A NEW SPECIES OF *STREPTOCEPHALUS* (CRUSTACEA, BRANCHIOPODA, ANOSTRACA) FROM NAMIBIA

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(With 2 figures)

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ABSTRACT

The adult male and egg morphology of a new anostracan species, *Streptocephalus namibiensis*, are described and illustrated. The new species resembles *S. proboscideus* and can be allocated to the same species group which also includes *S. trifidus*. *Streptocephalus namibiensis* has been collected from Bushmanland (northern Namibia), central Namibia, northern Botswana and the Transvaal Highveld (South Africa).

CONTENTS

INTRODUCTION

The Namibian branchiopod fauna was first investigated by Barnard (1924). He reported seven *Streptocephalus* species after extensive collecting, mainly in the Kaokoveld and Ovamboland areas. An eighth, and the only endemic species of the genus, *S. kaokoensis*, was described by Barnard in his 1929 review of the southern African branchiopods. Curtis (1991) listed the same eight and one additional unidentified streptocephalid species in a checklist of the freshwater macro-invertebrates of Namibia. As part of a recent study of the African Streptocephalidae (to be published at a later date), material from the State Museum, Windhoek (SMN), the National Museum of Zimbabwe (NMZ), Bulawayo and from Barnard's collection (South African Museum (SAM), Cape Town) was examined. A number of specimens resembling *S. proboscideus* Frauenfeld (1873) were found to be slightly different from the

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type description and from redescriptions and illustrations by Brauer (1877) and Brendonck (1990). Differences were most evident in male antennal and frontal appendage morphology. In addition, the two morphological types were collected sympatrically at two localities. This indicated that specimens of two distinct species, one undescribed, were involved. In this paper male antennal, frontal appendage and cercopod morphology of the new species are described. The external structure of the resting eggs and the distribution of the new species are also assessed. Finally, *S. namibiensis* sp. nov. will be allocated to a group consisting of species with similar antennal and frontal appendage morphologies.

MATERIALS AND METHODS

Specimens were drawn and prepared for scanning electron microscopy following the procedures in Hamer & Appleton (1993) and the terminology used is from Brendonck (1990). Measurements were made using a graticule and are presented as total body length (mean ± standard deviation if n > 10) from the front of the head (excluding the antennae) to the tips of the cercopods (excluding the setae).

TAXONOMIC DESCRIPTION

Family **Streptocephalidae** Daday, 1910

Streptocephalus namibiensis sp. nov.

Type material

Holotype. SMN 51312, 1 male (16 mm); collected by B. A. Curtis, 12 March 1988; Namibia, Bushmanland, Nyae-Nyae Pan (19°46′S 20°30′E).

Paratypes. SMN 51294, 46 males (13 ± 1,0 mm) and 18 females (13 > 1,0 mm); collected by B. A. Curtis, 12 March 1988, from grassy pool adjoining Nyae-Nyae Pan, Bushmanland (19°46′S 20°30′E).

Other material

SMN 51056, 1 male (17 mm), 1 female (15 mm); collected by B. A. Curtis, 14 May 1986, from Namibia, Bushmanland, Etosha National Park, Onangombati (18°45′S 14°50′E).

SMN 51318, 2 males (one with cercopods damaged, other 16 mm); collected by B. A. Curtis, 13 March 1988, from Namibia, Bushmanland, Tsumkwe (19°34′S 20°31′E).

SAM–5986, 4 males, 6 females, all in poor condition; collected by Miss Wilman, date unknown, from Namibia, Gobabis (22°33′S 18°56′E).

SAM–A7299, 1 male (19 mm), 3 females (19, 19, 18 mm); collected by G. Hutchinson, 1928, from Transvaal, Benoni, Avenue Pan (26°11′S 27°15′E).

SAM–7305, 3 males (20, 19, 17 mm); collected by Miss Schuurman, January 1929, from Transvaal, Heidelberg (26°30′S 28°22′E).

NMZ/Cr 9, many specimens, 14 males measured (20 ± 1,0 mm), 17 females measured (19 ± 1,0 mm); collected by J. Peacock, 26 April 1972, from Botswana, northern fringe of Makarikari Pan (20°S 25°E).

Description of male

Antenna. Lateral process (lp) slender, ventrally curved and apically acute (Fig. 1A). Median antennal process (mp) long (ratio to total body length 0,56:1).

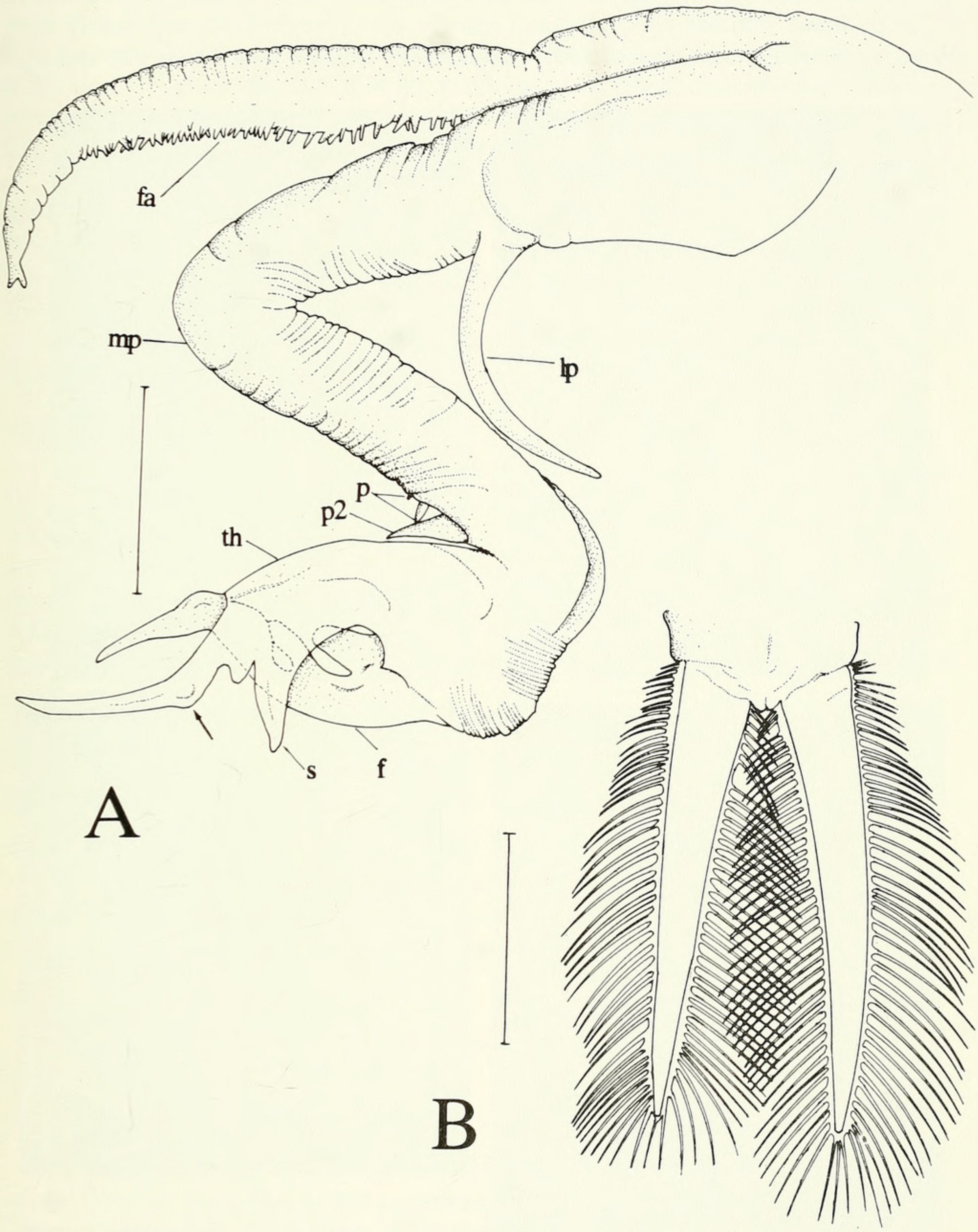

Fig. 1. *Streptocephalus namibiensis* sp. nov. A. Lateral view of left antenna and frontal appendage of male. B. Dorsal view of cercopods. Bar scale = 1 mm. Abbreviations: f = finger, fa = frontal appendage, lp = lateral process, mp = median antennal process, p = processes, p2 = process 2, s = spur, th = thumb.

Antero-medial surface proximal to hand with three slender triangular processes (p) of unequal length (Fig. 1A). A large leaf-shaped process (p1) just proximal to hand on medial surface (Fig. 2A) followed by a similar smaller process distally and another (p2) on the lateral surface (Fig. 1A). Thumb (th) slender, folded proximally. Anterior region of thumb with bend (Fig. 1A) and apically acute. Angle between proximal and distal region of anterior part of thumb about 135°. Thumb spur (s) broad, apically

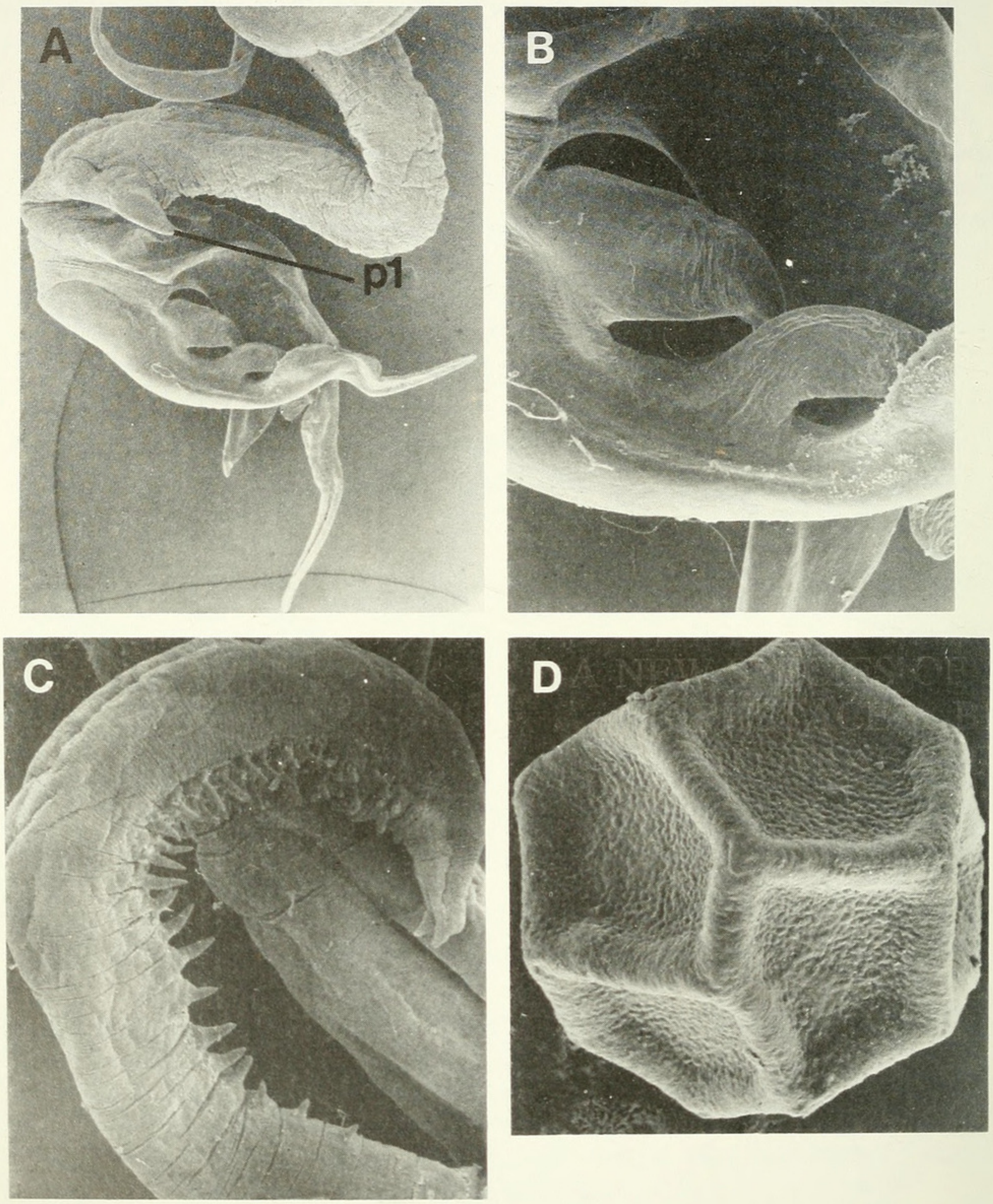

Fig. 2. *Streptocephalus namibiensis* sp. nov. A. Medial view of right antenna of male. × 33. B. Detail of teeth on dorsal margin of finger (medial view). × 117. C. Frontal appendage. × 66. D. Egg morphology. × 248. Abbreviation: P1 = process.

tapered and separated from anterior part of thumb by prominent rounded triangular tooth (Fig. 1A). Finger (f) approximately three-quarters length of thumb, recurved and with pointed apex (Fig. 2A). Two teeth of equal height on dorsal margin of finger, with distal tooth narrower (Fig. 2B). Finger with prominent inflation distal to teeth (Fig. 2A).

Frontal appendage. Long (half length of antenna), slightly coiled, distally tapered and apically bifid. Single row of short spiniform processes at base of frontal appendage, splitting into two rows about one-third along length. Distal half with four rows of irregularly arranged processes decreasing in size along length (Figs 1A, 2C).

Cercopods. Moderate length (in relation to total body length 0,16:1). Outer margin not strongly curved, both margins with long, plumose setae along entire length (Fig. 1B).

Egg morphology

Eggs angular, with large, regular pentagonal fields separated by broad, rounded ribs (Fig. 2D). Diameter = 420 μm.

Differential diagnosis

Although very similar in general appearance, *S. namibiensis* and *S. proboscideus* have a number of characters that are clearly different. *Streptocephalus proboscideus* has long digitiform processes on the anterior margin of the median antennal process and a shorter second tooth on the dorsal margin of the finger. *Streptocephalus namibiensis* only has three, shorter slender processes just proximal to the hand and has two teeth of equal length on the finger. In addition, in *S. proboscideus*, the frontal appendage is more tapered and strongly coiled with less regularly arranged spiniform processes and the distal thumb region is longer (ratio to total thumb length 0,43; in *S. namibiensis* this is only 0,34). The egg shell of *S. proboscideus* is characterized by a large number of complex polygons (Brendonck 1990) rather than the large, regular and simple pentagons of the *S. namibiensis* egg.

Distribution

Streptocephalus namibiensis has, to date, been collected from four areas: the Transvaal Highveld (South Africa), central Namibia (Gobabis), northern Namibia (Bushmanland), and the Makarikari Pan area in northern Botswana.

Etymology

Streptocephalus namibiensis is named after the country from which the type specimens were collected.

Habitat

The only data regarding the habitat of *S. namibiensis* are provided by Hutchinson *et al.* (1932) for the SAM–A7299 specimens. These were collected from an open pan, about one-third of a mile (approx. 0,5 km) in diameter, south-west of Avenue Station, Benoni, which filled up after heavy rains in January 1928. On 5 May (presumably when the fauna was sampled), the pan contained about 2 ft (approx. 0,6 m) of turbid water and was largely unvegetated apart from four species of *Lemna* and some weeds and grasses in the shallow part of the east side. The fauna of the pan included *Arcella* (Protozoa), five cladoceran species, one species of Ostracoda, and four copepod species.

DISCUSSION

Due to the similarity between the antenna and frontal appendage of *S. namibiensis* and *S. proboscideus*, the Benoni (SAM–A7299), Heidelberg (SAM–7305) and Gobabis (SAM–5986) specimens were previously all described as *S. proboscideus* (Barnard, 1929). Brendonck (1990), in his redescription of that species, noted the fact that both Barnard (1929) and Brauer (1877) had illustrated large and, in Barnard's (1929) redescription, equal-sized teeth on the dorsal margin of the finger, rather than the smaller, unequal teeth of *S. proboscideus*. The importance of the antenna and frontal appendage in specific mate selection has recently gained interest (Belk 1991). According to theory, even slight differences in (primary or secondary) reproductive structures can indicate separate species. Based on several studies, it has also been suggested that temporary pools are relatively isolated habitats, and that regular gene flow between them may thus be restricted (Wiman 1979; Brendonck *et al.* 1990; Fugate 1990). Dispersal of species over large areas is most likely a rare event, occurring in instances such as episodic flooding. Local adaptations and morphological changes from the source population are likely and the possibility of immigrants neutralizing these changes, small. Under these conditions, groups of species with a common basic pattern of morphological features may be expected. This appears to have occurred in the African streptocephalids, which can be divided into ten so-called species groups consisting of species sharing a number of antennal and frontal appendage characters. This division needs to be researched further but, at this stage, it provides a basis for the investigation of streptocephalid evolutionary trends, interspecific relationships, and possibly the zoogeography of the genus. *Streptocephalus namibiensis* can be allocated to a species-group consisting of *S. proboscideus* and *S. trifidus* Hartland-Rowe, 1968.

Wiman (1979) found that, because of the isolated nature of temporary pool habitats, the development of sexual isolating mechanisms in streptocephalids is rare and that hybrids are common under laboratory conditions. In this context, the collection of *S. namibiensis* and *S. proboscideus* from the same localities on two occasions (SMN 51312, 51294) is interesting. No specimens with intermediate morphologies were found and it appears that some form of isolating mechanism prevents the formation of hybrids. No other case of members of the same species-group occurring sympatrically is known.

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