A REDESCRIPTION OF *POTAMONAUTES LOVENI* (COLOSI, 1924), A MEDICALLY IMPORTANT FRESHWATER CRAB FROM WESTERN KENYA AND EASTERN UGANDA, EAST AFRICA (BRACHYURA, POTAMOIDEA, POTAMONAUTIDAE)

BY

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ABSTRACT

Potamonautes loveni (Colosi, 1924) from western Kenya and eastern Uganda is resurrected from synonymy and redescribed as a valid species. This taxon is compared with similar species and its distribution, ecology, and conservation status are discussed. *Potamonautes loveni* has been implicated in the transmission of onchocerciasis in the highland areas of parts of East Africa.

RÉSUMÉ

Potamonautes loveni (Colosi, 1924) de l'ouest du Kenya et de l'est de l'Ouganda est redécrit comme une espèce valide. Ce taxon est comparé avec les espèces proches et sa repartition, son écologie et son statut de conservation sont discutés. *Potamonautes loveni* a été impliqué dans la transmission de l'onchocercose dans les zones montagneuses de l'Afrique de l'Est.

INTRODUCTION

Potamonautes loveni (Colosi, 1924) is an abundant species of East African freshwater crab that is closely linked with river blindness (onchocerciasis) in the highlands of western Kenya and eastern Uganda. Its distributional range includes Mt. Elgon, a volcanic mountain that straddles the border

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between Uganda and Kenya. *Potamonautes loveni*, however, has long been taxonomically problematic, a fact that is reflected in its extensive synonymy list. For example, the literature (Colosi, 1924; Sjöstedt, 1925; Rathbun, 1935; Roux, 1935; Bott, 1955) includes several described taxa from Mt. Elgon. These include *P.* (*Geothelphusa*) *loveni* Colosi, 1924, *P.* (*G.*) *granviki* Colosi, 1924, *P.* (*Potamonautes*) *harvardi* Rathbun, 1935, and *P.* (*G.*) *loveni longimerus* Roux, 1935 (cf. Colosi, 1924; Rathbun, 1935; Roux, 1935). Bott (1955) considered all of these Mt. Elgon taxa to belong to a single species — *Potamonautes* (*Rotundopotamonautes*) *granviki* (Colosi, 1924), and treated the remaining three taxa as junior synonyms of this species. In addition, Bott (1955) also judged two other geographically separated taxa, *Potamon* (*G.*) *jeanneli* Bouvier, 1921, from central Kenya and *Potamon* (*G.*) *idjwiensis* Chace, 1942, from Lake Kivu in the Western Rift Valley in eastern D. R. Congo to be junior synonyms of *P.* (*G.*) *granviki.*

In recognizing that *Potamonautes loveni* (Colosi, 1924) was the valid name of Bott's (1955) "*P.* (*R.*) *granviki*" from Mt. Elgon, Williams (1968, 1991) and Cumberlidge (1997, 1998) treated three taxa (*P. granviki*, *P. harvardi*, and *P.* (*G.*) *loveni longimerus*) as junior synonyms of *P. loveni* (cf. Ng et al., 2008). Williams (1968, 1991) and Cumberlidge (1997, 1998, 2009a) also pointed out that both *P.* (*G.*) *jeanneli* (Mount Kenya) and *P.* (*G.*) *idjwiensis* (Lake Kivu) should properly be treated as valid species rather than as junior synonyms of *P. granviki* as suggested by Bott (1955). As a result of these taxonomic changes, freshwater crabs collected from western Kenya are difficult to identify because the only available keys (Bott, 1955) are outdated, and the only way to make reliable identifications is to refer to the original type series that have been deposited in a number of museums.

Our revision is based on the examination of the type specimens of all of the relevant taxa, as well as on a large series of previously unexamined museum specimens from Mt. Elgon and western Kenya collected by T. R. Williams and his colleagues in the 1960s, and more recently by M. Dobson (Dobson, 2004; Dobson et al., 2007). The specimens of *P. loveni* from Mt. Elgon described here were collected from forests on the western slopes of the mountain in Uganda from streams, rivers, and nearby land during a survey of a focus of onchocerciasis (Barnley & Prentice, 1958; McMahon et al., 1958; Hynes et al., 1961; Williams et al., 1961; Williams, 1964).

Despite recent contributions (Corace et al., 2001; Cumberlidge & Vannini, 2004; Cumberlidge & Dobson, 2008; Cumberlidge, 2009a, b) it is still nev-

ertheless difficult to identify some species of freshwater crabs from western Kenya. This has been exacerbated in the case of specimens from Mt. Elgon by the fact that some taxonomically important characters of species such as *P. loveni* change dramatically as crabs grow to maturity, which means that juvenile, sub-adult, and adult specimens of the same species have morphologically different cheliped and gonopod characters. A similar phenomenon has been reported to occur in other species of freshwater crabs from east and southern Africa (Reed & Cumberlidge, 2004). Other taxonomic difficulties with the identification of freshwater crabs from Mt. Elgon arise from the presence of two other undescribed species that are morphologically similar to *P. loveni* (cf. Cumberlidge & Clark, 2010). These species were most likely confused with *P. loveni* by Williams (1991). In order to clarify the taxonomy of the freshwater crabs of Mt. Elgon, *P. loveni* is redescribed here based on a combination of characters of the adult male (GO1, carapace, thoracic sternum, and chelipeds). This species is closely linked with human river blindness (onchocerciasis). Onchocerciasis is endemic to the highlands of western Kenya and eastern Uganda (Williams, 1968, 1991; Crosskey, 1990).

Specimens are deposited in the following museums: the Natural History Museum, London, U.K. (NHM); Department of Biology, Northern Michigan University, Marquette, MI, U.S.A. (NMU); Museum of Comparative Zoology, Harvard, MA, U.S.A. (MCZ); Musée Royal de l'Afrique Centrale, Tervuren, Belgium (MRAC); Swedish Museum of Natural History (Naturhistoriska Riksmuseet) Stockholm, Sweden (SMNH); and United States National Museum of Natural History, Smithsonian Institution, Washington, D.C., U.S.A. (USNM). Abbreviations used in the text are: 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; e = thoracic episternite; s4/s5, s5/s6, s6/s7, s7/s8 = sternal sutures between adjacent thoracic sternites; s4/e4, s5/e5, s6/e6, s7/e7 = episternal sutures between adjacent thoracic sternites and episternites; p1-p5 = pereiopods 1-5; a1-a6 = abdominal somites 1-6; a7, telson of the abdomen; GO1 = gonopod 1; GO2 = gonopod 2; juv. = juvenile; stn = station; coll. = collected by; asl = above sea level. All measurements are given in mm.

TAXONOMY

Family POTAMONAUTIDAE Bott, 1970

Potamonautes MacLeay, 1838

Potamonautes loveni (Colosi, 1924) (figs. 1-3)

Potamon (*Geothelphusa*) *Lovéni* Colosi, 1924: 13, fig. 9, pl. 1 fig. 4.
Potamon (*Geothelphusa*) *Granviki* Colosi, 1924: 16, fig. 11, pl. 1 fig. 5.
Geothelphusa loveni — Balss, 1929: 351.
Potamon (*Geothelphusa*) *harvardi* Rathbun, 1935: 23-24, pl. 1.
Potamon granviki — Chace, 1942: 211.
Potamon lovéni — Chace, 1942: 215.
Potamon harvardi — Chace, 1942: 212, fig. 9.
Potamonautes (*Rotundopotamonautes*) *granviki* — Bott, 1955: 286-288, figs. 52, 90, pl. XXII fig. 2a-d.
Potamonautes loveni — Williams, 1968: 32; 1991: 181-187 (part); Cumberlidge, 1997: 583; 1998: 201; Ng et al., 2008: 171.

Type material examined. — Holotype, *Potamon* (*Geothelphusa*) *loveni* Colosi, 1924, 1 subadult male (cw 26.3, cl 19.5) (SMNH 1291), Mt. Elgon, Mbale Province, Uganda, coll. Swedish Expedition, 1921; lectotype, *Potamon* (*Geothelphusa*) *harvardi* Rathbun, 1935, 1 adult male (cw 42.6) (MCZ 8241), Mt. Elgon, Sipi Falls, 1829 m asl, coll. 18.xii.1933. Paratypes of *P.* (*G.*) *harvardi*, adult male (MCZ 8242), Mt. Elgon, Sipi Falls, 1829 m asl, coll. 18.xii.1933; 19 males, 6 females (MCZ 8243), Mt. Elgon, Sipi Falls, 1829 m asl, coll. 18.xii.1933; adult male, adult female ovigerous (MCZ 8240), Mt. Elgon, Kaburomi, coll. 28.xii.1933; adult male (cw 32), adult female (cw 29.5) of *P.* (*G.*) *harvardi*, from a large series of 34 males, 28 females, 6 juv. (MCZ 8244, 8245), Kaimosi, Kakamega, Kenya, coll. 10-15.ii.1934.

Additional material examined. — Uganda. 2 adult males (cw 42.2, 38.2), 1 adult female (cw 40.6) (USNM 70907), Mt. Elgon, Sipi, 2000 m asl, 18.xii.1933, coll. A. Loveridge; 1 adult male (cw 38.7) (USNM 70912), Mt. Elgon, Butandiga, 8.i.1935, coll. A. Loveridge; 2 males (cw 30.8, 13.0), 3 females (cw 23.9-17.0) (NHM 2008.3033-3037), stn El.9, Mt. Elgon, Sision River, 2073 m asl, 24.xii.1960, coll. T. R. Williams; 10 males (cw 43.3-10.4), 8 females (cw 16.3-10.5), 2 juv. (NHM 3270-3279), stn El.33, Mt. Elgon, Kamijaro River, Manafwa sector, 1463 m asl, 28.xii.1960, coll. T. R. Williams; 6 males (cw 23.5-11.7), 10 females (cw 28.1-11.7), 10 juv. (NHM 3280-3289), stn El.66, Mt. Elgon, Namafumbulwe River, Manafwa sector, 1402 m asl, 1.i.1961, coll. T. R. Williams; 1 male (cw 12.1), 4 females (cw 23.3-12.7), 13 juv. (NHM 2008.3290-3299), stn El.68, Mt. Elgon, Manafwa River, Manafwa sector, 1829 m asl, 1.i.1961, coll. T. R. Williams; 1 male (cw 47.4) (NHM 2008.3300), stn El.74, Mt. Elgon, Suamme River, Manafwa sector, 1768 m asl, 3.i.1961, coll. T. R. Williams; 2 males (cw 32.4, 28.1), 2 females (cw 27.8, 26.1) (NHM 2008.3303-3306), stn El.78, Mt. Elgon, Nalakwa River, Manafwa sector, 1402 m asl, 3.i.1961, with *Potamonautes niloticus*, coll. T. R. Williams; stns El.93a, El.93b, El.96, Mt. Elgon, Namafumbole River, Namatala sector, 1585 m asl, coll. T. R. Williams; 4 males (cw 36.9-13.3), 4 females (cw 27.7-16.1), 1 juv. (NHM 2008.3024-3032), stn El.95, Mt. Elgon, Namafumbole River, Namatala sector, 1585 m asl, 8.i.1961, coll. T. R. Williams; 1 male (cw 18.0), 4 females (cw 49.0-15.0), 1 juv. (NHM 2008.3308-3331), stn El.99, Mt. Elgon, Sisiwachi River, Namatala sector, 1585 m asl, coll. T. R. Williams; 6 males (cw 27.8-17.2), 6 females (cw 33.5-16.9) (NHM 2008.3038-3052), stn El.113, Mt. Elgon, Simu tributary, Siroko sector, 1341 m asl, 9.i.1961, coll. T. R. Williams; 6 males (cw 29.1-14.20), 3 females (cw 25.1-18.3) (NHM 2008.3340-3348), stn El.135, Mt. Elgon, Tabok

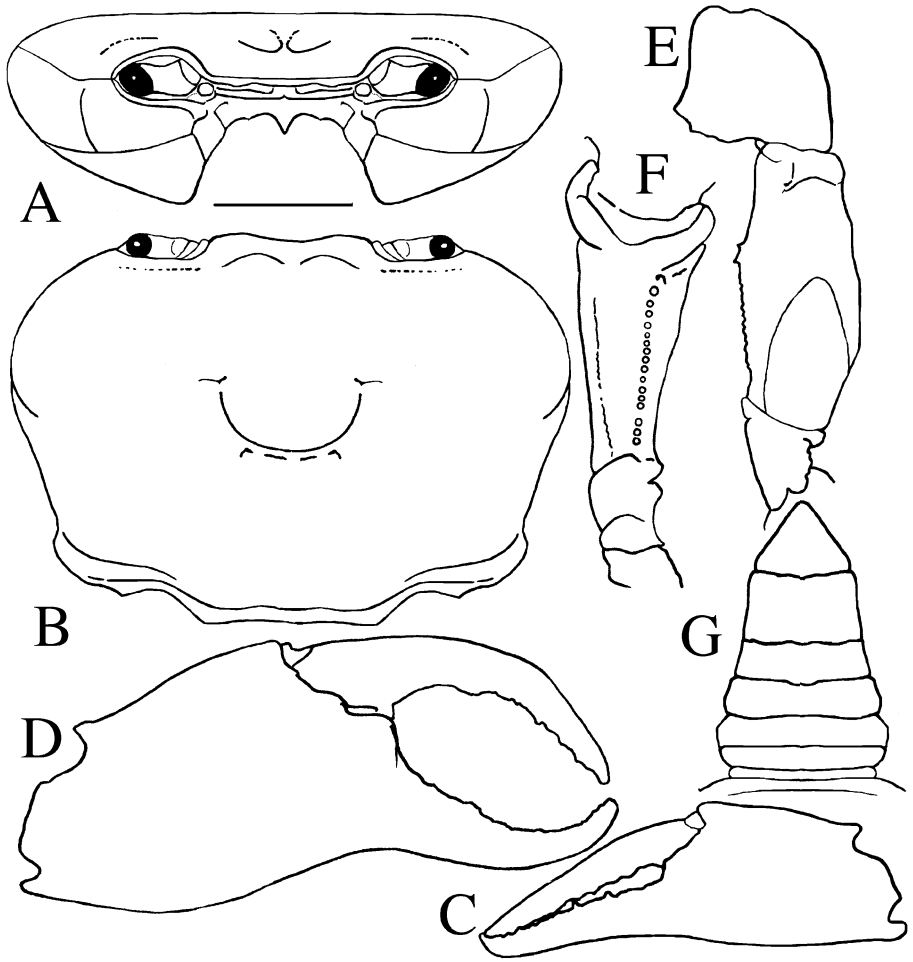

Fig. 1. *Potamonautes loveni* (Colosi, 1924). Male lectotype of *Potamonautes loveni* (Colosi, 1924), male lectotype of *P.* (*G.*) *harvardi* Rathbun, 1935, cw 42.8, from Sipi Falls, Mt. Elgon, Uganda (MCZ 8241). A, cephalothorax, frontal view; B, carapace, dorsal view; C, left (minor) cheliped, frontal view; D, right (major) cheliped, frontal view; E, carpus and merus of right cheliped, dorsal view; F, carpus and merus of right cheliped, inferior view; G, abdomen. Scale bar: 11 mm.

River, Nyenye sector, 2042 m asl, 13.i.1961, coll. T. R. Williams; 6 males (cw 35.8-10.3), 2 females (cw 40.9, 39.8), 2 juv. (NHM 2008.3349-3358), stn El.139, Mt. Elgon, Kondia River, Kiriki sector, 2073 m asl, 14.i.1961, coll. T. R. Williams; 2 males (cw 47, 14.4), 3 females (cw 29.9-18.8), 3 juv. (NHM 2008.1000), stn El.142, Mt. Elgon, Jikwil River, Kiriki sector, 2134 m asl, 14.i.1961, coll. T. R. Williams; 3 males (cw 26.6-20.9), 5 females (cw 28.3-16.9), 7 juv. (NHM 2008.3009-3023), stn El.152, Mt. Elgon, Kimotho River, 3048 m asl, 15.i.1961, coll. T. R. Williams; 1 male (cw 27.9), 3 females (cw 22.0-18.7) (NHM 2008.3359-3362), stn El.159, Mt. Elgon, Suamam River, Suam sector, 2073 m asl, 15.i.1961, coll. T. R. Williams;

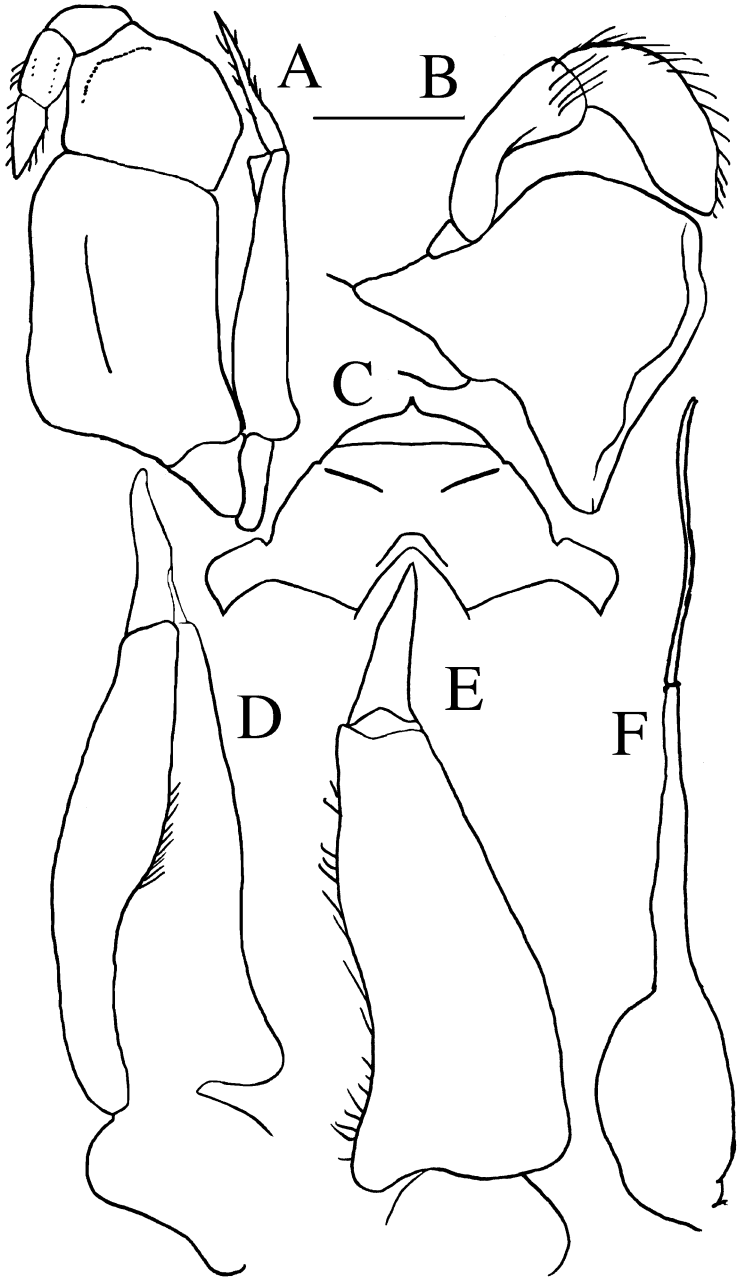

Fig. 2. *Potamonautes loveni* (Colosi, 1924), male lectotype of *Potamon* (*Geothelphusa*) *harvardi* Rathbun, 1935, cw 42.6, from Sipi Falls, Mt. Elgon, Uganda (MCZ 8241). A, left third maxilliped; B, right mandible frontal view; C, anterior sternum; D, left GO1 ventral view; E, left GO1 dorsal view; F, left GO2 ventral view. Scale bar: 11 mm (A, C), 2 mm (B, D-F).

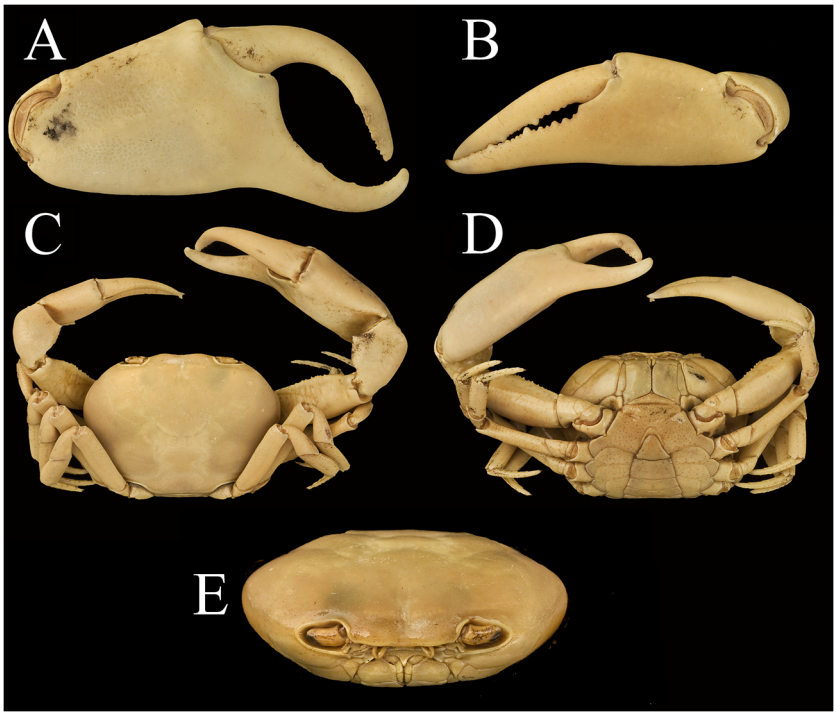

Fig. 3. *Potamonautes loveni* (Colosi, 1924). Adult male, cw 40.6 mm, Rongai, Rift Valley Province, Kenya (NHM 1930.6.24.11-12). A, right (major) cheliped, frontal view; B, left (minor) cheliped, frontal view; C, whole animal, dorsal view; D, whole animal ventral view; E, carapace, frontal view. Photograph Phil Crabb, NHM Photographic Unit. Scale bar: 14 mm (A, B, E), 23.2 mm (C, D).

9 males (cw 26.3-11.0), 2 females (cw 24.3, 18.5), 6 juv. (NHM 2008.3363-3372), stn El.167, Mt. Elgon, Njomunjone River, Nyenye sector, 1890 m asl, 16.i.1961, coll. T. R. Williams; adult male (cw 34 mm) (NMU 20.VII.1996), undisturbed high altitude bamboo forest, caught in a mist net on north facing slopes of Mt. Elgon, 3800 m asl, coll. S. King, 20.vii.1996.

Kenya. 1 adult male (cw 46.9) (USNM 70911), Mt. Elgon, Elgonyi, 2333 m asl, coll. A. Loveridge, 25.i.1934; 1 adult (USNM 82294), coll. P. J. Rainey; adult male (cw 36.5), adult female (cw 41.5) (NMU TRW 09.03.1988.1-2), Kibisi River, Kapsokisio, Coffee factory site 14, Mt. Elgon, coll. 9.iii.1988; adult male (MRAC 41.222), Suam River, Mt. Elgon, 15.xii.1953, coll. J. Bouillon; 3 males (cw 34.4, 28.8, 27.1), 2 females (cw 31.4, 28.7), juvenile male (cw 14.2), juvenile female (cw 10) (USNM 70908), Rift Valley Province, Kaimosa (= Kaimosi) (0°8′0″N 34°56′0″E) near Kakamega, coll. A. Loveridge, 10-15.ii.1935; 1 male (cw 24.9), 4 females (cw 22.0-15.2) (NHM 2008.3373-3377), stn EA62.135, Itsala River (first river to the west of Koiparak), Kakamega (0°8′0″N 34°53′0″E), Western Province, 25.iii.1962, coll. T. R. Williams; 10 males (cw 31.0-25.0), 6 females (cw 32.8-31.1) (NHM 2008.3378-3387), stn EA62.138, local streams near the Kakamega forestry station, Mokhubzia River, Kakamega (0°11′0″N 34°49′0″E), Western Province, 25.iii.1962, coll. T. R. Williams; 1 male (cw 53.4) (NHM 2008.3388), stn EA62.141, Sergoi River at Soy (between Eldoret and Kitale) Kakamega to Kitale region (0°35′0″N 35°1′0″E), Western Province, Kenya, 26.iii.1961, with

Potamonautes niloticus; 2 males (cw 25.4, 20.9), 1 female (cw 17.2) (NHM 2008.3389-3391), stn EA62.141, Sergoi River at Soy (between Eldoret and Kitale), Kakamega to Kitale region (0°35′0″N 35°1′0″E), Western Province, 26.iii.1962, with *Potamonautes niloticus*, coll. T. R. Williams; 10 males (cw 29.9-13.6), 13 females 32.0-13.3) (NHM 2008.3392-3401), stn EA62.143, Little Nzoia River on Eldoret-Kitale road, from Kakamega to Kitale (0°3′48″N 33°57′16″E), Western Province, 26.iii.1962, coll. T. R. Williams; 18 males (cw 35.9-14.6), 16 females (cw 40.2-13.5), 2 females ovig. (cw 43.1, 37.6) (NHM 2008.3402-3411), stn EA62.144, Kaibos Farm, west of Kitale, Kakamega to Kitale region (1°12′0″N 35°8′0″E), Western Province, 26.iii.1962, coll. T. R. Williams; 1 adult female (cw 34.5), 1 sub-adult male (cw 28.5) (NMU TRW 1960.01), river 16 km north of Kisumu, coll. J. P. McMahon (0°6′0″S 34°45′0″E); 1 adult male (cw 36.1), 1 adult female (cw 33), 3 sub-adult males (cw 31.5-32.5) (NMU TRW 1960.02a), Western Province, streams in the Kakamega-Kaimosi region, coll. R. B. Highton (0°12′0″N 34°57′0″E); 4 males (cw 36.5-31.5), 1 sub-adult female (cw 33.4) (NMU 1960.04a), Western Province, from river 16 km north of Kisumu, coll. J. P. McMahon (0°6′0″S 34°45′0″E); 1 sub-adult male (cw 26.5) (NMU TRW EA62.121), Sukute River, 2195 m asl, Koiwa Fisheries Rest House, Kericho, coll. T. R. Williams, 1962 (0°22′0″S 35°17′0″E); 14 specimens (largest adult male cw 33 mm) (NMU TRW EA62.146), Cherangani Mts., Marun River at Kaibuibich, Sigor, coll. T. R. Williams (1°34′0″N 35°31′0″E); (NMU TRW 1963.03), Western Province, Kibos River, near Maragoli, 15 mi from Kisumu, on the Kakamega road, coll. M. J. Clarkson (0°10′0″S 34°46′0″E); 1 adult female (cw 33), 1 sub-adult male (cw 29.5), 1 sub-adult female (cw 32.5) (NMU TRW 5.IV.1972A), Mau Escarpment, Narok Road, coll. 5.iv.1972; 2 sub-adult females (cw 27, 21.5) (NMU TRW 5.iv.1972B), Mau Escarpment, Narok Road, coll. 5.iv.1972; 1 adult male (cw 36.5), 1 adult female (cw 38) (NMU TRW 5.IX.1988), Sosio River, Sosio Bridge, coll. 5.ix.1988; 1 sub-adult male (cw 28.5) (NMU MD 20.XI.2003A), Lukusi River, Lukusi Bridge, coll. M. Dobson, 20.xi.2003; 1 sub-adult male (cw 26) (NMU MD 20.XI.2003B), Lukusi River, Lukusi Bridge, coll. M. Dobson, 20.xi.2003; 1 adult female (cw 31.5) (NMU MD 20.XI.2003C), Lukusi River, Lukusi Bridge, coll. 20.XI.2003; 1 sub-adult male (cw 21.5) carapace damaged (NMU MD 20.XI.2003D), Shitiya River, Kakamega Forest, coll. M. Dobson, 20.xi.2003; 1 adult male (cw 32) (NMU JF 21.II.2001), Lake Naivasha, coll. J. Foster, 21.ii.2001.

Type locality. — *Potamon* (*Geothelphusa*) *loveni*: Uganda, Mt. Elgon, Mbale Province. *Potamon* (*Geothelphusa*) *harvardi*: Uganda, Mt. Elgon, Sipi Falls, 1829 m asl. *Potamon* (*Geothelphusa*) *granviki* Uganda, Mt. Elgon.

Diagnosis. — Postfrontal crest incomplete; epigastric, postorbital crests faint, not joining with each other; postorbital crests faint, short, not extending laterally, not meeting anterolateral margins; exorbital, epibranchial teeth both missing; anterolateral margin completely smooth immediately behind epibranchial tooth; ischium of third maxilliped with faint vertical suture; thoracic sternal suture s3/s4 incomplete, missing on sides deep in middle; dactylus of major cheliped of adult male slender, highly arched, enclosing oval interspace when fingers closed, dentition absent; first, second carpal teeth on carpus of cheliped weak, low, blunt; ventral margins of merus of pereiopod 1 weakly granular; distal meral tooth either low or missing; terminal article of GO1 straight, slim, tapering evenly to pointed tip; terminal article not widened in middle, medial, lateral lobes both low, even; dorsal membrane narrow.

Description (based on sub-adult male holotype of *Potamon* (*Geothelphusa*) *loveni* Mt. Elgon and adult male lectotype of *Potamon* (*Geothelphusa*) *harvardi* from Sipi Falls, Mt. Elgon). — Carapace ovoid, wide (cw/fw 3.15), moderately high (ch/fw 1.2); surface texture completely smooth; semi-circular, urogastric, transverse branchial grooves present. Front straight, about one-third carapace width (fw/cw 0.32), anterior margin sharply deflexed. Postfrontal crest incomplete; epigastric, postorbital crests faint, not joining with each other; postorbital crests faint, short, not extending laterally, not meeting anterolateral margins; exorbital, epibranchial teeth missing; anterolateral margin completely smooth immediately behind epibranchial tooth, continuous with posterolateral margin. Suborbital margin raised, completely smooth. Suborbital, subhepatic, pterygostomial regions of carapace completely smooth; sidewall divided into three parts by longitudinal (epimeral) suture (dividing suborbital, subhepatic regions from pterygostomial region), by vertical (pleural) suture (dividing suborbital from subhepatic regions), dorsal end of vertical suture ending just before meeting epibranchial tooth. First thoracic sternal suture not visible; second suture s2/s3 deep, running horizontally across sternum; thoracic sternal suture s3/s4 incomplete, missing on sides deep in middle; episternal sutures s4/e4 to s7/e7 absent. Third maxillipeds filling entire oral field, except for transversely oval respiratory openings at superior lateral corners; long flagellum on exopod of third maxilliped, ischium of third maxilliped with faint vertical suture. Epistomial tooth prominent, smooth, triangular. Dactylus of major cheliped of adult male slender, highly arched, enclosing oval interspace when fingers closed, dentition absent. First, second carpal teeth of cheliped weak, low, blunt; second carpal tooth followed by several granules; ventral margins of merus of pereiopod 1 weakly granular; distal meral tooth either low or missing; superior surface of merus smooth. Pereiopods p2-p5 slender, p3 longest, p5 shortest, dactyli of p2-p5 tapering to point, each bearing 4 rows of downward-pointing short, sharp spines. Mandibular palp 2-segmented; terminal segment single, undivided, with setae (but no hard flap) at junction between segments. Adult male abdomen triangular, somites a1-a6 of male abdomen four-sided, telson (a7) triangular, apex rounded; somites a5-a6 broadest. Terminal article of GO1 straight, slim, tapering evenly to pointed tip, not widened in middle, medial, lateral lobes both low, even; dorsal membrane narrow. Terminal article of GO2 long, flagellum-like. Medium-size species, adult size ranging from cw 35-49 mm.

Geographical distribution. — *Potamonautes loveni* is found in the highlands of western Kenya including the Mau Range, Nandi Hills, Cherangani Mountains, and Mt. Elgon as well as the Kakamega and Kericho areas of Nyanza and

Western Provinces, Kenya. More recent collections have extended its range beyond the Nile drainage, eastward to Lake Naivasha in the Rift Valley, Kenya (John Foster, pers. comm.). In many parts of its range *P. loveni* is found at high altitude localities, including Kakamega (1465 m asl), Kericho (1770 m asl), the Cherangani Mountains (1830-1950 m asl) and Mt. Elgon (1070-3060 m asl). It is also found on the Ugandan side of Mt. Elgon in all seven radial river drainage sectors recognized by Williams (1968, 1991): Malawa, Manafwa, and Namatala (west), Siroko (north-west), Nyenye (north), Kiriki (north), and Suam (northeast). *Potamonautes loveni* is also found in the eastern and southern (Kenyan) sides of Mt. Elgon in the Suam and Nzoia drainage sectors that drain the southern and southeastern parts of the mountain, joining with rivers from the western side of the Cherangani Mountains that drain into Lake Victoria. Mount Elgon represents the western limit of the range of *P. loveni*.

Habitat. — *Potamonautes loveni* occurs in streams of all sizes, from fast-flowing rivers to forest trickles in cooler waters and is the species that is found at the highest altitudes on the mountain. At higher elevations where there is forest *P. loveni* lives under stones in the larger rivers and also burrows into the banks of small streams, particularly where the soil is loose and waterlogged. In the damper parts of the forest this species is found out of water where it emerges onto the riverbanks. In the cultivated land at lower altitudes *P. loveni* is found in burrows in stream banks and is rarely seen out of the water. *Potamonautes loveni* coexists with *P. niloticus* on Mt. Elgon within the range of altitudes between 1280-1950 m asl where the water is cooler than the lowland streams but warmer than at higher altitudes. The species reaches its lowest altitudes on Mt. Elgon in the Namatala River drainage sector where the forest remains largely intact, below which it is replaced by *P. niloticus* that prefers warmer waters (Williams, 1991; Cumberlidge, 2009b).

Medical importance. — Much of the material reported on here was collected as part of long-term studies of onchocerciasis (river blindness) in the highland areas of East Africa (the Ethiopian highlands, the Ruwenzoris, and Mt. Elgon) by T. R. Williams and his colleagues in the 1960s. Those investigations were aimed at identifying associations between freshwater crabs and the aquatic larval stages of the biting blackflies (*Simulium* Latreille, 1802) that serve as vectors for the parasite (*Onchocerca volvulus* (Leuckart, 1893)). The larval stages of *Simulium* need to develop in fast-flowing rivers and streams, and must attach themselves either to stones or to the carapaces of river-living species of freshwater crabs in order to complete their development into adult flies (McMahon, 1951; Barnley & Prentice, 1958; McMahon et al., 1958;

Williams et al., 1964; Crosskey, 1990; Williams, 1991). Control measures for the spread of river blindness focus on limiting the numbers of blackflies, and one possibility for such control involves understanding the relationship between *Simulium* larval stages and freshwater crabs. In the highland areas of western Kenya and Mt. Elgon, Uganda *P. loveni* has been demonstrated to be associated with onchocerciasis by Williams (1968, 1991) and Crosskey (1990). Other research in the Rwenzori (= Ruwenzori) Mountains, western Uganda indicates that a different species of freshwater crab (*P. aloysiisabaudiae* Nobili, 1906) also supports the larval stages of *Simulium neavei*, the blackfly vector of *O. volvulus*, which attach to the carapace of freshwater crabs living in the cold well-oxygenated waters of fast-running highland streams (Crosskey, 1990; Corace et al., 2001).

Conservation status. — *Potamonautes loveni* is listed as Least Concern (IUCN, 2004) in view of its wide distribution (it is known from more than 50 locations, mostly on the slopes of Mount Elgon in Uganda but the range is wide, covering an area spanning two countries), its tolerance of a degree of habitat modification, and its presumed large population. It is thought that it is unlikely to be declining fast enough to qualify for listing in a more threatened category and there are no known long-term threats. The stable population estimates are based on the fact that there are large numbers of specimens in museum collections, and this species has been collected recently in Kenya, which implies that populations are not necessarily declining (Cumberlidge, 2008; Cumberlidge et al., 2009).

Taxonomic remarks. — *Potamonautes loveni* was first collected by members of the Swedish Zoological Expedition to Kilimanjaro, Meru and the surrounding Masai plains between 1905 and 1906 (Colosi, 1924; Sjöstedt, 1925), and by the American Museum Expedition (Rathbun, 1935). Other specimens from the highland regions of western Kenya and eastern Uganda were collected in the early 1960s by Trefor R. Williams and his colleagues as part of an onchocerciasis study (Williams, 1968, 1991). The type material of *Potamon* (*Geothelphusa*) *loveni longimerus* Roux, 1935, has not been examined here and so we are unable to comment on the suggestions by Bott (1955) and Williams (1991) that this taxon is a junior synonym of *P. loveni.* Until the type specimens can be examined, this taxon remains tentatively listed as a junior synonym of *P. loveni* (cf. Ng et al., 2008: 171).

It is important to be able to identify the freshwater crabs involved in the transmission of river blindness to humans. However, this has proven to be difficult in the past for medical entomologists seeking the identity of crabs

with *Simulium* larvae attached to their carapaces. For example, the species from Mt. Elgon originally identified by Williams et al. (1961) and Hynes et al. (1961) as "*P. berardi*" was referred to by Williams et al. (1961) as *P. granviki* (Colosi, 1924). Subsequently, Bott (1955) recognized the latter taxon as *Potamonanutes* (*Rotundopotamonautes*) *granviki*, and he placed several other taxa in synonymy with it. Williams (1968, 1991) pointed out that priority would dictate that this species should properly be referred to as *Potamonautes loveni* (Colosi, 1924) because *Potamon* (*Geothelphusa*) *granviki* Colosi, 1924, is a junior synonym of *Potamon* (*Geothelphusa*) *loveni* Colosi, 1924. This opinion was accepted by Cumberlidge (1997, 1998) following examination of the type specimens of these two taxa, and had implications for the several taxa that Bott (1955) had placed in synonymy with his *P.* (*R.*) *granviki.*

The revision of *P. loveni* presented here was necessary not only because of the above taxonomic confusion, but also because of our recognition (arising from the re-examination of material collected by Williams), that Williams (1968, 1991) included two other (as yet undescribed) species from Mt. Elgon in his treatment of *P. loveni* (see Cumberlidge & Clark, 2010).

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