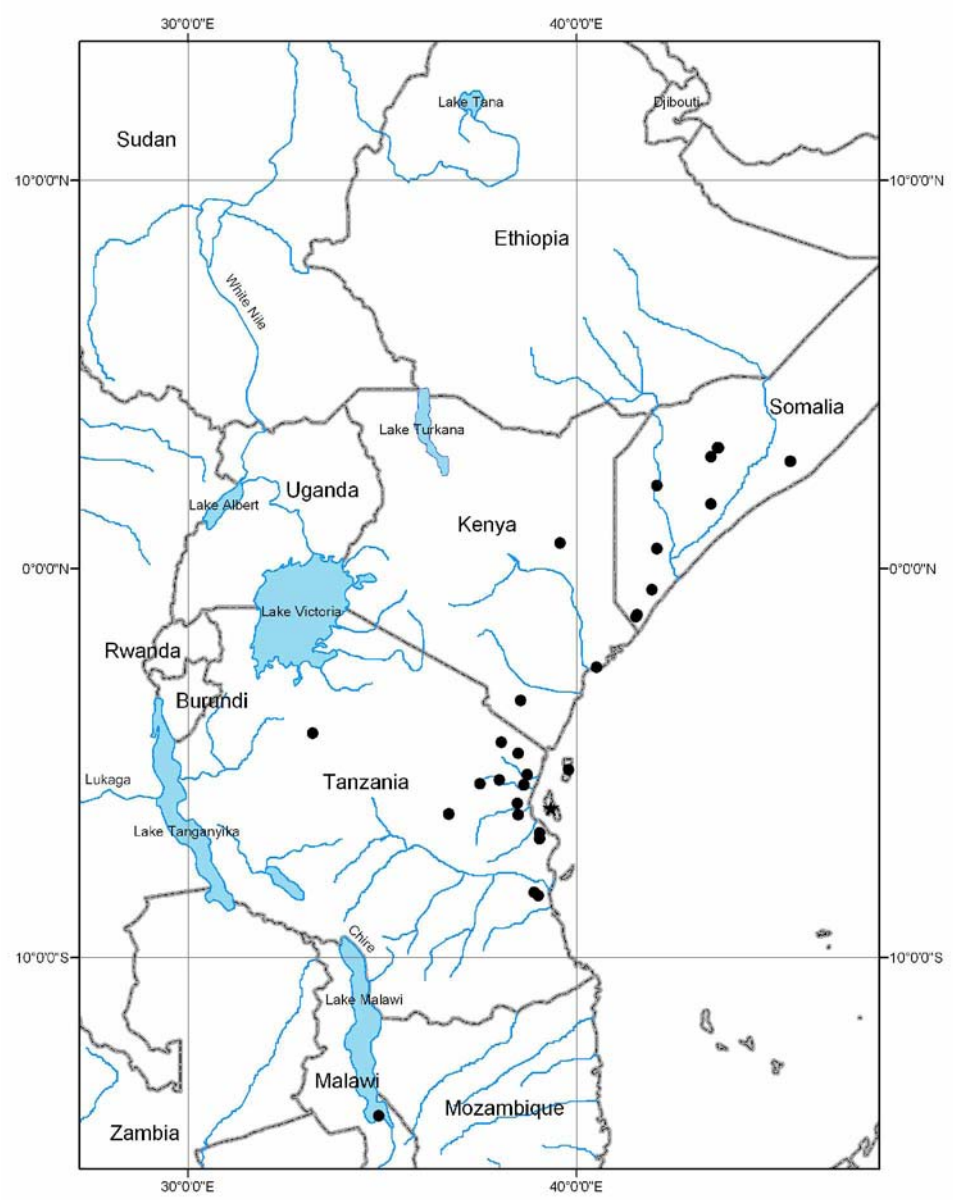


FIGURE 179. Summary of the distribution of *Potamonautes obesus* (A. Milne-Edwards, 1868) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Barnard 1950; Pretzmann 1977). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

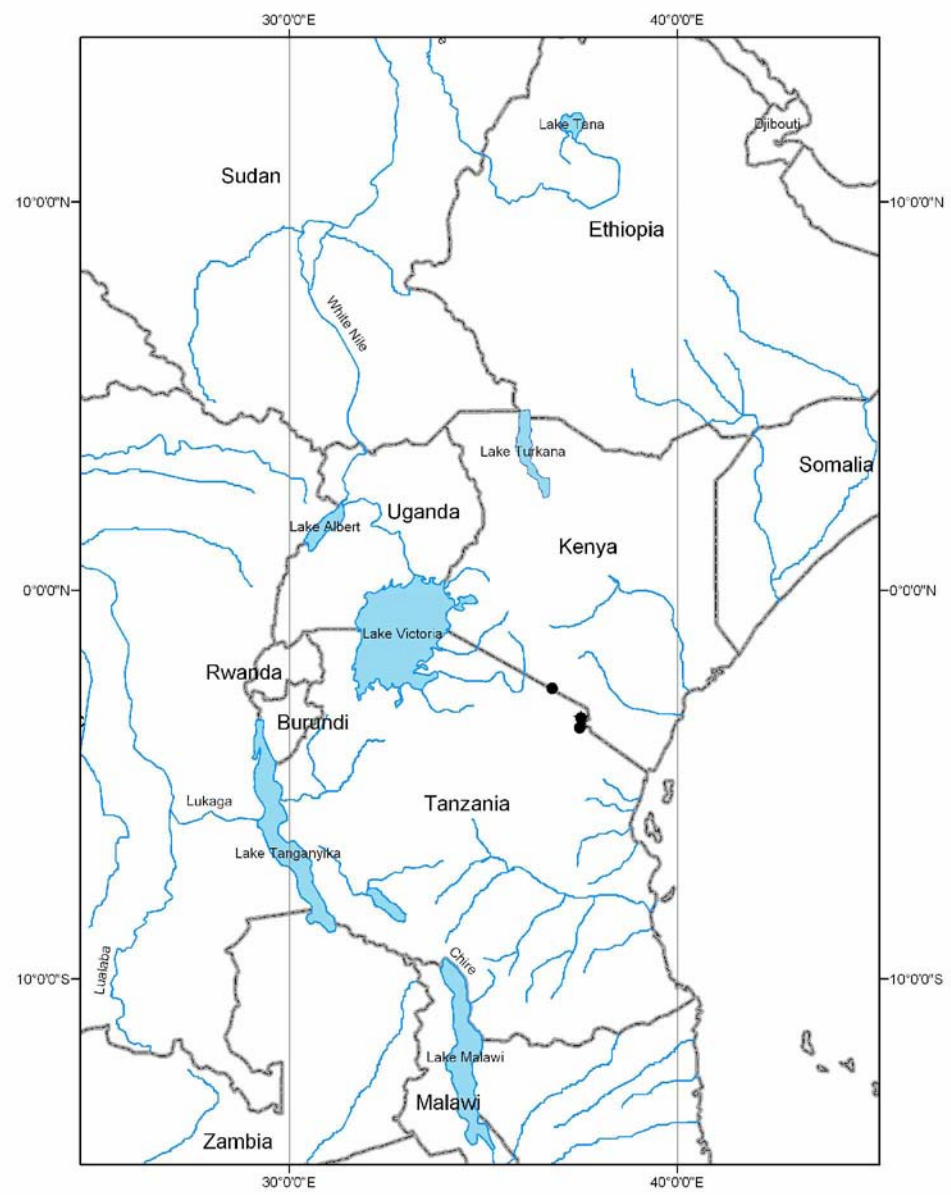


FIGURE 180. Summary of the distribution of *Potamonautes pilosus* (Hilgendorf, 1898) (black circles). The black star denotes the type locality. Data are taken from the present study. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

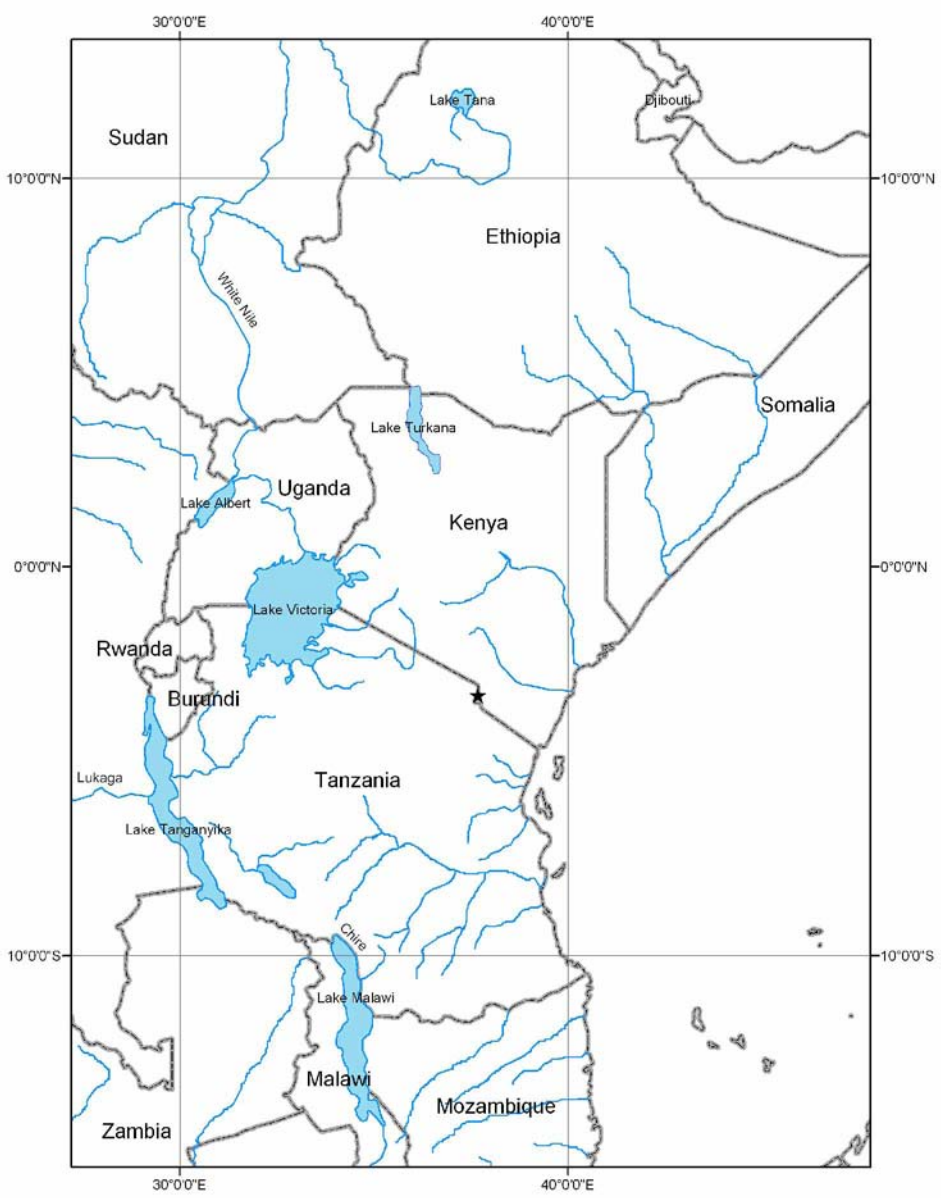


FIGURE 181. Summary of the distribution of *Potamonautes platycentron* (Hilgendorf, 1897) (black circles). The black star denotes the type locality. Data are taken from the present study. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

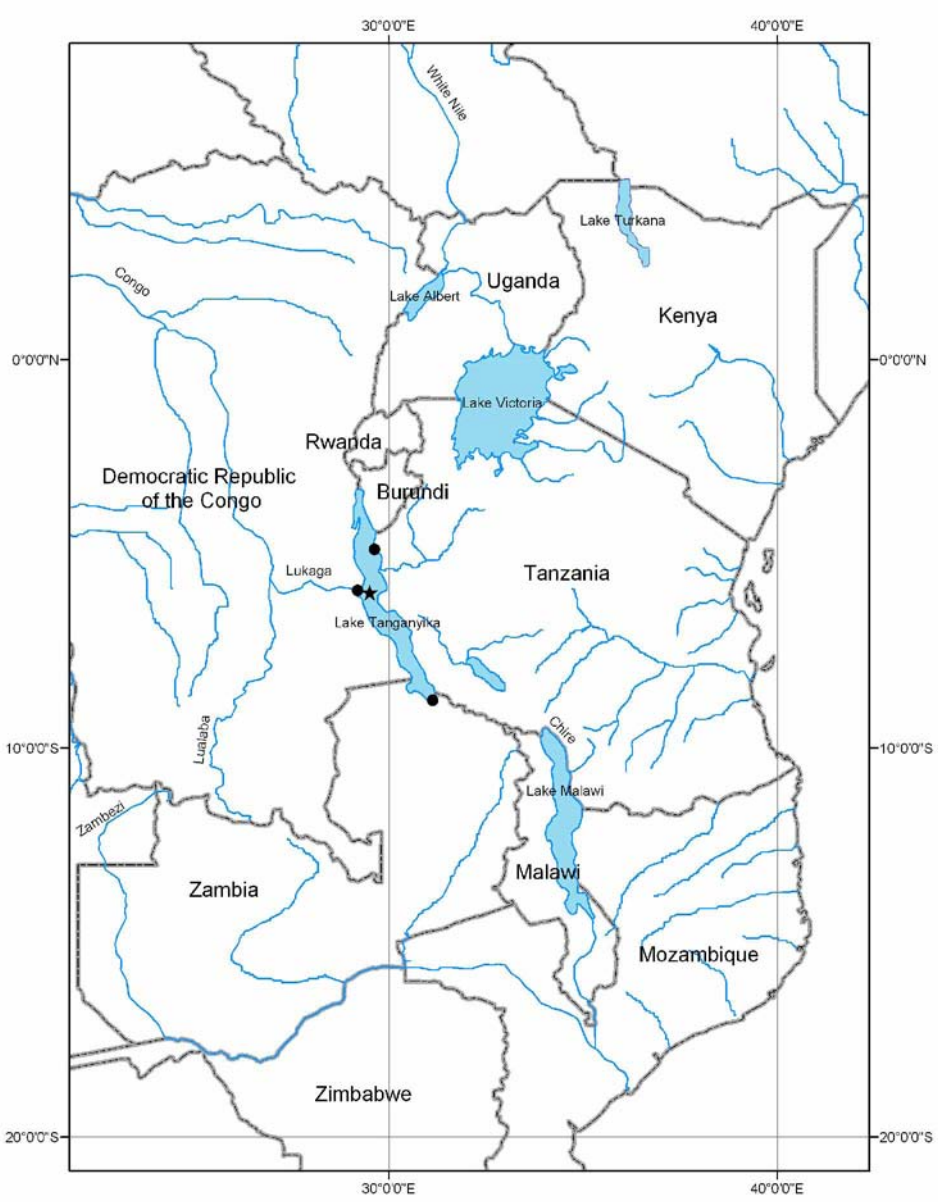


FIGURE 182. Summary of the distribution of *Potamonautes platynotus* (Cunnington, 1907) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Cumberlidge 1998). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

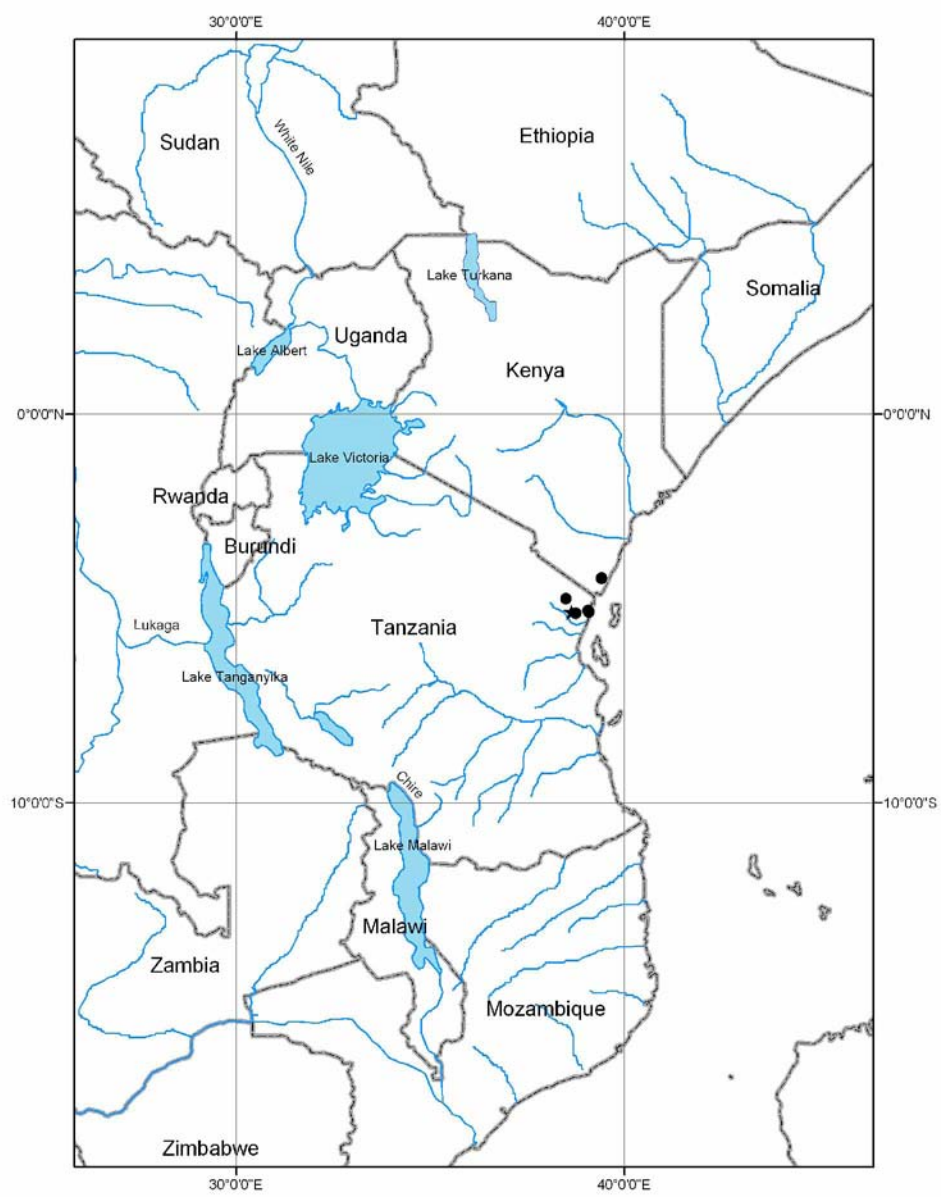


FIGURE 183. Summary of the distribution of *Potamonautes raybouldi* Cumberlidge & Vaninni, 2004 (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Cumberlidge & Vannini 2004). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

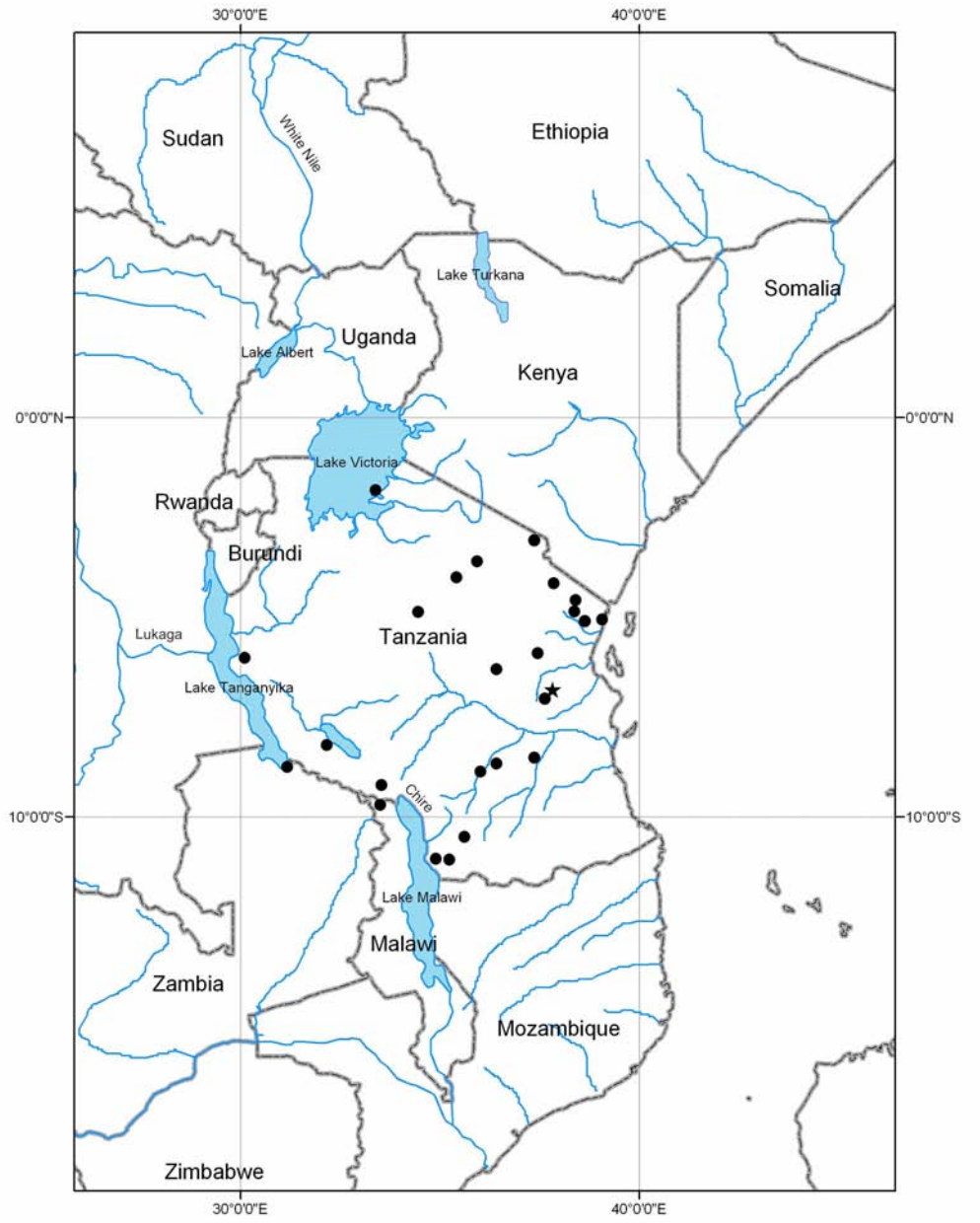


FIGURE 184. Summary of the distribution of *Potamonautes suprasulcatus* (Hilgendorf, 1898) (black circles). The black star denotes the type locality. Data are taken from the present study. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

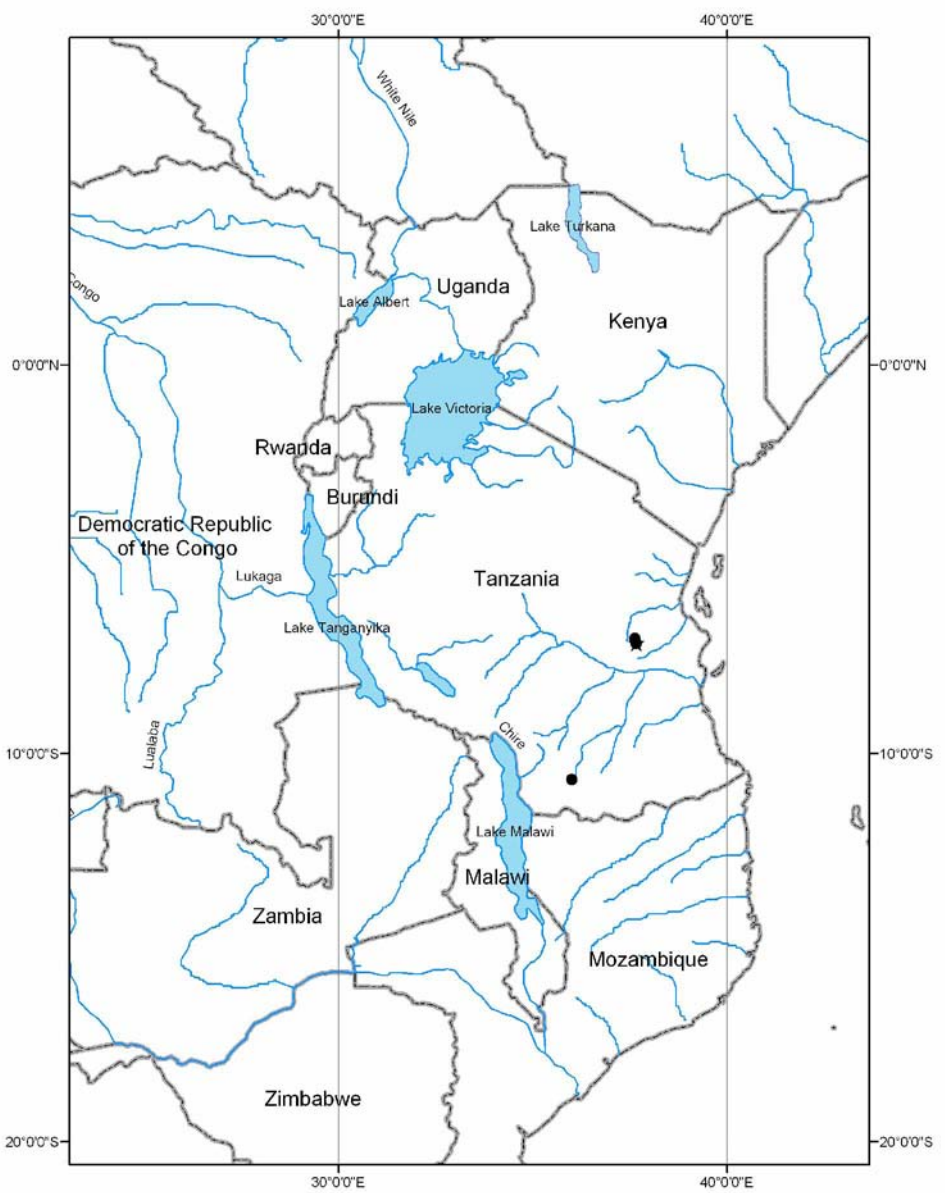


FIGURE 185. Summary of the distribution of *Potamonautes unisulcatus* (Rathbun, 1933) (black circles). The black star denotes the type locality. Data are taken from the present study and the literature (Rathbun 1933). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

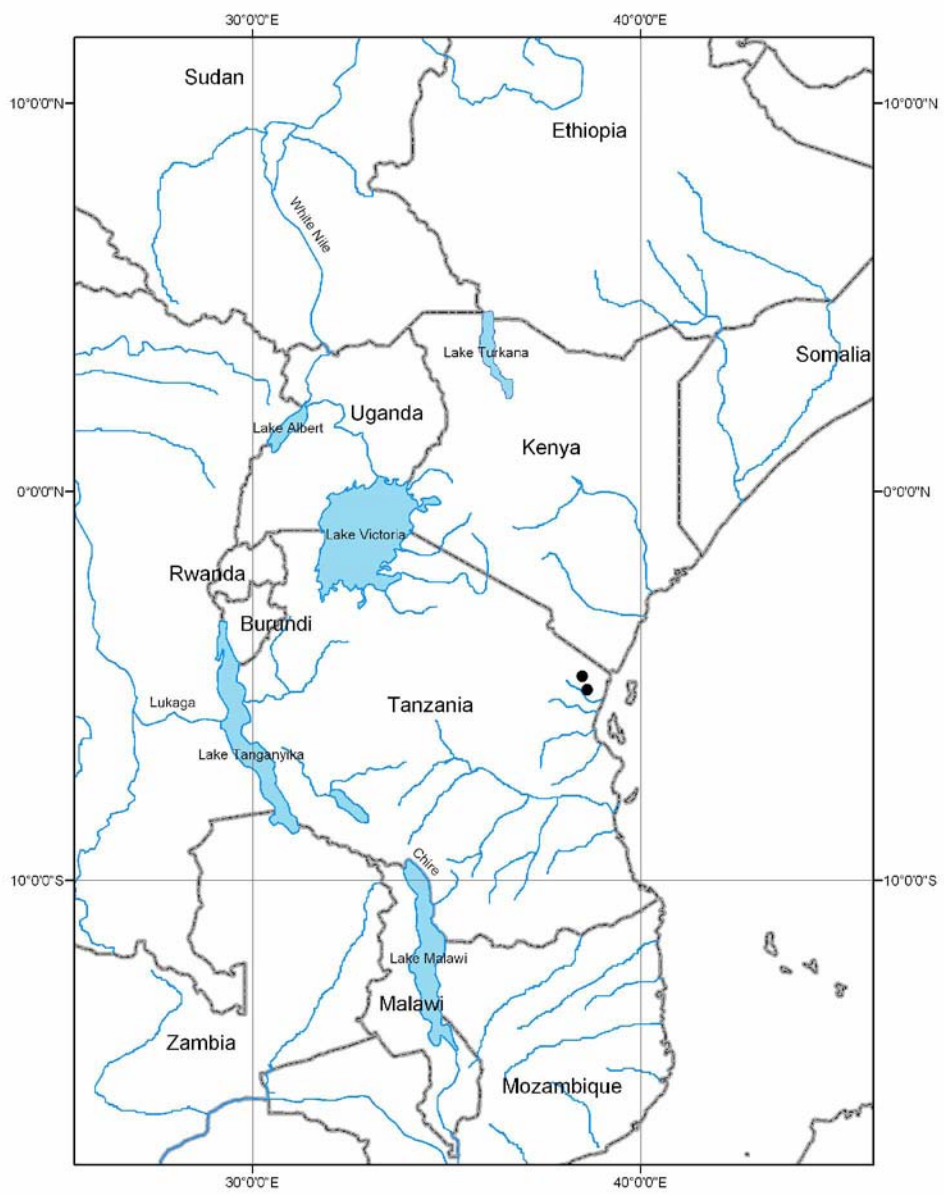


FIGURE 186. Summary of the distribution of *Potamonautes xiphoidus* n. sp. (black circles). The black star denotes the type locality. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

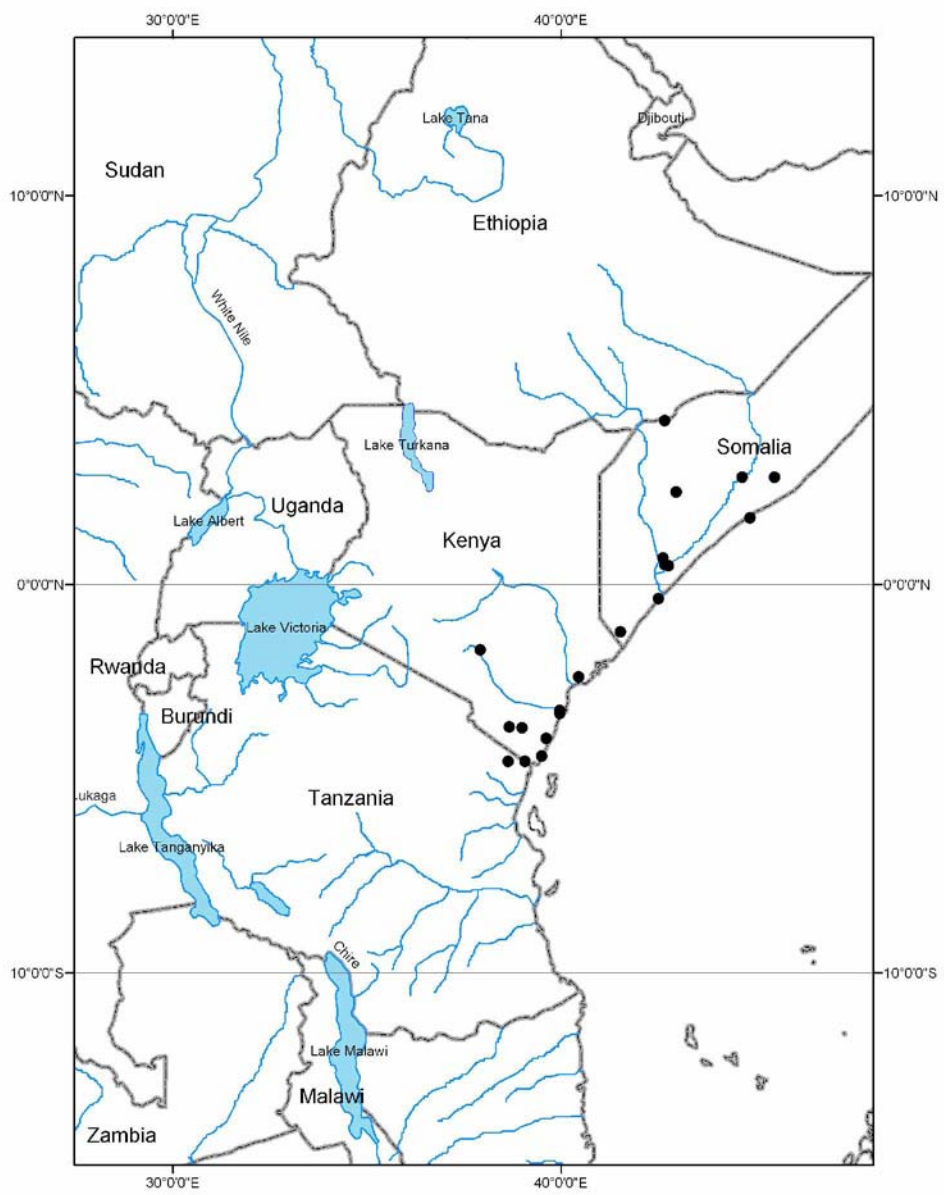


FIGURE 187. Summary of the distribution of *Deckenia imitatrix* (black circles). The black star denotes the type locality. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

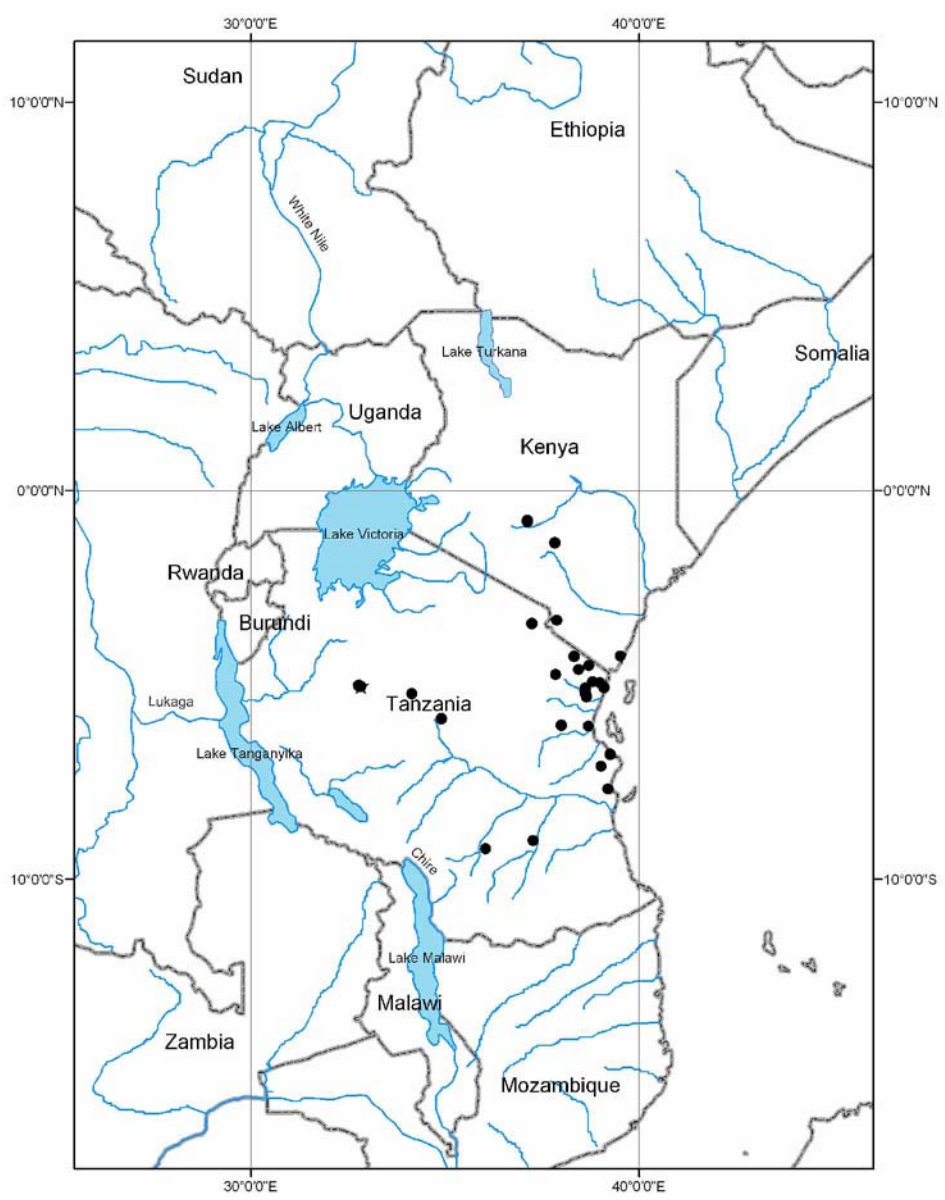


FIGURE 188. Summary of the distribution of *Deckenia mits* (black circles). The black star denotes the type locality. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

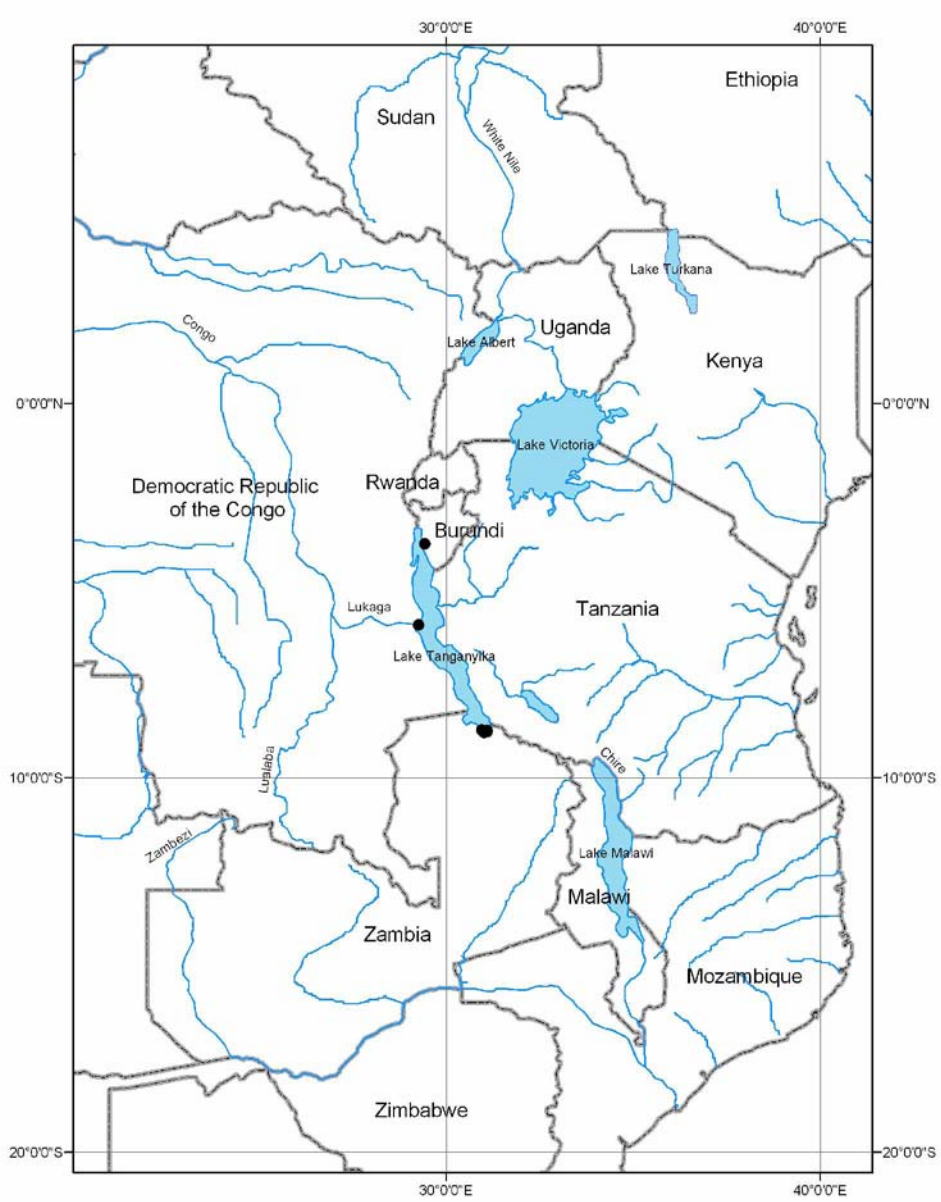


FIGURE 189. Summary of the distribution of *Platythelphusa armata* (black circles). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

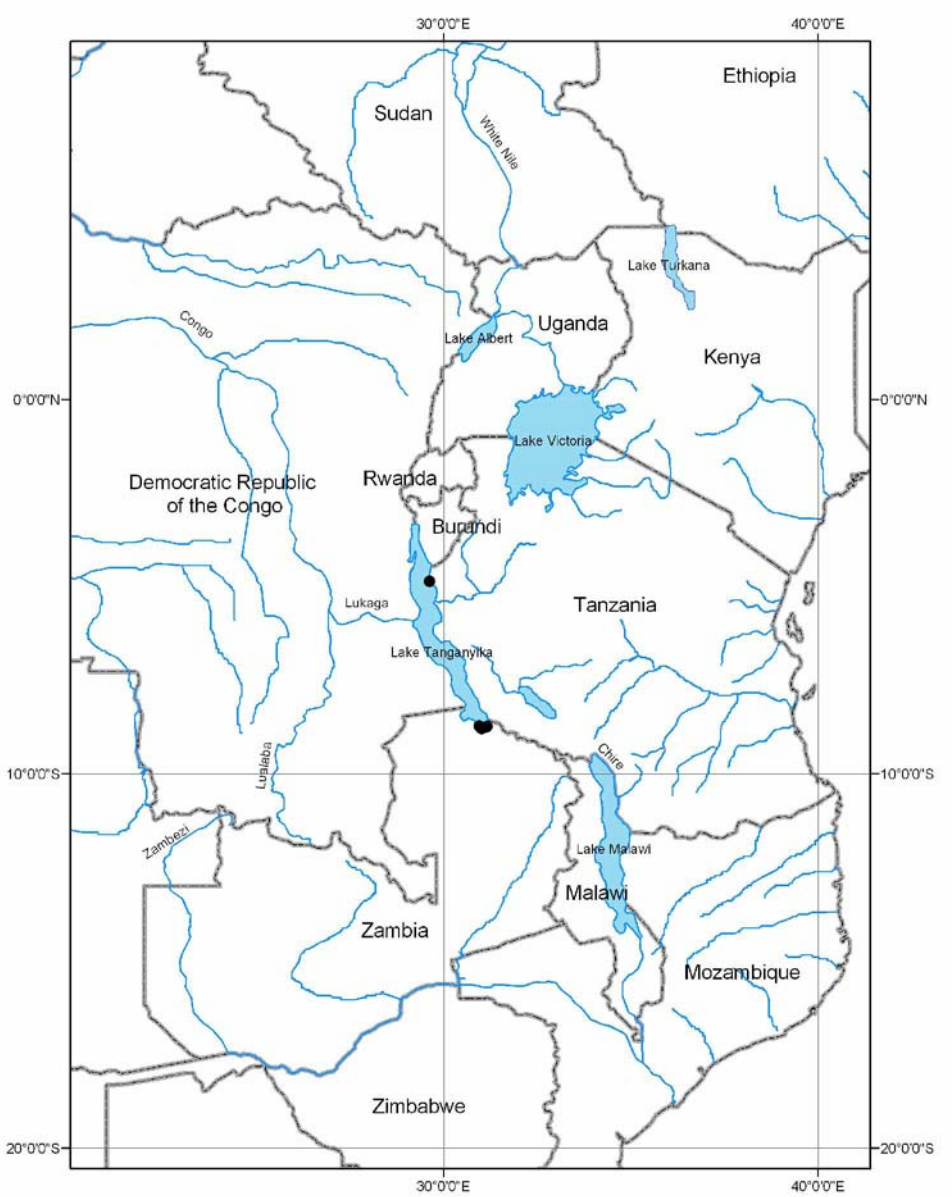


FIGURE 190. Summary of the distribution of *Platythelphusa conculcata* (black circles). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

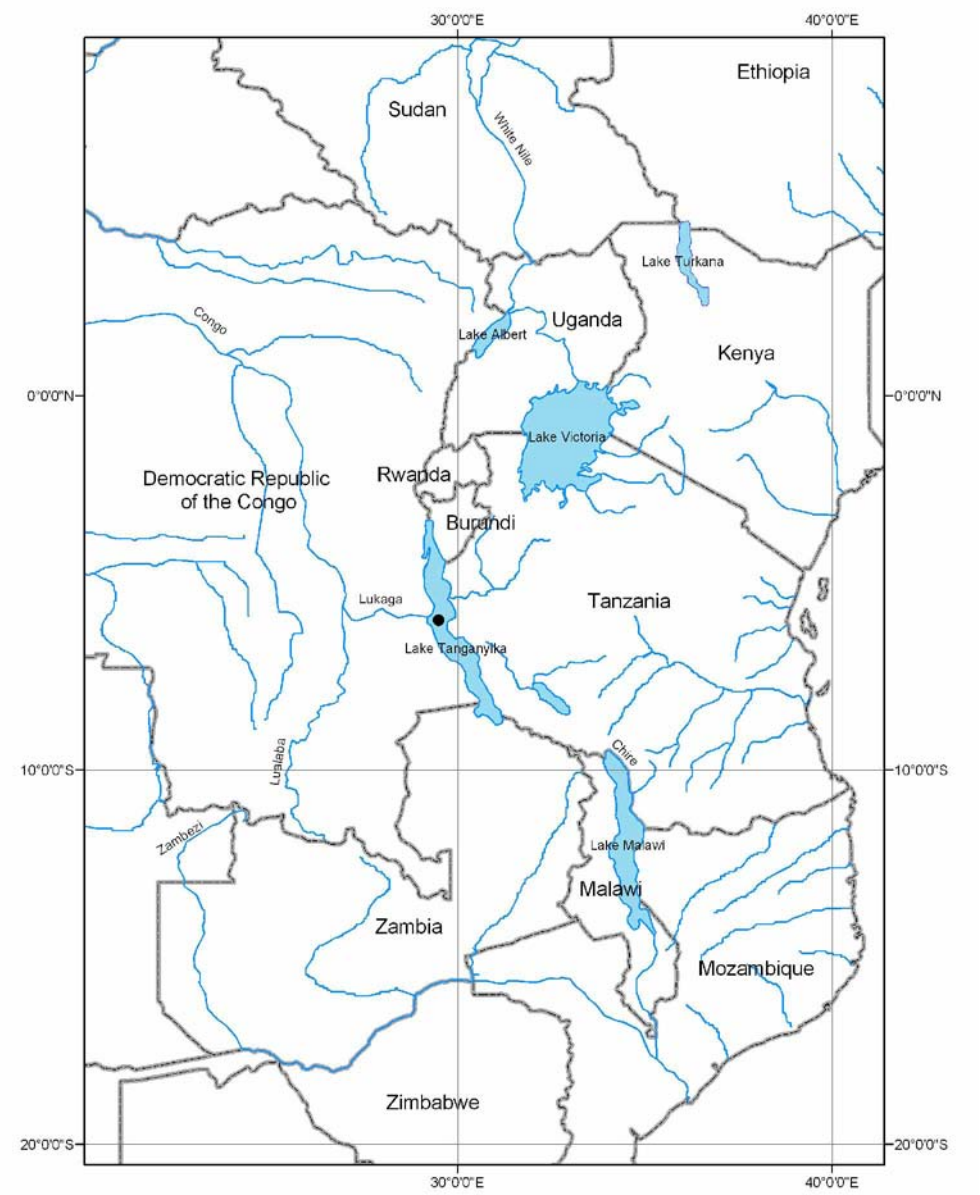


FIGURE 191. Summary of the distribution of *Platythelphusa denticulata* (black circles). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

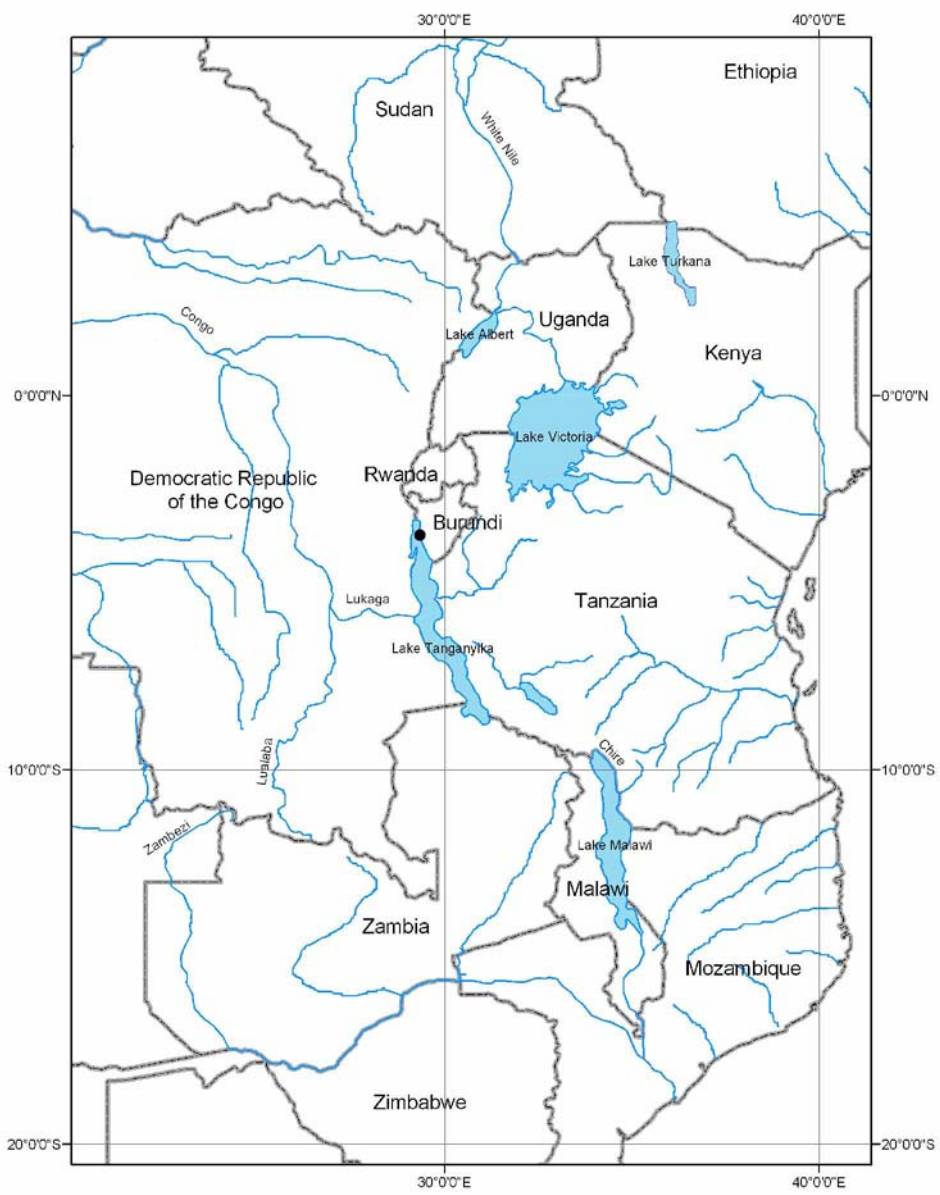


FIGURE 192. Summary of the distribution of *Platythelphusa echinata* (black circles). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

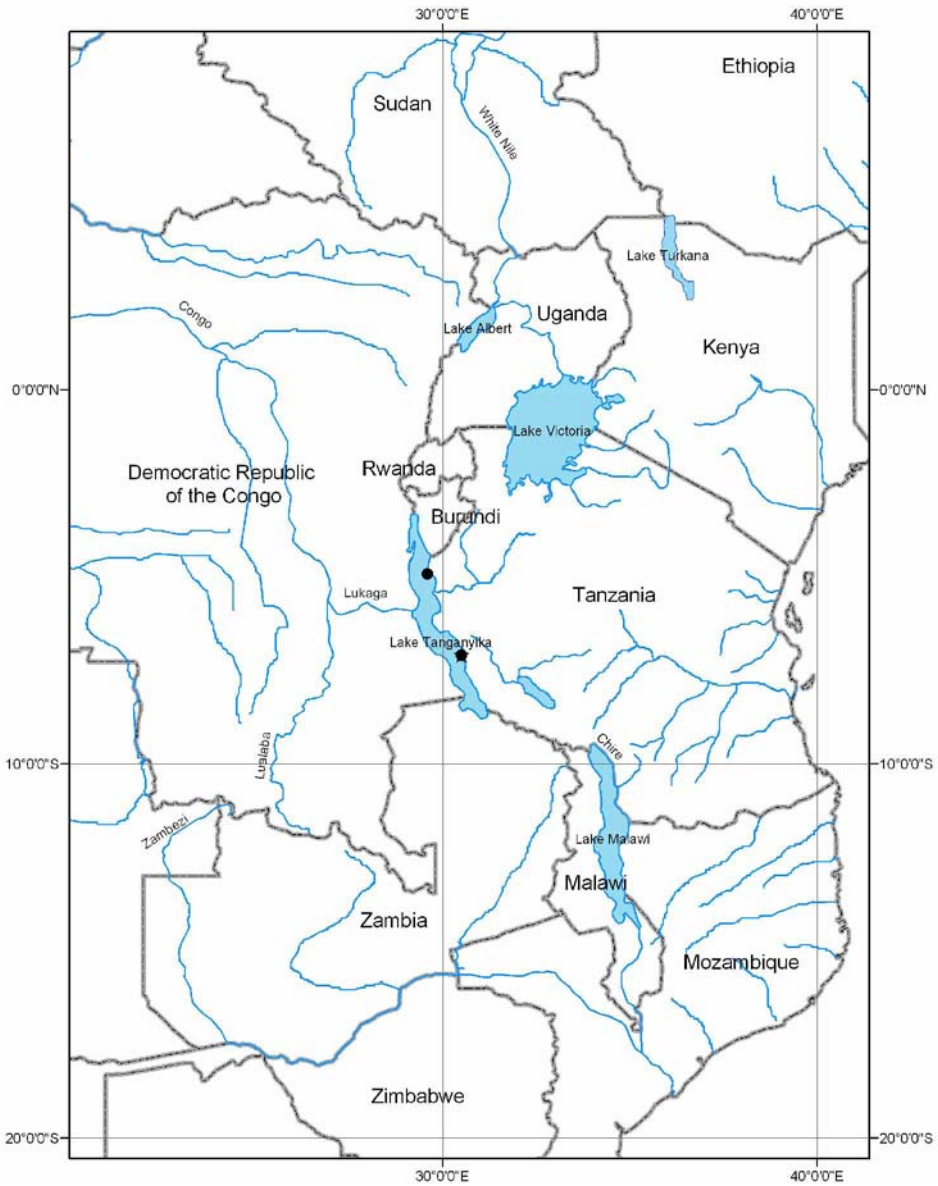


FIGURE 193. Summary of the distribution of *Platythelphusa immaculata* (black circles). The black star denotes the type locality. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

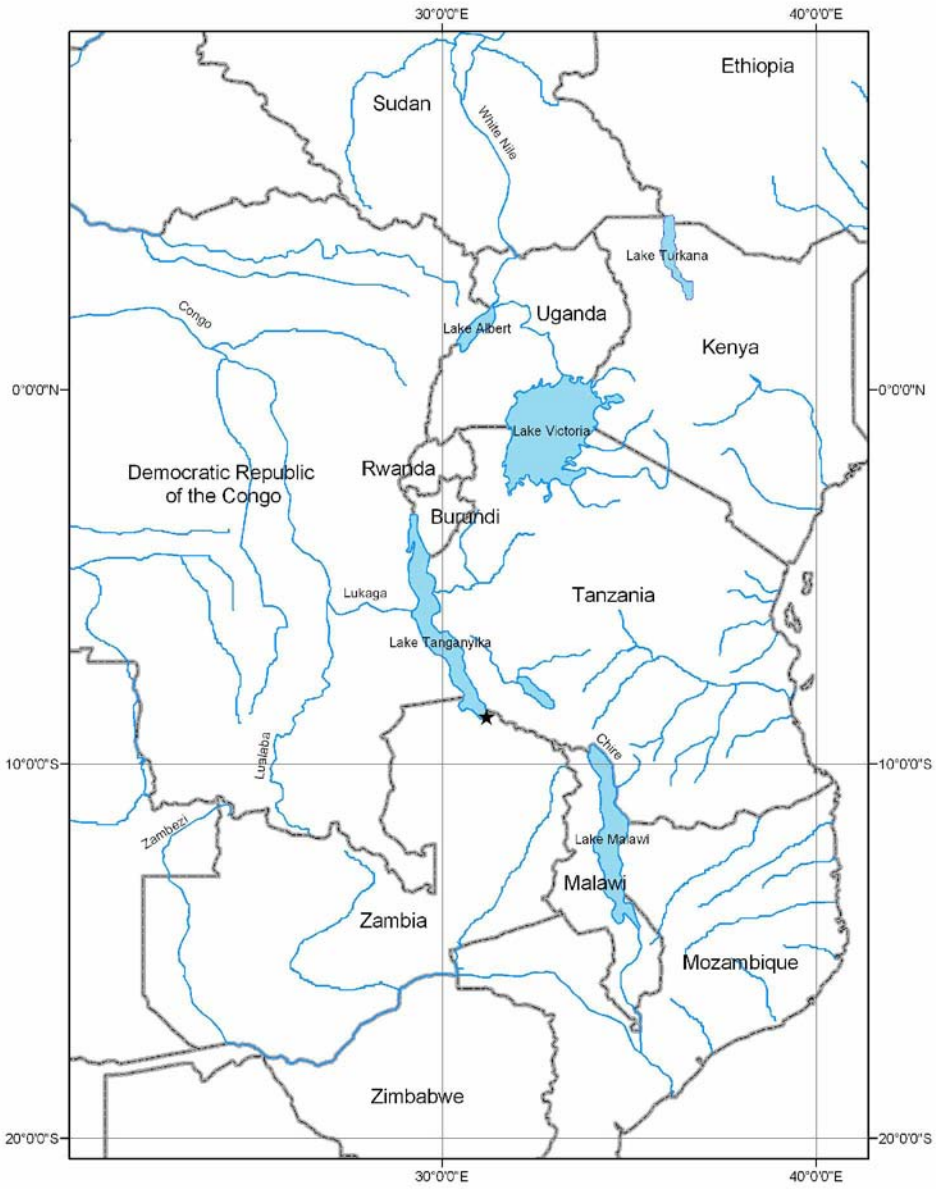


FIGURE 194. Summary of the distribution of *Platythelphusa maculata* (black circles). The black star denotes the type locality. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

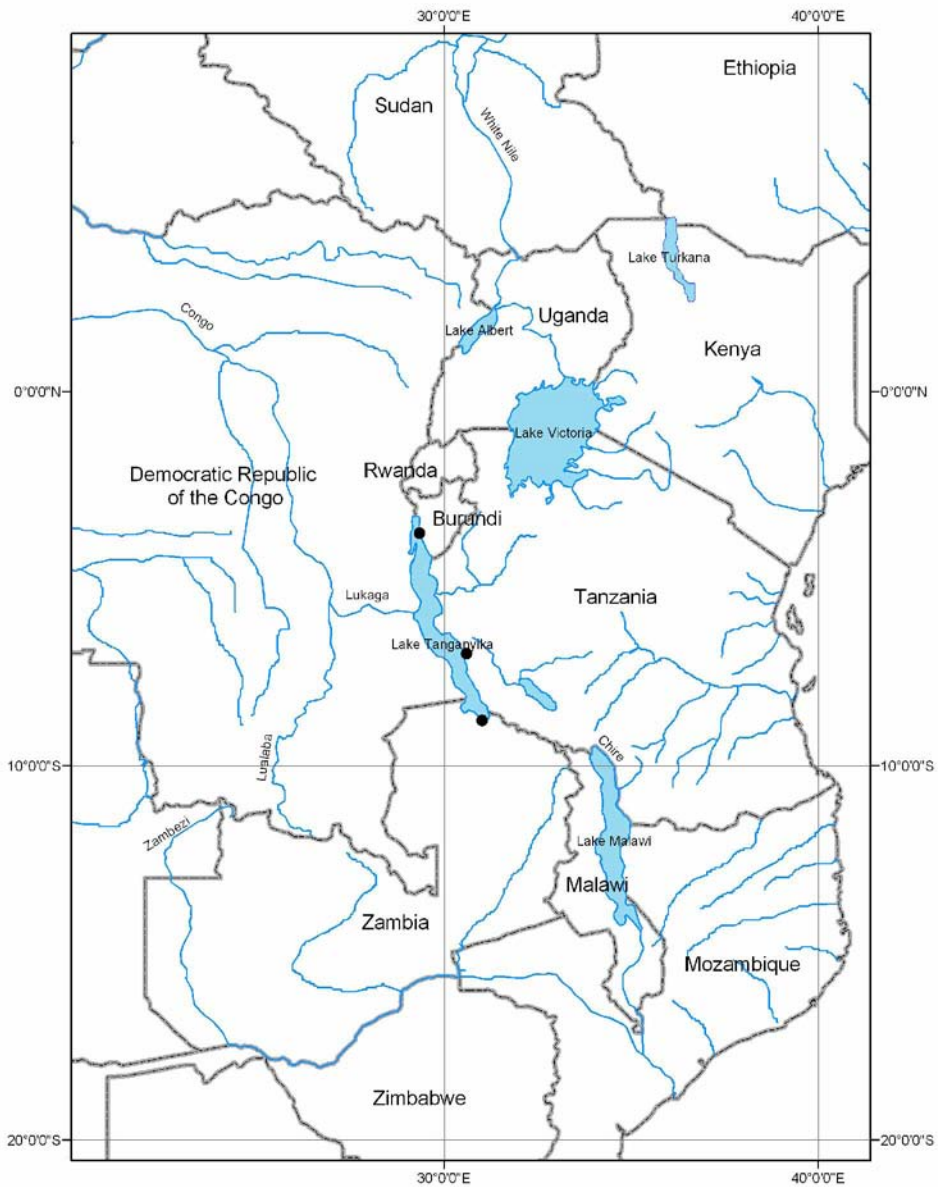


FIGURE 195. Summary of the distribution of *Platythelphusa polita* (black circles). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

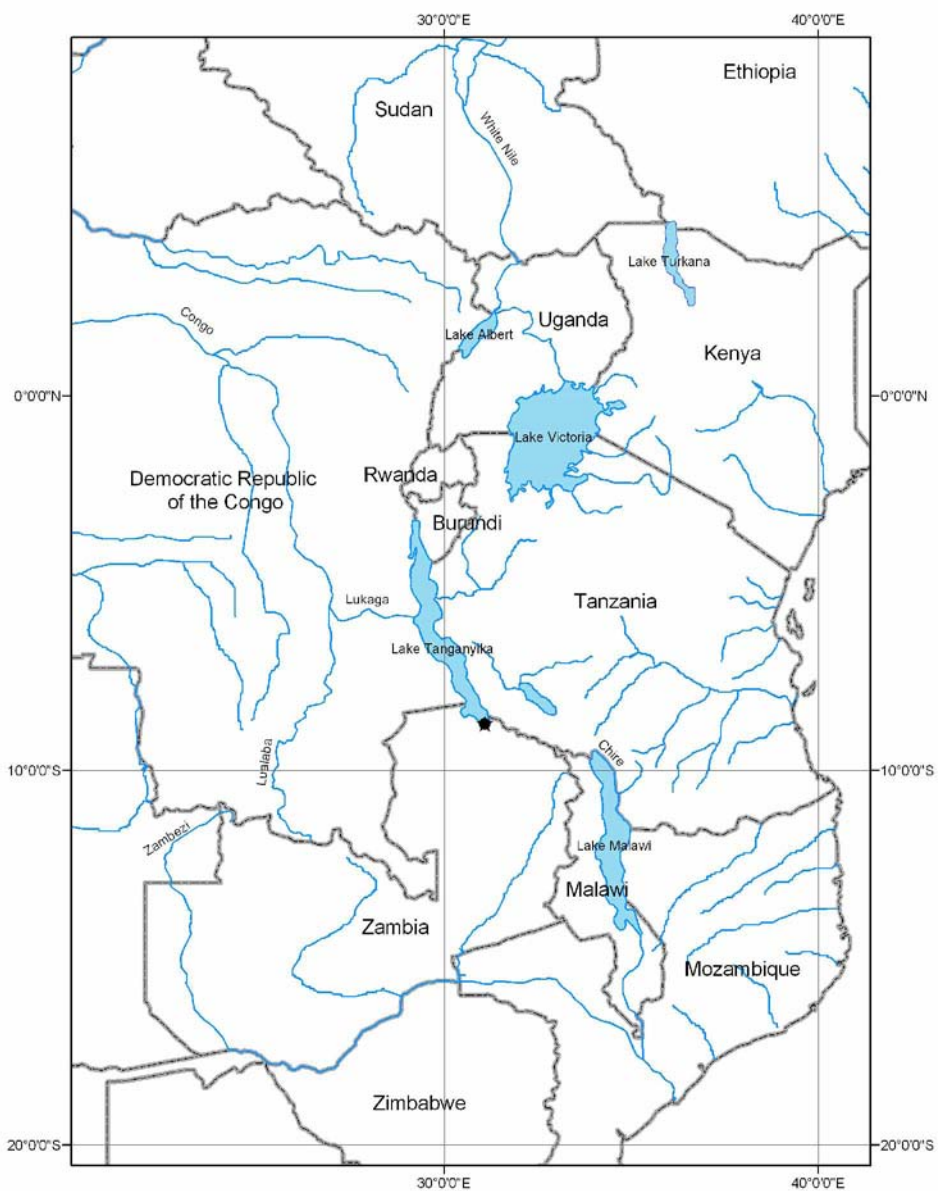


FIGURE 196. Summary of the distribution of *Platythelphusa praelongata* (black circles). The black star denotes the type locality. Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

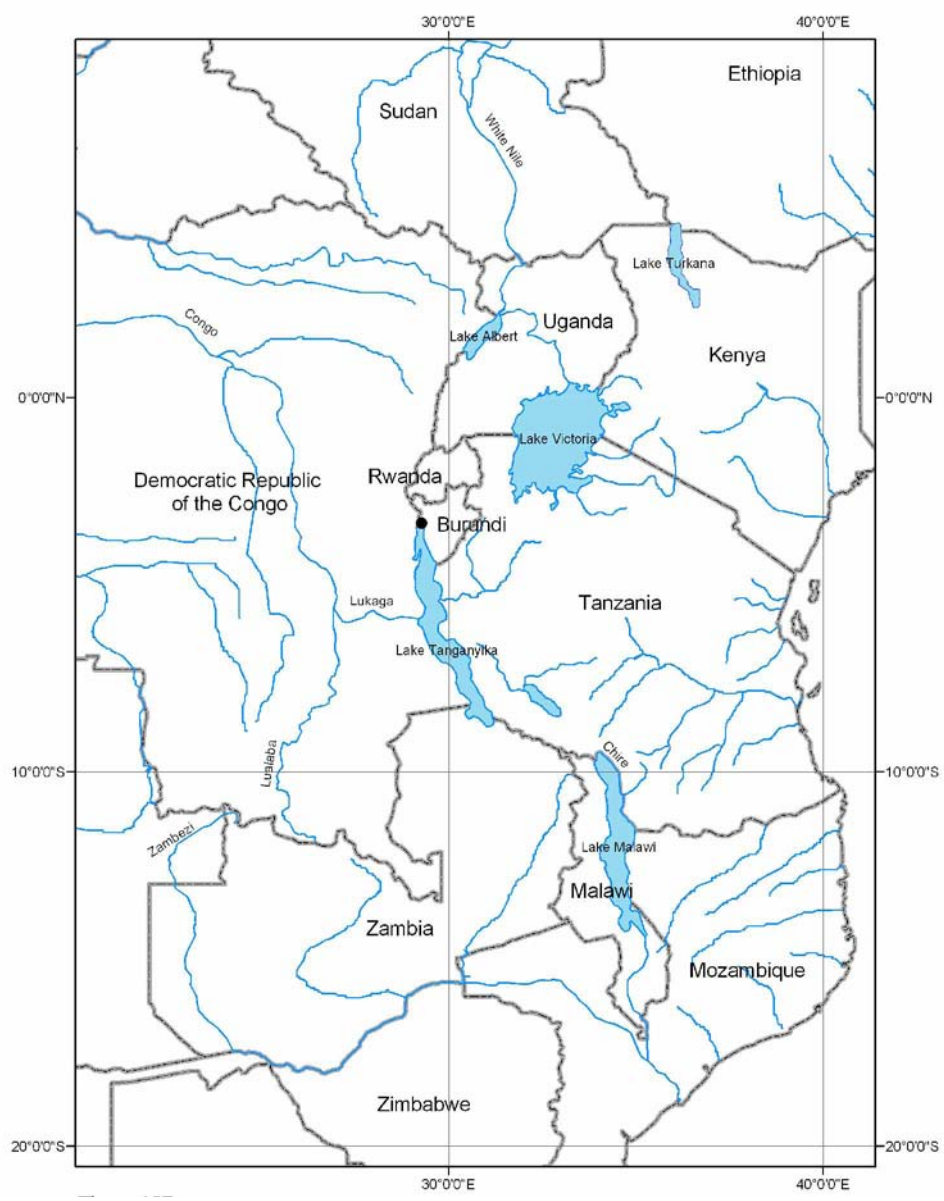


FIGURE 197. Summary of the distribution of *Platythelphusa tuberculata* (black circles). Country boundaries are shown with a shaded dashed line. Solid lines represent permanent waters of the region.

Appendix. A gazetteer including all known localities for the taxa included in this study.

Locality	Country	Latitude	Longitude	Species
Lake Tanganyika, Ruzizi river mouth	Burundi	03°21’15”S	29°16’50” E	*P. tuberculata*
Lake Tanganyika, at Makara	Burundi	03°43’50” S	29°20’50’’ E	*P. echinata*
Lake Tanganyika, Rumonge	Burundi	03°45’20’’ S	29°25’35’’ E	*P. armata*
Lake Tanganyika, near Gitaza	Burundi	03°46’50’’ S	29°20’35’’ E	*P. polita*
Lake Tanganyika, Kigoma bay at Luanza Point	Burundi	04°51’15’’ S	29°37’25’’ E	*P. conculcata*
Liranga	D. R. Congo	00°39’00’’ S	17°36’26’’ E	*P. lirrangensis*
Lukolela	D. R. Congo	01°03’00’’ S	17°12’00’’ E	*P. lirrangensis*
Kalemie	D. R. Congo	05°56’00’’ S	29°12’00’’ E	*P. platynotus* *P. armata*
Kasiki	D. R. Congo	17°22’00’’ S	24°24’00’’ E	*P. loveridgei*
Kisangani	D. R. Congo	00°30’00’’ N	25°12’00’’ E	*P. lirrangensis*
Arabuko-Sokoke Forest	Kenya	03º15’00’’ S	39º58’00’’ E	*D. imitatrix*
Comarock, Athi plains	Kenya	01º20’00’’ S	37º50’00’’ E	*D. mitis*
Gazi	Kenya	04º25’00’’ S	39º30’00’’ E	*D. imitatrix*
Girdalo	Kenya	1°56’00’’ S	35°20’00’’ E	*P. gerdalensis*
Kadiaro	Kenya	03º40’00’’ S	38º40’00’’ E	*D. imitatrix*
Kibwezi	Kenya	02°19’00’’ S	38°07’00’’ E	*P. johnstoni*
Kisii	Kenya	00°41’00’’ S	34°46’00’’ E	*P. gerdalensis*
Kisu	Kenya	00°58’00’’ S	34°29’00’’ E	*P. gerdalensis*
Lorian Marsh	Kenya	00°40’00’’ N	39°35’00’’ E	*P. obesus*
Malindi	Kenya	03º13’00’’ S	40º70’00’’ E	*D. imitatrix*
Mbolo	Kenya	03°17’00’’ S	38°28’00’’ E	*P. johnstoni*
Mida creek	Kenya	03º19’00’’ S	39º58’00’’ E	*D. imitatrix*
Mombasa	Kenya	04º20’00’’ S	39º40’00’’ E	*D. mitis*
Murang’a	Kenya	00º47’00’’ S	37º08’00’’ E	*D. mitis*
Namanga Hill	Kenya	2º31’00’’ S	36º47’00’’ E	*P. pilosus*
Pokomonie	Kenya	02º23’00’’ S	40º27’00’’ E	*D. imitatrix*
Samburu	Kenya	03º46’00’’ S	49º16’00’’ E	*D. imitatrix*
Shimba Hills National Park	Kenya	04°13’00’’ S	39°25’00’’ E	*P. raybouldi*
Taru	Kenya	03º41’00’’ S	39º00’00’’ E	*D. imitatrix*
Taveta	Kenya	03°32’00’’ S	37°29’00’’ E	*P. johnstoni*
Tiwi	Kenya	04º13’00’’ N	39º34’00’’ E	*D. mitis*
Voi	Kenya	03°23’00’’ S	38°34’00’’ E	*P. obesus*
Lake Nyasa	Malawi	12°00’00’’ S	34°30’00’’ E	*P. lirrangensis*
Mhandwe stream	Malawi	14°05’00’’ S	34°55’00’’ E	*P. obesus*

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Appendix (continued)

Locality	Country	Latitude	Longitude	Species
Monkey Bay	Malawi	14°03’00’’ S	35°55’00’’ E	*P. lirrangensis*
Wilindi Forest	Malawi	09°42’00’’ S	33°30’00’’ E	*P. suprasulcatus*
Afgoi	Somalia	02°08’30’’ N	42°03’59’’ E	*P. obesus*
Afmedu	Somalia	00°31’03’’ N	42°03’59’’ E	*P. obesus*
				D. imitatrix
Baidoa	Somalia	03°07’00’’ N	43°39’00’’ E	*P. obesus*
Bur Akaba mountain	Somalia	02º46’00’’ N	44º40’00’’ E	*D. imitatrix*
Chisimaio	Somalia	00º22’00’’ S	42º31’00’’ E	*D. imitatrix*
Dinsor	Somalia	02º23’00’’ N	42º58’00’’ E	*D. imitatrix*
Eil	Somalia	07º58’00’’ N	49º49’00’’ E	*D. imitatrix*
Gavani	Somalia	02º23’00’’ N	42º58’00’’ E	*D. imitatrix*
Gelib, Giuba river	Somalia	00º29’00’’ N	42º46’00’’ E	*D. imitatrix*
Giohar	Somalia	02°46’00’’ N	45°31’00’’ E	*P. obesus*
				D. imitatrix
Giuba	Somalia	00º14’00’’ N	42º38’00’’ E	*D. imitatrix*
Lac Badana	Somalia	00°44’00’’ S	42°32’00’’ E	*P. obesus*
Matagoi Bool	Somalia	01°40’00’’ N	43°28’00’’ E	*P. obesus*
Misciani river	Somalia	01º43’00’’ N	44º52’00’’ E	*D. imitatrix*
Ogarca	Somalia	04º13’00’’ N	42º40’00’’ E	*D. imitatrix*
Ola Uager	Somalia	01°14’00’’ S	41°32’00’’ E	*P. obesus*
				D. imitatrix
Amani	Tanzania	05°06’00’’ S	38°38’00’’ E	*P. infravallatus*
				P. johnstoni
				P. raybouldi
				P. suprasulcatus
				P. xiphoidus
				D. mitis
Bagamoyo, Ruvu River	Tanzania	05º12’00’’ S	38º37’00’’ E	*D. mitis*
Bukoba	Tanzania	01°50’00’’ S	31°49’00’’ E	*P. emini*
Bunduki	Tanzania	07°02’00’’ S	37°38’00’’ E	*P. suprasulcatus*
Cham Hawi	Tanzania	06°18’00’’ S	36°25’00’’ E	*P. suprasulcatus*
Dar es Salaam	Tanzania	06°48’00’’ S	39°03’00’’ E	*P. obesus*
				D. mitis
Derema	Tanzania	05°38’00’’ S	37°30’00’’ E	*P. infravallatus*
Genda Genda Forest	Tanzania	05°34’00’’ S	38°39’00’’ E	*P. obesus*
Girdalo	Tanzania	01°56’00’’ S	35°20’00’’ E	*P. gerdalensis*

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Appendix (continued)

Locality	Country	Latitude	Longitude	Species
Gonja, Same District	Tanzania	04º16’00’’ S	38º20’00’’ E	*D. mitis*
Handemi	Tanzania	05°26’00’’ S	38°01’00’’ E	*P. obesus*
Herkulu Estate, Usambara Mountains, Lushoto District	Tanzania	04°47’00’’ S	38°17’00’’ E	*P. xiphoidus*
Iringa Mts.	Tanzania	01°49’00’’ S	33°23’00’’ E	*P. suprasulcatus*
Itete	Tanzania	08°40’00’’ S	36°25’00’’ E	*P. suprasulcatus*
Kahe	Tanzania	03°30’00’’ S	37°26’00’’ E	*P. johnstoni*
Kanyamugua River	Tanzania	01°50’00’’ S	31°36’00’’ E	*P. emini*
Kazimzumbwi Forest Reserve	Tanzania	06°57’00’’ S	39°03’00’’ E	*P. obesus*
Kibati	Tanzania	05°54’00’’ S	37°27’00’’ E	*P. suprasulcatus*
Kibosho	Tanzania	03°15’00’’ S	37°19’00’’ E	*P. johnstoni*
Kigoma	Tanzania	04°52’00’’ S	29°38’00’’ E	*P. lirrangensis*
Kihurio, Gonja	Tanzania	04°28’00’’ S	38°04’00’’ E	*P. obesus*
Kilimanjaro	Tanzania	03°04’00’’ S	37°22’00’’ E	*P. suprasulcatus* *P. johnstoni*
Kilimatinde	Tanzania	05º52’00’’ S	34º55’00’’ E	*D. mitis*
Kilombero River	Tanzania	08°31’00’’ S	37°22’00’’ E	*P. suprasulcatus*
Kilwa	Tanzania	05°32’00’’ S	37°31’00’’ E	*P. obesus*
Kiono Forest (= Zaraninge forest, Bagamoyo District, Kiono Plateau)	Tanzania	06°20’00’’ S	38°30’00’’ E	*P. obesus* *D. mitis*
Kipoke River	Tanzania	09°12’00’’ S	33°32’00’’ E	*P. suprasulcatus*
Kitange-Tange River	Tanzania	07°02’00’’ S	37°38’00’’ E	*P. unisulcatus*
Lake Chala	Tanzania	03°19’00’’ S	37°41’00’’ E	*P. platycentron* *P. johnstoni*
Lake Manyara	Tanzania	03°36’00’’ S	35°56’00’’ E	*P. suprasulcatus*
Lake Tanganyika	Tanzania	06°00’00’’ S	29°30’00’’ E	*P. platynotus* *P. suprasulcatus* *P. loveridgei* *P. denticulata*
Lake Tanganyika, South of Kabwe, Utinta Bay	Tanzania	07°00’00’’ S	30°36’00’’ E	*P. polita*
Lake Tanganyika, Cape Mpimbwe near Katondo Point	Tanzania	07°05.59’ S	30°30.00’ E	*P. immaculata*
Lake Tanganyika, Mzungu Point	Tanzania	04°55.05’ S	29°35.73’ E	*P. immaculata*
Lindi	Tanzania	09°50’00’’ S	39°43’00’’ E	*P. johnstoni*
Lipupuma	Tanzania	10°30’00’’ S	35°37’00’’ E	*P. suprasulcatus*
Litipo Forest Reserve	Tanzania	06°02’00’’ S	38°29’00’’ E	*P. obesus*

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Appendix (continued)

Locality	Country	Latitude	Longitude	Species
Lushoto	Tanzania	04°40’00’’ S	38°20’00’’ E	*P. loveridgei*
Magoroto Hill	Tanzania	05°07’00’’ S	38°45’00’’ E	*P. raybouldi*
Magrotto	Tanzania	05°07’00’’ S	38°45’00’’ E	*P. infravallatus*
Mahenge Mts.	Tanzania	04°52’00’’ S	34°27’00’’ E	*P. suprasulcatus*
Makangala	Tanzania	04°34’00’’ S	38°24’00’’ E	*P. suprasulcatus*
Malagarasi	Tanzania	05°12’00’’ S	29°47’00’’ E	*P. lirrangensis*
Mangea Hill	Tanzania	04°19’49’’ S	39°31’47’’ E	*P. raybouldi*
Marangu	Tanzania	03°17’00’’ S	37°31’00’’ E	*P. johnstoni* *P. pilosus*
Matumbi Forest	Tanzania	08°20’00’’ S	38°55’00’’ E	*P. obesus*
Mbinga stream	Tanzania	11°04’00’’ S	35°14’00’’ E	*P. suprasulcatus*
Mkulusi	Tanzania	10°48’00’’ S	35°03’00’’ E	*P. unisulcatus*
Mkusu River	Tanzania	04°51’00’’ S	38°22’00’’ E	*P. suprasulcatus*
Mlali.	Tanzania	06°19’00’’ S	36°43’00’’ E	*P. obesus*
Mount Meru	Tanzania	03º25’00’’ S	36º75’00’’ E	*D. mitis*
Mount Tongwe	Tanzania	05°18’00’’ S	38°44’00’’ E	*P. obesus*
Muheza	Tanzania	05°10’00’’ S	38°47’00’’ E	*P. obesus*
Mwembe	Tanzania	04°09’00’’ S	37°51’00’’ E	*P. suprasulcatus*
Ndengu	Tanzania	11°03’00’’ S	34°54’00’’ E	*P. suprasulcatus*
Nyange	Tanzania	06°13’00’’ S	39°08’00’’ E	*P. unisulcatus*
Pemba Island	Tanzania	05°10’00’’ S	39°48’00’’ E	*P. obesus*
Ruaha River, Iringa-Dodoma Road	Tanzania	08°52’00’’ S	36°51’00’’ E	*D. mitis*
Ruhuji River	Tanzania	08°52’00’’ S	36°01’00’’ E	*P. suprasulcatus*
Rungwe Mt.	Tanzania	09°08’00’’ S	33°40’00’’ E	*P. loveridgei*
Sali	Tanzania	08°12’00’’ S	32°10’00’’ E	*P. suprasulcatus*
Segera	Tanzania	5º18’S	38º39’E	*D. mitis*
Sigi River	Tanzania	05°03’00’’ S	39°04’00’’ E	*P. suprasulcatus* *P. raybouldi*
Singi (= Zingi)	Tanzania	04º59’00’’ S	38º45’00’’ E	*D. mitis*
Tabora	Tanzania	5º01’S	32º47’E	*D. mitis*
Tana River	Tanzania	02°32’00’’ S	40°31’00’’ E	*P. obesus*
Tanga	Tanzania	5º04’S	39º06’E	*D. mitis*
Tanga District	Tanzania	05°05’00’’ S	39°05’00’’ E	*P. raybouldi*
Tongwe Forest	Tanzania	05°18’00’’ S	38°44’00’’ E	*P. raybouldi*
Tonoíomba Forest	Tanzania	08°25’00’’ S	39°01’00’’ E	*P. obesus*

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Appendix (continued)

Locality	Country	Latitude	Longitude	Species
Ujiji	Tanzania	04°54’20’’ S	29°40’00’’ E	*P. loveridgei*
Uluguru Mts.	Tanzania	07°10’00’’ S	37°40’00’’ E	*P. unisulcatus*
Usa River	Tanzania	03°26’00’’ S	36°51’00’’ E	*P. johnstoni*
Usambara Mts.	Tanzania	04°45’00’’ S	38°30’00’’ E	*P. obesus* *P. johnstoni* *P. infravallatus*
Uvinza	Tanzania	05°06’00’’ S	30°22’00’’ E	*P. lirrangensis*
Uzongwe (=Uzungwe) Mts.	Tanzania	04°59’00’’ S	31°15’00’’ E	*P. loveridgei*
Wembere Steppe	Tanzania	05º02’00’’ S	32º50’00’’ E	*D. mitis*
Zaraninge Forest	Tanzania	06º02’00’’ S	38º00’00’’ E	*D. mitis*
Near Nyasa & Lake Tanganyika	Tanzania	04°14’00’’ S	33°13’00’’ E	*P. obesus*
Zanzibar	Tanzania	06°10’00’’ S	39°20’00’’ E	*P. obesus*
Lake Muhazi	Rwanda	01°53’43’’ S	30°24’29’’ E	*P. emini*
Ruhengeri	Rwanda	01°53’43’’ S	30°24’29’’ E	*P. emini*
Kigoya	Uganda	02°05’00’’ S	31°26’00’’ E	*P. emini*
Ruwenzori	Uganda	00°25’00’’ N	30°00’00’’ E	*P. emini*
Waki River	Uganda	01°48’00’’ N	31°19’00’’ E	*P. emini*
Lunzua stream	Zambia	08°45’00’’ S	31°10’00’’ E	*P. suprasulcatus*
Lake Tanganyika at Mwela, SW shore	Zambia	08°43’30’’ S	30°57’00’’ E	*P. armata* *P. conculcata*
Lake Tanganyika, Chituta Bay	Zambia	08°43’55’’ S	31°09’40’’ E	*P. conculcata* *P. maculata*
Lake Tanganyika, Onzye Island Rocks	Zambia	08°44’00’’ S	31°07’55’’ E	*P. conculcata*
Lake Tanganyika, Mpulungu at Mbita Island	Zambia	08°44’25’’ S	31°05’45’’ E	*P. armata*
Lake Tanganyika at Musende Rocks, Mpulungu	Zambia	08°45’50’’S	31°05’55’’ E	*P. armata*
Lake Tanganyika at Kombe Point	Zambia	08°45’50’’ S	31°01’15’’ E	*P. armata* *P. conculcata* *P. polita*
Lake Tanganyika off Kazi Beach, north of Mbita Island	Zambia	08°45.226’ S	31°05.148’ E	*P. praelongata*

About the authors

Sadie Reed has a Bachelor's degree in Zoology from Northern Arizona State University, and a Master's degree from Northern Michigan University that included a thesis on the taxonomy, phylogeny, and biogeography of the freshwater crabs of Tanzania. She has a long-standing interest in crustaceans beginning with undergraduate research on a mud-shrimp (*Neotrypaea uncinata*) in the Gulf of California, working on isopods and amphipods at Columbia University's Biosphere II in Arizona as research assistant to Dr. Richard C. Brusca, and interning at the US National Museum of Natural History at the Smithsonian Institution in Washington D.C. for her work on freshwater crabs. She has a growing number of publications on freshwater crabs and other crustaceans. Sadie is currently completing a doctoral dissertation in a dual program at Kent State University and the University of Akron in Ohio on the evolution of the rare androdioecious mating system in the clam shrimp genus, *Eulimnadia* (Crustacea, Branchiopoda).

Originally from Britain, Neil Cumberlidge started to work on African freshwater crabs when he moved to Nigeria to work as a professor of biology. He is now a Professor and Head of the Department of Biology at Northern Michigan University, Marquette, MI, USA and has studied African and Madagascan freshwater crabs for more than 25 years. He has authored over 70 articles, including a book-length monograph *The Freshwater Crabs of West Africa* (*IRD, Paris, 1999*), and has a career-long interest in African freshwater crabs developed while living in Nigeria, Liberia, and in other parts of Africa.

