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**Redescription of *Liberonautes chaperi* (A. Milne-Edwards, 1887) n. comb.
(Brachyura, Potamonautidae) from Ivory Coast and Ghana**

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Liberonautes chaperi (A. Milne-Edwards, 1887) n. comb. is redescribed from the holotype from Ivory Coast and from new material from Ghana. The present study introduces 12 newly discovered specimens, including 4 males, from the collection of the British Museum (Natural History), London. New evidence from comparisons of gonopod structure leads to a suggested reassignment of this species to the genus *Liberonautes* Bott, 1955. A key to distinguish between the species of the genus *Liberonautes* is provided.

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Liberonautes chaperi (A. Milne-Edwards, 1887), n. comb. est décrit de nouveau après examen de l'holotype, recueilli en Côte d'Ivoire, et de nouveaux spécimens récoltés au Ghana. Douze spécimens, y compris quatre mâles, ont été découverts dans la collection du British Museum (Natural History) de Londres. La structure des gonopodes suggère que l'espèce soit transférée au genre *Liberonautes* Bott, 1955. On trouvera ici une clé d'identification des espèces du genre *Liberonautes*.

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Introduction

Parathelphusa chaperi (A. Milne-Edwards, 1887) was previously known only from the female holotype from Assine, Ivory Coast. This species has consistently posed problems to taxonomists since its original description in 1887. This difficulty has been due to the lack of knowledge of the important diagnostic characters of this species, including the male gonopods, together with the lack of material. *Chaperi* was originally assigned to the genus *Parathelphusa* H. Milne-Edwards, 1855 (A. Milne-Edwards 1887; Rathbun 1900) and later assigned to the genus *Potamonautus* Savigny, 1826 (Rathbun 1905; Chace 1942; Capart 1954). The most recent classification of this species by Bott (1955) assigned *chaperi* to the genus *Sudanonautes* Bott, 1955 as a subspecies of *Sudanonautes (Sudanonautes) africanus* (A. Milne-Edwards 1869).

The present study is based upon 12 additional specimens of *Parathelphusa chaperi* that have been found recently in the collection of the British Museum (Natural History), London. Among these are four male specimens; these allow a description of the male gonopods of this species for the first time.

This study presents findings based upon the structure of the male gonopods, together with other characters of the carapace and chelipeds. These new data form the basis of a redescription and a reclassification of this species. They appear to warrant the reassignment of *Parathelphusa chaperi* to the genus *Liberonautes* Bott, 1955, as the full species, *Liberonautes chaperi* n. comb. *Liberonautes* was previously a monospecific genus, so a key to distinguish between its two species is given.

Materials and methods

Specimens of *L. chaperi* examined included the female holotype (MNHN B2401-82), dry specimen, Assine, Ivory Coast; 1 male, 2 females (BMNH 1902.3.22 (1-3)), Ifoam, Gold Coast (now Ghana); and 3 males, 6 females (BMNH 1938.7.4 (31-35)), Goaso, Gold Coast (now Ghana). Measurements (in millimetres) were made with vernier calipers or with a microscope eyepiece micrometer and are given correct to 0.1 mm. The gonopods were drawn with the aid of a camera lucida. The following abbreviations are used: BMNH, British Museum (Natural History), London; MNHN, Museum National d'Histoire Naturelle, Paris; AMNH, American Museum of Natural History, New York; CW, carapace width at the widest point, between the bases of the epibranchial teeth; CL, carapace length, measured along the median line, from the anterior to the posterior margin; CT, cephalothorax thickness, the maximum depth of the cephalothorax; FW, front width, the width of the front measured along the anterior margin.

Systematics

GENUS *Liberonautes* Bott, 1955

Liberonautes chaperi (A. Milne-Edwards, 1887) is removed from the genus *Sudanonautes* Bott, 1955 and designated as a new combination based upon the characters of the end segments of the first and second male gonopods (Figs. 1A, 1B).

Liberonautes chaperi (A. Milne-Edwards, 1887) n. comb.
(Figs. 1A–1E)

HOLOTYPE: MNHN (BP 2401-82), female, dried specimen,

Key to the species of the genus *Liberonautes*

- 1'. Series of pointed teeth on anterolateral margin of carapace behind epibranchial tooth; intermediate tooth large, triangular, pointed; epibranchial tooth large and pointed (Fig. 1C); fixed finger of major cheliped with large flat tooth in proximal region (Fig. 1D) *Liberonautes chaperi* (A. Milne-Edwards, 1887), n. comb.
- 1". Anterolateral margin of carapace behind epibranchial tooth smooth; intermediate tooth and epibranchial tooth small; fixed finger of major cheliped without large flat tooth in proximal region *Liberonautes latidactylus* (DeMan, 1903)

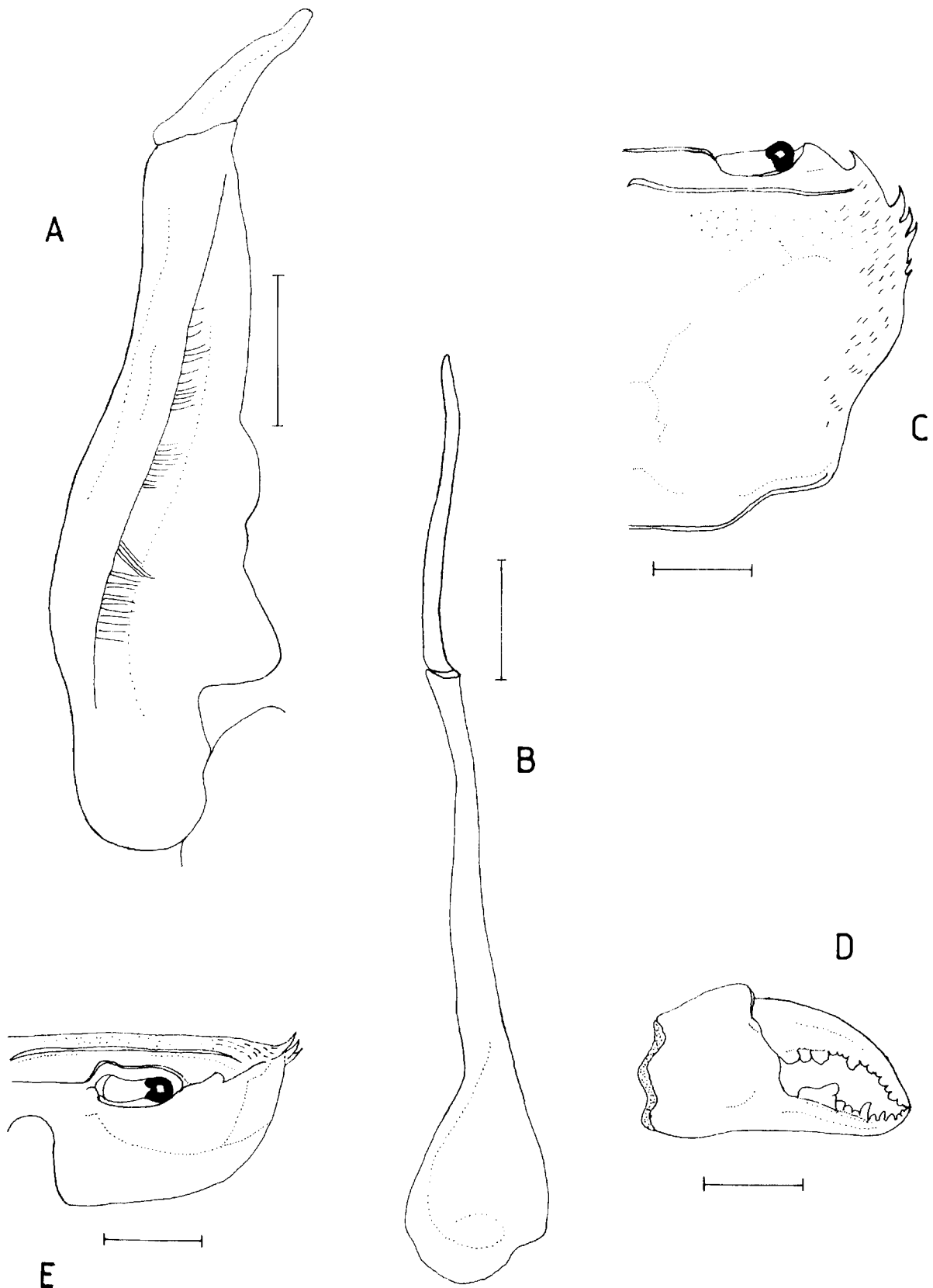


FIG. 1. *Liberonautes chaperi* (A. Milne-Edwards, 1887) n. comb. Male, Iufoam, Ghana (carapace width = 55 mm; BMNH 1902.3.22.0(1-3)). (A) Right male gonopod 1, ventral aspect. (B) Right male gonopod 2, ventral aspect. (C) Cephalothorax, dorsal aspect. (D) Right cheliped, lateral aspect. (E) Cephalothorax, frontal aspect. Scale bars represent 2.5 mm (A), 4.0 mm (B), 20.0 mm (D), and 10.0 mm (C, E).

TABLE 1. Measurements (in millimetres) of all known specimens of *Liberonautes chaperi* (A. Milne-Edwards, 1887)

	Sex	CW	CL	CT	FW	FF(L)		FF(H)	
						R	L	R	L
Ivory Coast									
Assine*	F	53.0	37.0	na	na	na	na	na	na
Ghana									
Iufoam	M†	55.0	38.5	17.5	17.0	48.0	41.0	23.5	18.0
	F	44.0	32.0	14.0	14.0	33.0	30.0	15.5	12.5
	F	38.0	27.0	12.0	12.5	—	23.5	—	9.5
Goaso	F	52.0	36.5	18.5	17.5	45.5	—	19.5	—
	F	51.0	36.0	17.5	16.5	35.0	40.0	16.0	17.5
	F	45.0	31.5	14.5	14.5	33.0	29.5	15.0	12.5
	F	44.0	31.5	15.0	15.0	33.5	28.5	16.0	12.0
	F	42.0	30.5	15.0	14.0	—	32.0	—	14.0
	F	39.5	28.5	13.5	13.5	—	—	—	—
	M	39.0	27.0	13.5	13.5	—	22.0	—	9.0
	M	28.5	20.5	9.0	9.0	16.0	18.0	6.5	8.0
	M	26.0	19.0	9.0	9.0	18.0	15.0	13.0	6.0

NOTE: CW, carapace width at widest point, between the bases of the epibranchial teeth; CL, carapace length, measured along the median line, from the anterior to the posterior margin; CT, cephalothorax thickness, the maximum depth of the cephalothorax; FW, front width, the width of the front measured along the anterior margin; FF(L), horizontal length of ventral margin of fixed finger; FF(H), maximum vertical height of fixed finger; R, right; L, left; M, male; F, female; na, data not available; —, cheliped missing from specimen.

*Holotype, data from A. Milne-Edwards (1887).

†Present study, Figs. 1A–1E.

collected by M. Chaper, Assine, Ivory Coast. Measurements in Table 1.

Parathelphusa chaperi A. Milne-Edwards, 1887, p. 144, Plate 18, Fig. 4a; Rathbun, 1900, pp. 284–285.

Potamon (Parathelphusa) chaperi Rathbun, 1905, pp. 262–263, Plate 12, Fig. 6.

Potamon chaperi Chace, 1942, p. 209; Capart, 1954, p. 828.

Sudanonautes (Sudanonautes) africanus chaperi Bott, 1955, pp. 298–299, (non *Potamon (Acanthothelphusa) faradjensis* Rathbun, 1921); Monod, 1977, p. 1216; Monod, 1980, p. 384.

Distribution

Liberonautes chaperi has been found in the following three localities: Assine, Ivory Coast, and Iufoam and Goaso, Ghana.

Description

The female holotype of *Liberonautes chaperi* (MNHN B2401-82) is a fragile, dried specimen. It has been described by a number of other workers (A. Milne-Edwards 1887; Rathbun 1905; Capart 1954). Only significant additions or departures from these descriptions are mentioned below. The following is a redescription of this species from a male from Iufoam, Ghana (CW = 55 mm).

Carapace (Figs. 1C, 1E; Table 1): Texture rough, with granules and rows of short ridges on anterior corners and on hepatic and branchial regions. Cardiac, urogastric, semicircular, posterior branchial and cervical grooves prominent. Carapace dorsoventrally flattened (ratio of CW to CT = 1:3.1), width exceeding length (ratio of CW to CL = 1:1.4), maximum width between epibranchial teeth. Front flat, broad (ratio of CW to FW = 1:3.2), anterior margin straight. Exorbital tooth large, swept forward, pointed; intermediate tooth similar; epibranchial tooth narrower, pointed, directed forward and slightly upward. Anterolateral margin behind epibranchial

tooth more or less straight, with 4 irregular forward-pointing teeth becoming smaller in a series posteriorly. Posterolateral margin biconcave before meeting posterior margin. Postfrontal crest low, straight, no meeting anterolateral margin. Flanks divided into 3 parts by two grooves. Lateral flank groove not meeting anterolateral margin, originating just below epibranchial tooth, curving forward close to intermediate tooth, then downward to meet longitudinal flank groove.

Gonopods (Figs. 1A, 1B): End segment of gonopod 1 short (ratio of length of end segment to penultimate segment = 1:4.1) broad at oblique junction with penultimate segment; tapered to rounded tip; curved inward when viewed from lateral aspect. Groove for gonopod 2, on penultimate segment of gonopod 1, running diagonally and ending short of junction between segments of gonopod 1. Gonopod 2 slender, end segment long and filamentous (ratio of length of end segment to penultimate segment = 1:1.9), somewhat pointed at tip; base of slender tapered penultimate segment rounded and broad; slanted collar at junction with end segment.

Chelipeds (Fig. 1D; Table 1): Chelipeds unequal, right enlarged more than left. Dactylus and fixed finger of right cheliped touching at tips, but not overlapping; gaping when closed. Right cheliped with one conspicuously large, flattened tooth in proximal region; two other large teeth and row of small teeth in middle and distal regions; dactylus with 4 large teeth in proximal and middle region (opposing large flat tooth of fixed finger); distally row of smaller teeth. Left cheliped lacking conspicuously large tooth on fixed finger.

Measurements

The taxonomically important dimensions of all known specimens of *Parathelphusa chaperi*, including the male from Iufoam, Ghana (CW = 55 mm), described here, are given in Table 1. The original description of the female holotype of *Parathelphusa chaperi* gave only the length and breadth of the

carapace (A. Milne-Edwards 1887). This specimen is now too fragile to record its dimensions in more detail.

Comparisons

Liberonautes latidactylus (DeMan, 1903), the type-species of the genus, has been redescribed by Bott (1955). *Liberonautes latidactylus* resembles *L. chaperi* in the following characters: the end segment of gonopod 1 curves inward when viewed from the lateral aspect; the end segment of gonopod 2 is long and filamentous; the postfrontal crest does not meet the anterolateral margin; and the carapace surface is rough, with granulations and short ridges on the hepatic and branchial regions. In addition, the distribution of both species of *Liberonautes* Bott, 1955 is similar: they both occur in the same region of West Africa, to the west of the Dahomey Gap. Thus, both species are found in Ivory Coast and Ghana, while *L. latidactylus* also occurs in Liberia, Sierra Leone, Guinea, Mali, and Senegal (Bott 1955, 1959).

Liberonautes latidactylus differs from *L. chaperi* in the following characters: the intermediate and epibranchial teeth are small and low, not large and pointed; the anterolateral margin behind the epibranchial tooth is smooth, not toothed; the cephalothorax is somewhat convex (ratio of CW to CT = 1:2.6 (Bott 1955)), not flattened; the major cheliped lacks a large flat tooth; the end segment of gonopod 1 does not curve as far inward; the groove for gonopod 2, on the penultimate segment of gonopod 1, does not meet the inner margin of this segment; the junction between the segments of gonopod 1 slants inward, not outward; and the collar on gonopod 2 is sited just below the junction of the two segments, not at the junction.

Sudanonautes (Sudanonautes) africanus africanus (A. Milne-Edwards, 1869), redescribed by Bott (1955), superficially resembles *L. chaperi* in its flattened, rough, deeply grooved carapace and large triangular intermediate tooth. However, *S. (S.) africanus* is different from *L. chaperi* in the following characters: the end segment of gonopod 1 curves distinctly outward; the end segment of gonopod 2 is very short; the anterolateral margin is smooth, without pointed teeth; the epibranchial tooth is small and low; and the postfrontal crest meets the anterolateral margin (Bott 1955).

According to Bott (1955), *chaperi* closely resembles *Sudanonautes (Sudanonautes) africanus chavanesii* (A. Milne-Edwards, 1886). However, I have examined the gonopod structure of the type-specimen of *Potamon (Parathelphusa) chavanesii* (MNHN BP 79), and found that this species properly belongs to the genus *Sudanonautes*, not *Liberonautes*.

Comments

Until the present study, no male specimens of *Liberonautes chaperi* were known. (Other specimens identified as *chaperi* in the MNHN, Paris (B5077, B5078), proved not to belong to this species.) Previous attempts to classify *Parathelphusa chaperi* (A. Milne-Edwards 1887; Rathbun 1905; Chace 1942; Capart 1954) have obviously suffered from the lack of knowledge of the structure of the male gonopods. Moreover, the most recent assignment of this species to the genus *Sudanonautes* Bott, 1955 by Bott (1955) was based on his incorrect synonymization of *Parathelphusa chaperi* with *Potamon (Acanthothelphusa)*

faradjensis Rathbun, 1921. It is argued here that these two species are not valid synonyms of each other and, in fact, belong to two different genera, *Liberonautes* and *Sudanonautes*, respectively.

The genus *Liberonautes* is distinguished from the genus *Sudanonautes* on the basis of differences in the male gonopod characters (Bott 1955). The inward-curving end segment of gonopod 1 and the long filamentous end segment of gonopod 2 of *Parathelphusa chaperi* reported here (Figs. 1A, 1B) clearly suggest that this species should be included in the genus *Liberonautes* rather than in *Sudanonautes*, as suggested by Bott (1955). I have examined the gonopod structure of the holotype of *Potamon (Acanthothelphusa) faradjensis* (AMNH 3346) and found that this species indeed belongs to the genus *Sudanonautes*, as defined by Bott (1955). Consequently, I must question the validity of Bott's (1955) description of *Sudanonautes (Sudanonautes) africanus chaperi*, since this incorrect synonymy led to the error of combining characters of both *Parathelphusa chaperi* and *Potamon (Acanthothelphusa) faradjensis* in the same description. Furthermore, the figures of the carapace and of gonopod 1 and the account of the ecology given in that work are those of *faradjensis*, not *chaperi*. Unfortunately, Bott's (1955) classification has been adopted by other authors (Bott 1959; Monod 1977, 1980). In the light of the present findings it is suggested that these works be revised accordingly.

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