

A new record of *Cletocamptus confluens* (Schmeil 1894) (Copepoda Harpacticoida) from a small pond in north-west Namibia

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Received 13 August 1999, accepted 13 January 2000

Specimens of *Cletocamptus* Schmankeiwitsch 1875, collected in a small pond in north-west Namibia, were identified and redescribed as *C. confluens* (Schmeil 1894). The morphology of both sexes is illustrated in detail and compared to the existing descriptions. The new record expands considerably the known distribution of *C. confluens*. A map showing the locations of this widespread species is presented.

KEY WORDS: *Cletocamptus confluens*, Copepoda Harpacticoida, systematics, Namibia, distribution.

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INTRODUCTION

The systematic position of *Cletocamptus* Schmankeiwitsch 1875 is unclear and controversial. The genus and its synonymous denominations (*Attheyella*, *Canthocamptus*, *Godetella*, *Marshia*, *Mesochra*, *Regis*) have been attributed to both the Cletoidea and the Canthocamptidae. At present, *Cletocamptus* is ranked among the Canthocamptidae as "incertae sedis" (POR 1986, BODIN 1997). Likewise, the species number is in question because of the repeatedly demonstrated variability in their morphology. FLEEGER (1980) validated 12 species. Recently, GEE (1999) described a new species, *C. merbokensis*, from Malaysia. Another two species, *C. axi* and *C. schmidti*, were recorded from the Galápagos Archipelago by MIELKE (2000).

On the occasion of a short stay in Namibia the author collected a few samples which contained numerous specimens of *Cletocamptus*. These were identified as *C. confluens* and the species is now redescribed and discussed in detail.

MATERIALS AND METHODS

The animals were collected in north-west Namibia from a small, obviously brackish pond by whirling and scraping up the sediment of the near-shore region. The specimens were fixed in vials in 4% formalin. Six individuals were dissected and embedded in W 15 medium (Zeiss); the cover glass was sealed with Eukitt and DePeX. Drawings were made with the aid of a camera lucida. The interpretation of the body parts, mouth parts and thoracopods is adopted from LANG (1948, 1965). With respect to the mouth parts, the interpretation of the components according to HUYS & BOXSHALL (1991) is given in parentheses. The material has been deposited in the collections of the Zoological Museum of the University of Göttingen.

Canthocamptidae incertae sedis

Cletocamptus Schmankewitsch 1875*Cletocamptus confluens* (Schmeil 1894)

Material. A total of 57 ♀♀ (28 ovigerous), 22 ♂♂, 8 copepodites, including two precopulatory pairs, were collected from "Ogams" pond in north-west Namibia, situated at 12°31'S and 18°30'E (W. Mielke leg., 19 September 1997); 3 ♀♀ and 3 ♂♂ were dissected (reg. nos. I Nam 1-6).

Description. Female: body lengths of three dissected females 0.58-0.62 mm measured from tip of rostrum to end of furcal rami. Rostrum subdistally with a fine seta on each side; distal margin has a row of slender spinules (Fig. 2A). Dorsal caudal margins of cephalothorax and succeeding prosomites set with hair-like spinules, accompanied by fine setules. Genital double-somite subdivided dorsolaterally, its suture weakly spinulose. Dorsal caudal margins of genital double-somite and following abdominal somites also slightly spinulose. Pereiopod 6 represented by a small lobe bearing two setae of different lengths. Ventral distal margins of abdominal somites spinulose. Furthermore, the surface of the abdominal somites is ornamented with rows of weak spinules. Anal operculum slightly curved, distal edge dentate. Furcal rami about 3 times as long as broad. Proximally, near the insertion point, a short seta arises on the outer margin. A little more distally, two juxtaposed setae insert. There is a single seta about 1/3 of the length on the dorsal surface; it is bipartite at the base. Distal end of furcal rami furnished with three setae: the inner one short; the middle and outer setae slightly pinnate, their basal parts fused (Figs 1A-B).

Antennula (Fig. 2A) with six segments. First segment with some rows of spinules and a seta. Second and third segments furnished with nine and five setae, respectively. Fourth segment has an aesthetasc and two setae. Fifth segment shortest, bearing only one seta. Last segment with a slender aesthetasc and 10 setae.

Antenna (Fig. 2B): allobasis with two setae on the anterior margin. Exopodite stunted, bearing one plumose seta apically. Distal segment of endopodite furnished with some rows of spinules, two slender spines and a small seta on the anterior edge and five elements apically, the outermost one pinnate.

Mandible (Fig. 2C): chewing edge of corpus mandibulae with several teeth, one seta laterally and a hyaline structure nearby. Palpus one-segmented, armed with one plumose seta laterally and two setae apically.

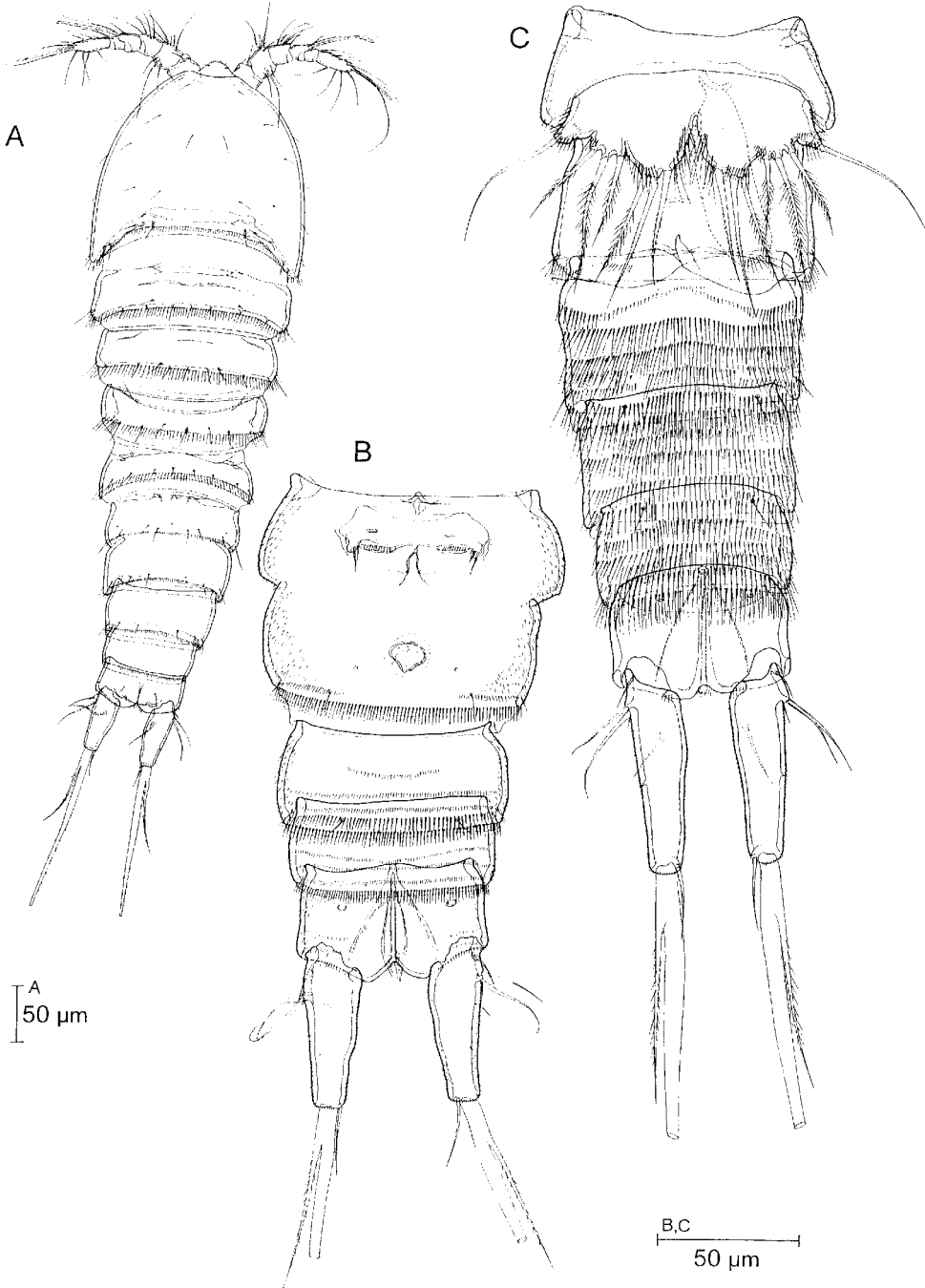


Fig. 1. — *Cletocamptus confluens*. A, habitus ♀, dorsal side; B, abdomen ♀, ventral side; C, abdomen ♂, ventral side.

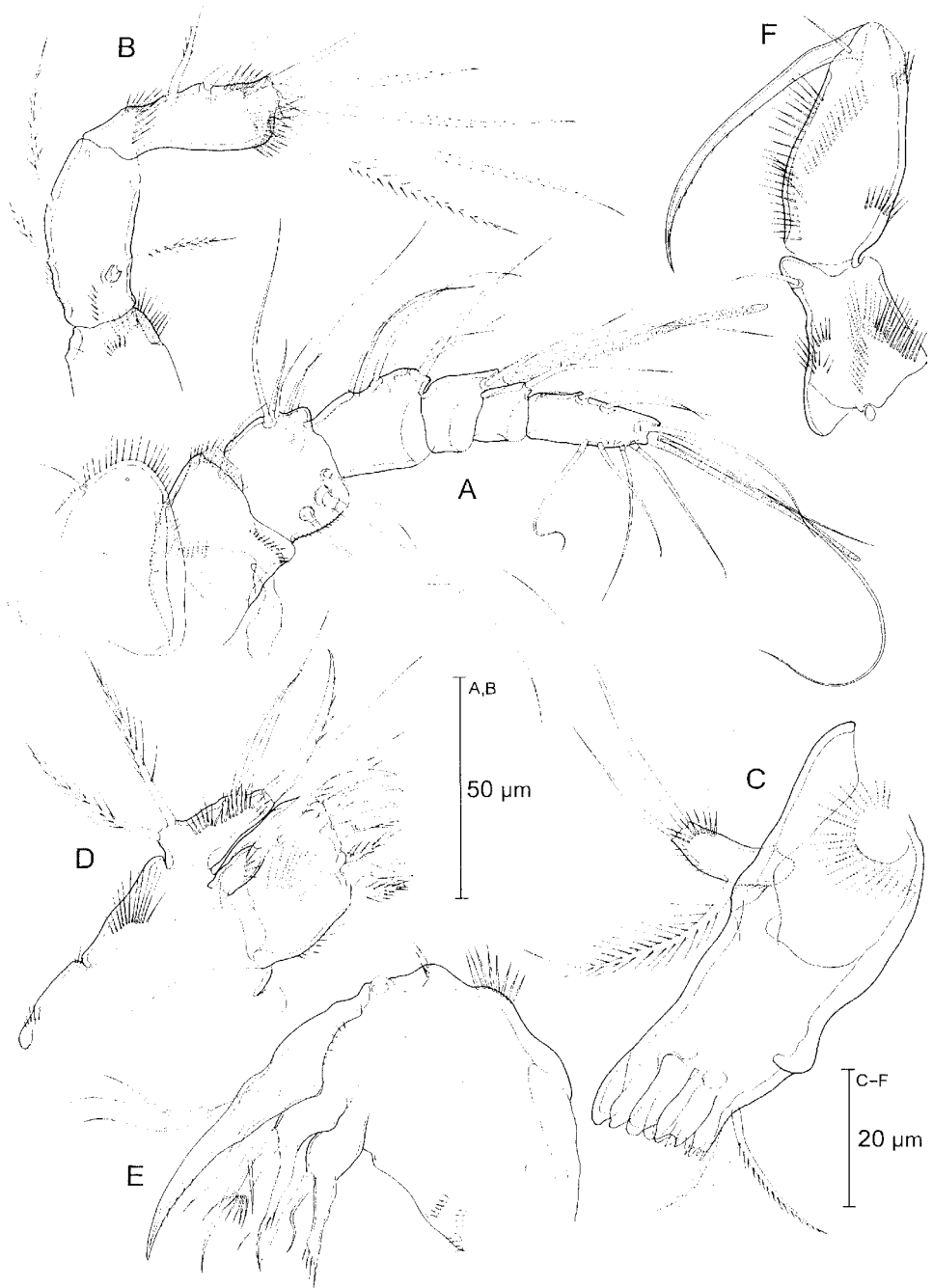


Fig. 2. — *Cletocamptus confluens* ♀. A, rostrum and antennula; B, antenna; C, mandible; D, maxillula; E, maxilla; F, maxilliped.

Maxillula (Fig. 2D): arthrite of praecoxa with seven claw-like elements, two stout plumose spines on the distal margin and one seta on the surface. Coxa and basis each set with two setae apically; exopodite and endopodite each represented by two setae.

Maxilla (Fig. 2E): syncoxa with two endites, both armed with three appendages. Basis (allobasis) drawn out into a slightly curved claw, which has an accompanying seta basally on the inner side. Endopodite represented by three setae.

Maxilliped (Fig. 2F) densely set with rows of spinules. Basal segment bears one inner seta; distal segment carries one slender claw and one short additional seta.

Pereiopod 1 (Fig. 6A): coxa well developed, ornamented with several rows of spinules. Basis also set with rows of spinules, bearing a spine on the inner and outer margin, respectively. Exopodite three-segmented, inner and outer margins spinulose. Basal segment broadest, with one outer spine. Middle segment with an outer spine and a plumose seta on the inner margin. Distal segment furnished with two spines on the distal outer edge and two setae apically. Endopodite two-segmented. Basal segment with an inner plumose seta. Distal segment spinulose, bearing three setae, the middle one longest.

Pereiopod 2 (Fig. 3A): coxa and basis with several rows of spinules on the margins and on the surface; distal outer corner of basis with a slender spine. Exopodite three-segmented, all margins spinulose. Proximal segment has an outer spine; middle segment bears an outer spine and a plumose seta on the inner margin. Distal segment furnished with two outer spines, two setae apically and a plumose seta on the inner margin. Endopodite two-segmented. Proximal segment short, with slender spinules on the inner and outer margins. Distal segment spinulose, armed with one inner and two apical plumose setae.

Pereiopod 3 (Fig. 4A) similar to preceding leg. Coxa with a slender seta on the outer corner; distal segment of endopodite bears five setae, the inner one shortest.

Pereiopod 4 (Fig. 5A): coxa and basis ornamented with some rows of spinules. Outer margin of coxa produced into a small lobate process bearing a slender seta. Exopodite three-segmented. Basal segment longest, margins spinulose, outer distal margin has a small spine. Middle segment with a slender outer spine and a plumose seta on the inner margin. Last segment bears two outer spines and two setae apically. Distal segment of two-segmented endopodite carries two setae apically.

Seta and spine formula:

	Exopodite	Endopodite
Pereiopod 1	(0.1.022)	(1.120)
Pereiopod 2	(0.1.122)	(0.021)
Pereiopod 3	(0.1.122)	(0.221)
Pereiopod 4	(0.1.022)	(0.020)

Pereiopod 5 (Fig. 6C): baseoendopodite and exopodite fused. Baseoendopodite with a slender seta on the outer lobe and six setae on the inner expansion. Part of exopodite furnished with four setae.

Male: differs from the female in the following aspects.

Body lengths of three dissected specimens 0.56-0.65 mm, measured from tip of rostrum to end of furcal rami.

Ventral surface of abdominal somites "furry", i.e., furnished with rows of long, slender spinules (Fig. 1C).

Furcal rami about 4 times longer than broad (Fig. 1C).

Antennula (sub)chirocer.

Inner appendage of basis of pereiopod 1 long and slender (Fig. 6B).

Pereiopod 2 (Fig. 3B) modified; all segments, especially the ones of the exopodite, more robust than in the female; all spines and setae shorter than the corresponding ones of the female.

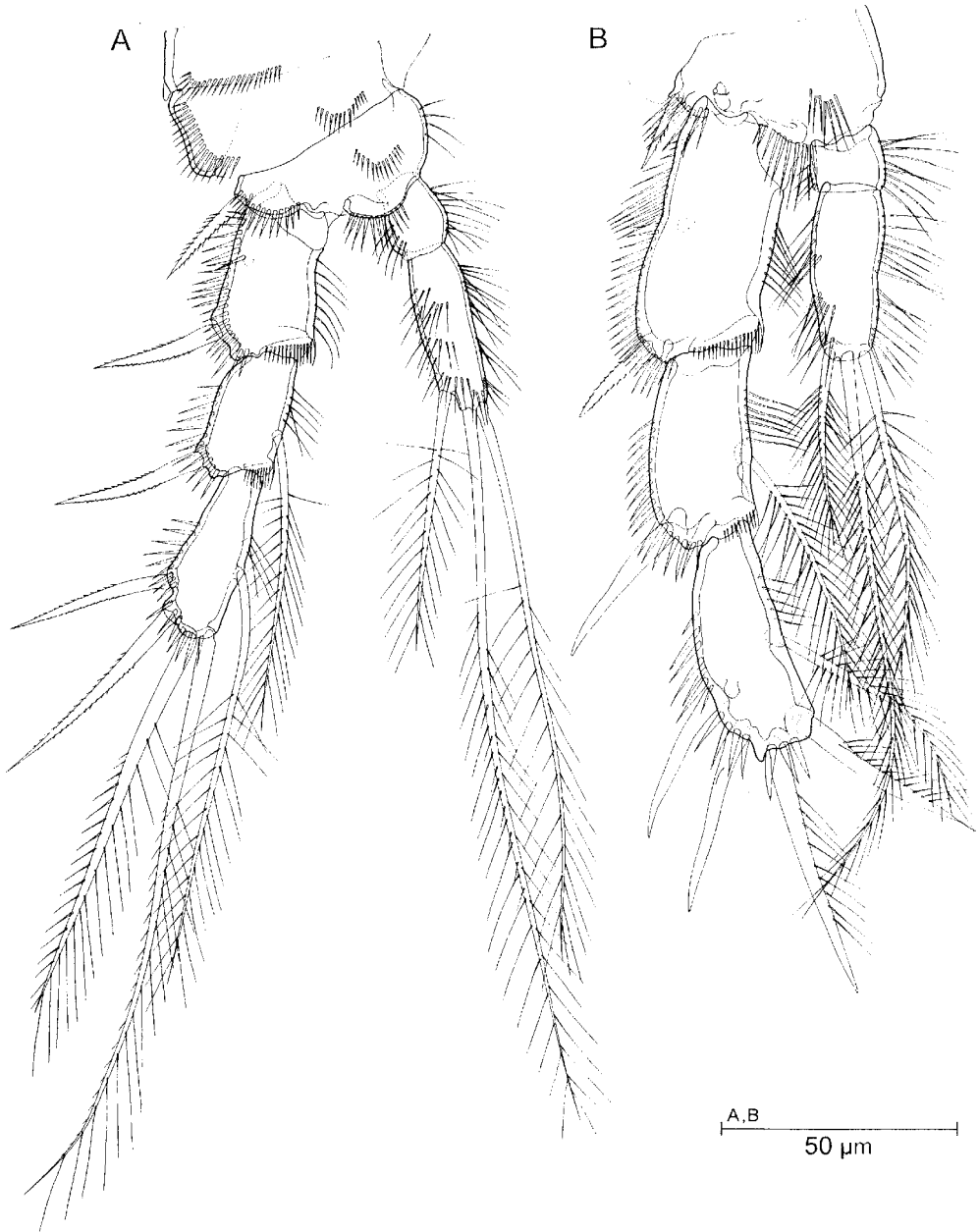


Fig. 3. — *Cletocamptus confluens*. A, P.2 ♀; B, P.2 ♂.

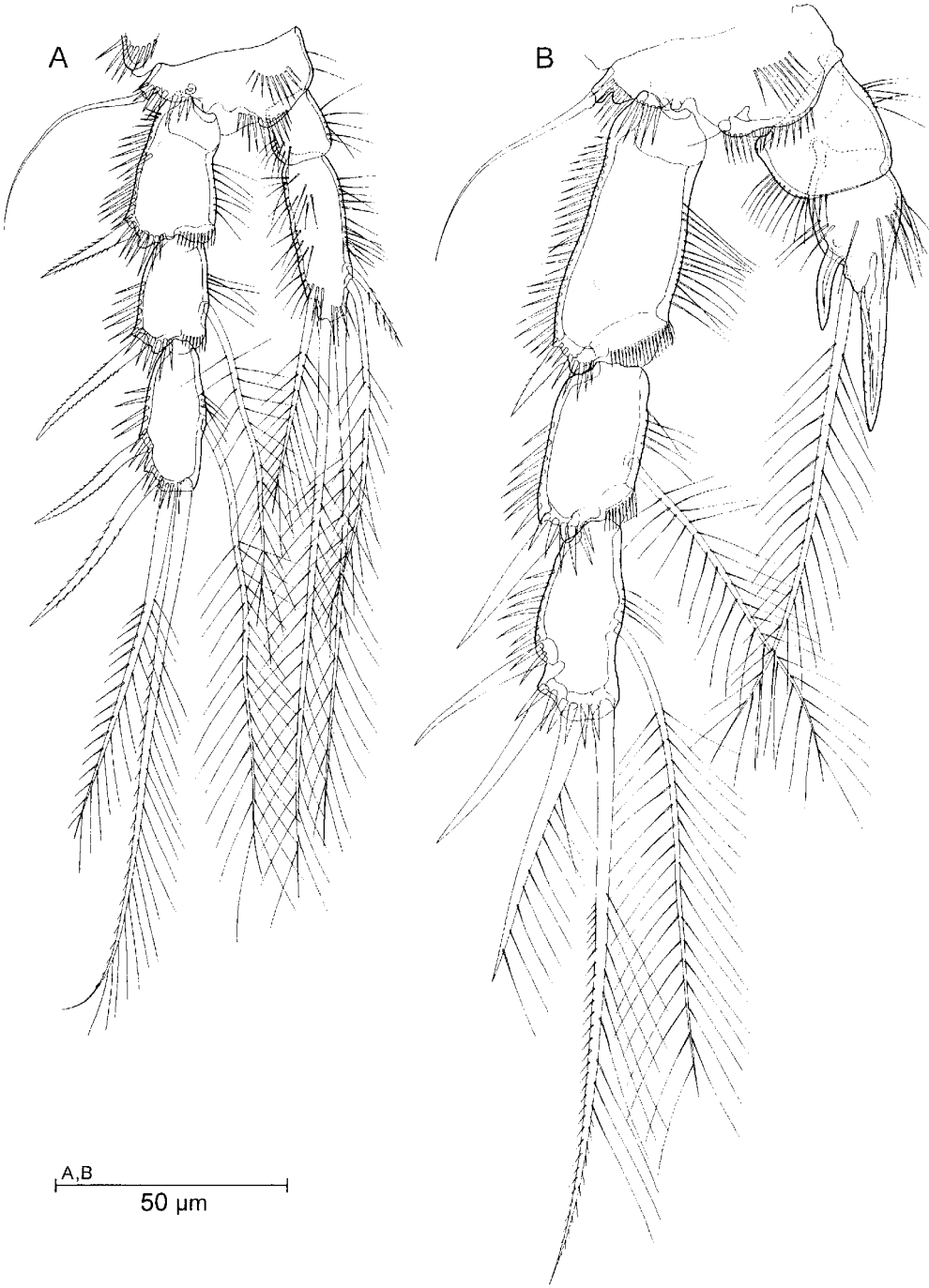


Fig. 4. — *Cletocamptus confluens*. A, P.3 ♀; B, P.3 ♂.

Pereiopod 3 (Fig. 4B) modified; exopodite much better developed than in the female. Basal segment of endopodite broadened; distal segment produced into two dentiform projections, framing a short naked seta and a long plumose seta.

Pereiopod 4 (Fig. 5B) modified. Basal segment of exopodite elongated, bearing a short outer spine; all margins intensely spinulose. Middle segment roundish,

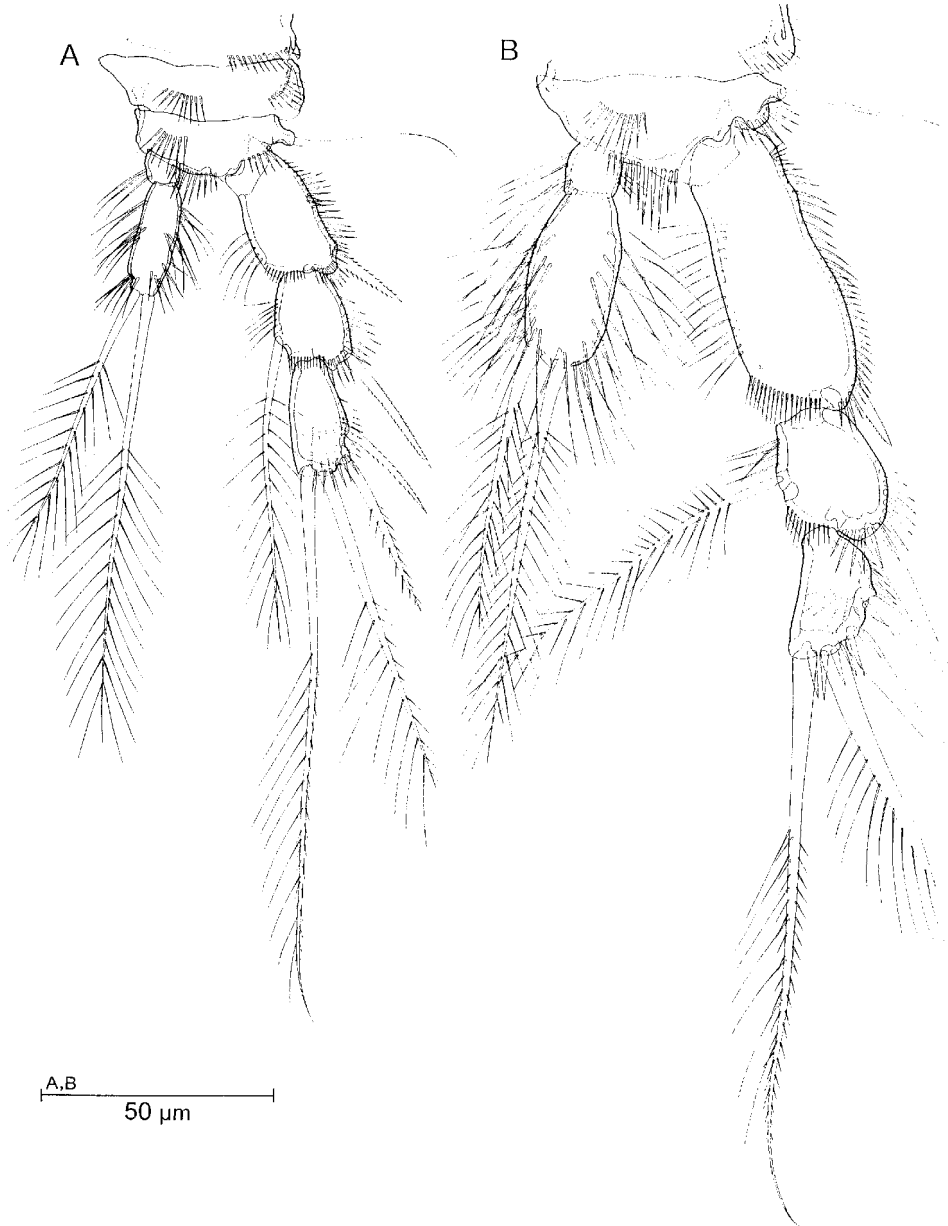


Fig. 5. — *Clotocampus confluens*. A, P.4 ♀; B, P.4 ♂.

furnished with an outer spine and a plumose seta on the inner margin. Distal segment reduced in size, with three outer spines and one seta apically. Proximal seg-

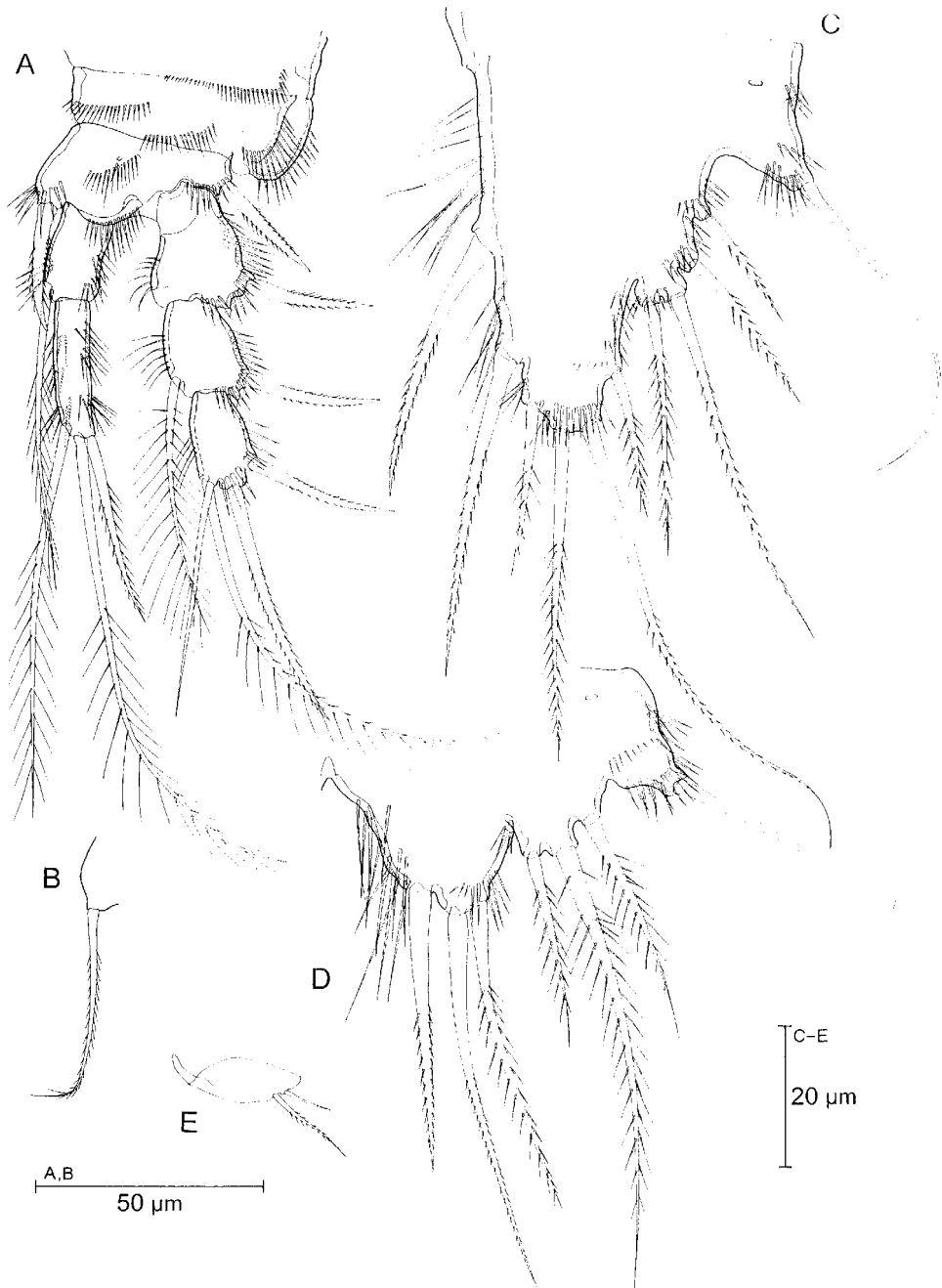


Fig. 6. — *Cletocamptus confluens*. A, P.1 ♀; B, seta on inner margin of the basis P.1 ♂; C, P.5 ♀; D, P.5 ♂; E, P.6 ♂.

ment of endopodite small, distal segment enlarged, set with long setules, armed with two plumose setae apically.

Pereiopod 5 (Fig. 6D): baseoendopodite and exopodite fused; both parts carry three setae plus a seta on the outer lobe.

Pereiopod 6 (Figs 1C, 6E): the right plate of all three dissected animals lacks a seta; the left one bears 0/1/2 setae, respectively.

Discussion. According to the existing records, *C. confluens* is a widespread species of almost cosmopolitan distribution. Mostly the species is mentioned in lists and/or in merely ecological papers, rarely with figures or comments on the morphology of the animals found. Obviously morphological differences can occur between the partial populations of such a widely distributed species. BORUTZKY (1964) interprets the "interracial differences" as due to "the different salt content of the respective water bodies". This led to the establishment of two subspecies: *C. c. cyrenaica* by BREHM (1908; introduced as a questionable new variety) and *C. c. meridionalis* by KIEFER (1929; sample made available by HUTCHINSON et al. 1932). However, *meridionalis* was withdrawn by LANG (1948) and by KIEFER (1949) himself who also rejected *cyrenaica*. In particular, because of the presence of five instead of three setae on the endopodite of the female pereiopod 3 of *meridionalis*, a separate status of subspecies/species was discussed. Yet, KIEFER (1949: fig. 59) found a specimen in "Siwa Oasis (Libyan Desert)" having three and five setae, respectively, on both counterparts of the endopodite of pereiopod 3; this indicated an unstable development of setae on this leg, probably depending on factors like temperature. The "pentasetose condition" (WELLS & MCKENZIE 1973) occurs prevalently in animals from southern regions like Africa, south-west Australia, (India?) (see KIEFER 1949).

Several more or less detailed papers with figures of *C. confluens* were published after LANG's (1948) monograph (e.g. KIEFER 1949, PETKOVSKI 1964, DUSSART 1967, MARINOV 1974, JANETZKY et al. 1996). By the way, the figs of A.1 - Mxp. in his Abb. 509, p. 1278 are erroneously marked with "1" instead of "1a"; they were drawn by GURNEY (1927). It should be emphasized that the proximal rudimentary seta on the outer margin of the furcal rami is not figured in general; furthermore, a long plumose seta and another short seta can be seen between both teeth of the distal segment of endopodite P.3 ♂; however, the last one is mostly hidden by the long inner tooth (compare KIEFER 1949). APOSTOLOV & MARINOV (1988) likewise present some illustrations of *C. confluens*. The inner part of baseoendopodite P.5 ♀ has seven setae; furthermore, their P.3 ♂ in reality seems to be the P.2 ♂. Up to now, only GURNEY (1927) has completely illustrated the mouth parts; apart from some minor differences they correspond to the ones presented in this paper.

In summary, in view of the present knowledge of morphological differences, the well-documented variability and the widespread occurrence, it cannot be excluded that "*C. confluens*" may in reality represent an assemblage of barely discernible species. Thus a thorough description of the animals of all localities is required.

Distribution. Like other *Cletocamptus* species, e.g. *C. retrogressus* Schmanke-witsch 1875 or *C. deitersi* (Richard 1897), *C. confluens* lives in different types of inland waters. It is a representative of brackish waters but obviously endures hypersaline and fresh water conditions (e.g. LANG 1948, NOODT 1956, DUSSART 1967). Furthermore, VOPEL et al. (1996) characterize the species as a "holobenthic infaunal borrower" with "a high tolerance for short-term exposure to sulphide and anoxia".

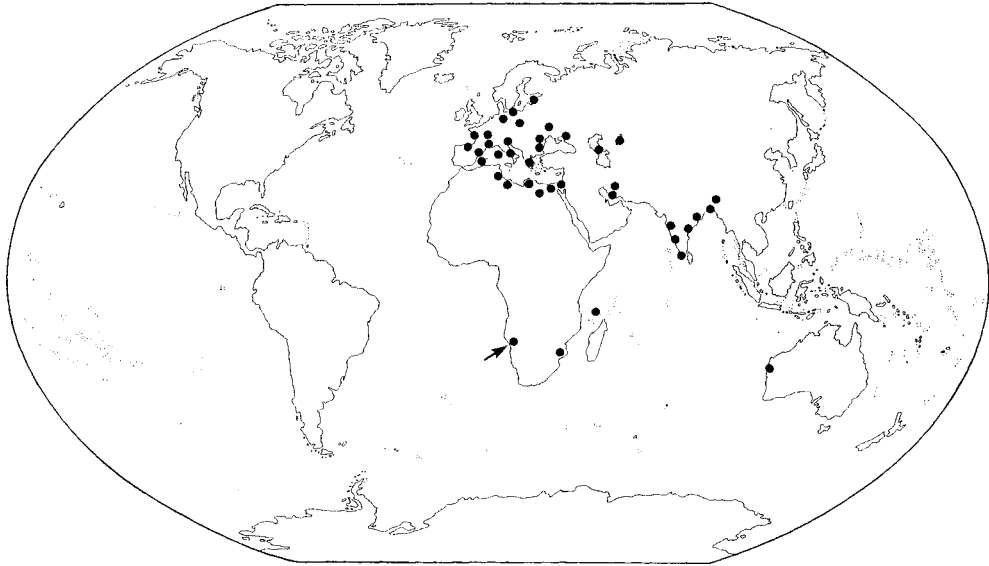


Fig. 7. — Map of the world showing the distribution of *Cletocamptus confluens* (see text). Arrow: new sample site in Namibia.

C. confluens was first described from Germany (“Colberger Heide”, Holstein) by SCHMEIL (1894). Meanwhile the species has been recorded from all continents, apparently with the exception of the Americas, where *C. albuquerqueensis* (Herrick 1895) seems to be the corresponding representative. To my knowledge, the “nearest” locality to the Namibian pond mentioned above is “Marramwe Lake nr Masiyeni, South Chopiland” in Mozambique, the former Portuguese East Africa (HUTCHINSON et al. 1932).

The map of Fig. 7 illustrates the broad distribution of *C. confluens* according to the information in the literature. However, some citations of older publications are difficult to locate exactly. Several of the black circles represent locations that are near the same sampling area. Without doubt the distribution centre of the species is in Europe. Nevertheless, several habitats have also been reported in northern Africa and in India. Some scattered localities are known from southern Africa and western Australia. The presence of *C. confluens* in a small, isolated pond in north-west Namibia (the specimens described in this paper) can perhaps be attributed to migrant birds.

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