

NEOECHINORHYNCHUS NINGALOOENSIS SP. NOV. (ACANTHOCEPHALA: NEOECHINORHYNCHIDAE) FROM *SCARUS GHOBBAN* AND *S. PSITTACUS* (SCARIDAE) FROM WESTERN AUSTRALIA

by SYLVIE PICHELIN^{*} & THOMAS H. CRIBB[†]

Summary

PICHELIN, S. & CRIBB, T. H. (2001) *Neoechinorhynchus ningalooensis* sp. nov. (Acanthocephala: Neoechinorhynchidae) from *Scarus ghobban* and *S. psittacus* (Scaridae) from Western Australia. *Trans. R. Soc. S. Aust.* (2001), 125(1), 51–55, 31 May, 2001.

Neoechinorhynchus ningalooensis sp. nov. is described from *Scarus ghobban* Forsskal, 1775 and *S. psittacus* Forsskal, 1775 (Scaridae) from Ningaloo Reef, Western Australia. The new species is distinguished by having a combination of the following: three circles of six hooks on the proboscis; anterior hooks equal in size (66–68 µm long), middle hooks (50–58 µm long), 79% smaller than anterior hooks, posterior hooks (40–44 µm long) smallest; lemnisci equal in length and extending beyond the proboscis receptacle but not to ovoid testes; terminal papilla absent. This report is the first published account of an acanthocephalan from parrotfish (Scaridae) and the first record of an eocanthocephalan from the western coast of Australia.

KEY WORDS: Acanthocephala, Neoechinorhynchidae, *Neoechinorhynchus*, parrotfish, Western Australia, Scaridae, new species.

Introduction

Neoechinorhynchus (Neoechinorhynchidae: Acanthocephala) has been recorded from about 50 families of fishes world-wide. Three species of *Neoechinorhynchus*, *N. agilis* (Rudolphi, 1819), *N. tylosuri* Yamaguti, 1939 and *N. aldrichellae* Edmonds, 1971 are present in Australian fishes. Another Australian species, *N. magnus* Southwell & Macfie, 1925, was described by Southwell & Macfie (1925) but Edmonds (1982) considered that it might be conspecific with *N. tylosuri*. *Neoechinorhynchus magnus* is currently considered a *species inquirenda* (see Edmonds 1989).

The new species described here was recovered from two species of parrotfishes (Scaridae) from Ningaloo Reef in Western Australia. To our knowledge, no acanthocephalan has previously been recorded from parrotfishes anywhere in the world.

Materials and Methods

Acanthocephalans were removed from the intestines of *Scarus* spp., washed in tapwater, compressed slightly between two glass slides to evert the proboscis, fixed in 10% Berland's fluid (95% glacial acetic acid and 5% formalin) in tapwater and stored in 70% ethanol. Specimens were examined and measured in temporary glycerol mounts under a

coverslip. Drawings were made with the aid of a *camera lucida* and added to by hand. Measurements, presented as the range with the mean in parenthesis, are given in micrometres unless otherwise stated. Width measurements refer to maximum width. Trunk length does not include neck, proboscis or male bursa. In order to compare relative hook sizes of different species, the median of each hook length for each species was determined from the ranges given in the literature.

Abbreviations used: AHC – Australian Helminthological Collection, South Australian Museum, Adelaide; WAM – Western Australian Museum, WA.

***Neoechinorhynchus ningalooensis* sp. nov.
(FIGS 1–3)**

Holotype: ♂ from intestine of *Scarus ghobban* Forsskal, 1775 (Scaridae), Ningaloo Reef WA, (22° 40' S, 113° 37' E), coll: S. Pichelin, T. H. Cribb, D. Capps and K. Hall, April, 2000, WAM V4144.

Paratypes: 1 ♂ and 2 ♀♀ from intestine of *Scarus ghobban* Forsskal, 1775 (Scaridae), Ningaloo Reef, WA, (22° 40' S, 113° 37' E), coll: S. Pichelin, T. H. Cribb, D. Capps and K. Hall, April, 2000, AHC 31406–31408.

Other material examined: 1 ♀ from intestine of *Scarus psittacus* Forsskal, 1775 (Scaridae), Ningaloo Reef, WA, (22° 40' S, 113° 37' E), coll: S. Pichelin, T. H. Cribb, D. Capps and K. Hall, April, 2000, WAM V4145.

* Department of Microbiology and Parasitology, The University of Queensland Brisbane Qld 4072.

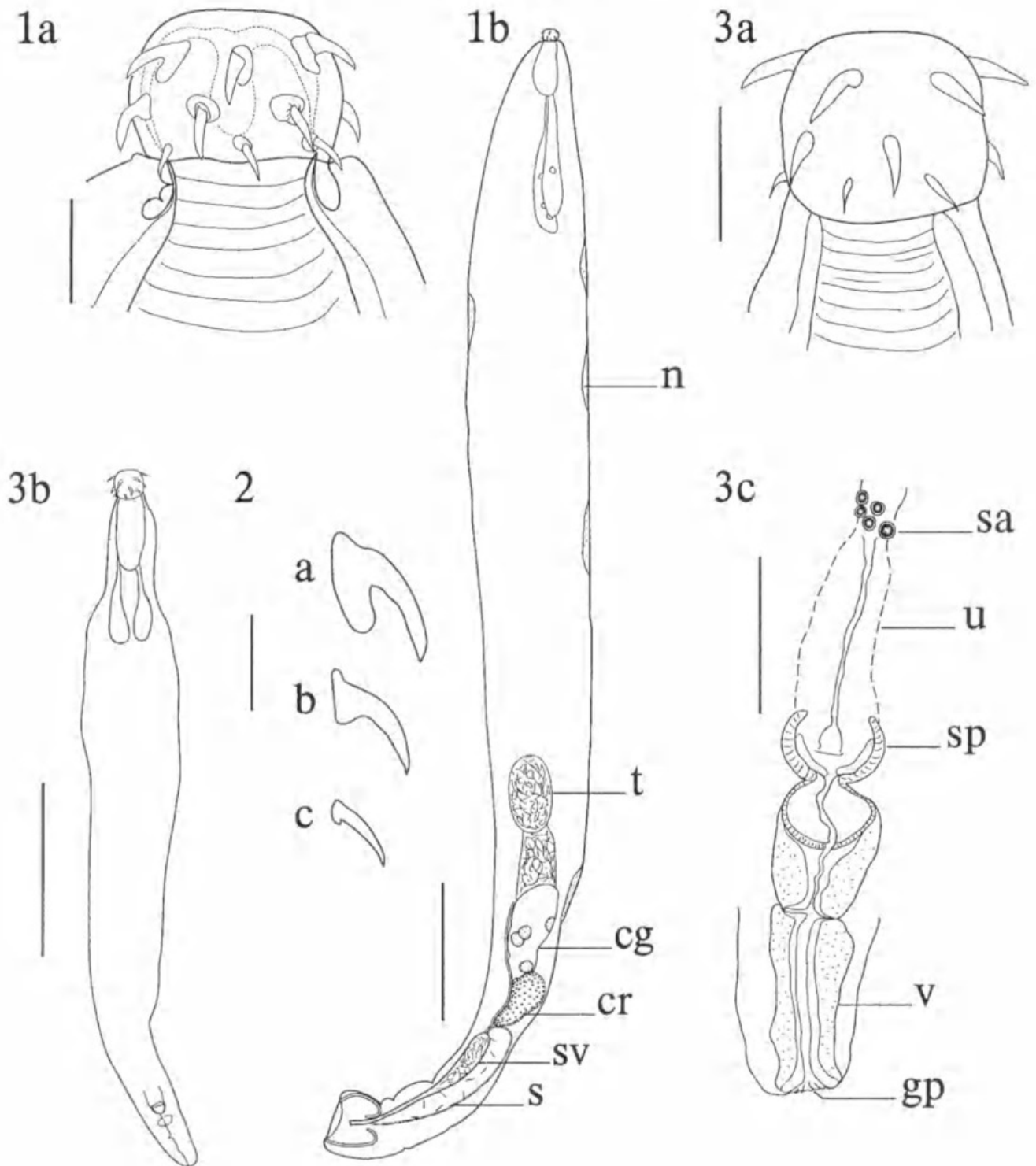


Fig. 1. Male (holotype). a. Proboscis, b. Whole mount. Scale bars = 100 μ m, a; 2 mm, b. Legend: cg, cement gland; cr, cement reservoir; n, nucleus; s, Säffigen's pouch; sv, seminal vesicle; t, testis.

Fig. 2. Proboscis hooks of holotype. a. Hook in anterior circle = anterior hook. b. Hook in middle circle = middle hook. c. Hook in posterior circle = posterior hook. Scale bar = 50 μ m.

Fig. 3. Female, immature (paratype). a. Proboscis, b. Whole mount, c. Terminal genitalia – the outline of the uterus (represented by a dashed-line) is estimated by considering the position of the selector apparatus and the vaginal sphincter. Scale bars = 100 μ m, a, c; 1 mm, b. Legend: gp, gonopore; sa, selector apparatus; sp, vaginal sphincter; u, uterus; v, vagina.

Description (Measurements of specimens from *Scurus ghobban*)

Trunk cylindrical, tapering posteriorly, inermis. Proboscis globular, armed with 3 circles of 6 hooks of similar size in each circle. Hooks in anterior circle robust, slightly curved, equal in size, 66-68 (68); roots robust 41-57 (50) but lacking distinct manubrium. Hooks in middle circle 50-58 (53), approx. 79% smaller than anterior hooks, similar in shape to anterior hooks; roots less developed, stumper, 27-35 (30). Posterior hooks 40-44 (42), slender, approx. 61% smaller than anterior hooks, approx. 78% smaller than middle hooks; roots ill-defined. Neck inconspicuous or absent. Proboscis receptacle single-walled; brain near posterior end. Hypodermal nuclei present in trunk wall, 5 in holotype. Lemnisci equal in length, single nucleus in one, 3 or more in other; extend beyond proboscis receptacle, about 15% trunk length. Genital pores terminal in both sexes. Terminal papillae absent.

Males (n=2 specimens)

Trunk 9.4-15.8 mm (12.6 mm) x 0.9-1.6 mm (1.3 mm). Proboscis 176-200 (188) x 160-208 (184). Anterior hooks 68-68 (68); roots 41-52 (47). Middle hooks 51-58 (54); roots 27-32 (30). Posterior hooks 40-44 (42). Proboscis receptacle 400-736 (568) x 158-240 (199), 31% of lemnisci length. Lemnisci 110-216 mm (1.8 mm) x 128-272 (198), extend beyond proboscis receptacle but not to testes, occupying 14% of trunk length. Testes 2, ovoid, equatorial, in tandem, contiguous or slightly overlapping; anterior testis 800-1,136 (968) x 400-704 (552); posterior testis 736-1,088 (912) x 480-592 (536). Cement gland multinucleate (4 nuclei observed in holotype). Cement reservoir large, posterior to cement gland. Saffigen's pouch long, posterior to cement gland, adjacent to seminal vesicle.

Females (n=2 specimens)

Trunk 4-8 mm (6 mm) x 0.448-1 mm (0.8 mm). Proboscis 144-145 (145) x 158-197 (177). Anterior hooks 66-68 (67); roots 57-57 (57). Middle hooks 50-54 (52); roots 28-35 (32). Posterior hooks 40-41 (40). Proboscis receptacle 442-555 (498) x 145-192 (169), 46% of lemnisci length. Lemnisci 656-1,440 (1,072) x 64-176 (120), occupying 18% of trunk length. Uterine bell not visible. Selector apparatus about 116 from vaginal sphincter. Uterus not clearly visible. Vagina thick-walled, 135 long. Gonopore terminal but slightly invaginated. Eggs not observed.

Remarks

A female specimen of *Neoechinorhynchus ningalooensis* sp. nov. was also recovered from *S. psittacus* in Western Australia. Its measurements are

as follows. Trunk 28 x 2.1 mm. Proboscis 189 x 215. Anterior hooks not measurable. Middle hooks 55; roots 27-32. Posterior hooks 41. Proboscis receptacle 976 x 272. Lemnisci 3.2-3.4 mm x 304-384.

Five species of scarids were examined from Ningaloo Reef: two of two *S. ghobban* and one of one *S. psittacus* were infected but none of seven *Leptoscarus vaigiensis* (Quoy & Gaimard, 1824), one *Chlorurus sordidus* (Forsskal, 1775) and one *Scurus chameleon* Choat & Randall, 1986 was infected. A further 66 scarids were examined from Heron L., Queensland but no acanthocephalans were found. These species of fish were *Cetoscarus bicolor* (Rüppell, 1829) (n = 1), *Scarus dimidiatus* Bleeker, 1859 (n = 3), *S. frenatus* Lacépède, 1802 (n = 7), *S. ghobban* Forsskal, 1775 (n = 2), *S. globiceps* Valenciennes, 1840 (n = 5), *S. microchirus* Bleeker, 1854 (n = 1), *S. niger* Forsskal, 1775 (n = 4), *S. oviceps* Valenciennes, 1840 (n = 1), *S. psittacus* Forsskal, 1775 (n = 3), *S. rivulatus* Valenciennes, 1840 (n = 7), *S. schlegelii* (Bleeker, 1861) (n = 4), *S. sordidus* Forsskal, 1775 (n = 27), *S. spinus* (Kner, 1868) (n = 1).

Etymology

The specific name of the new species refers to the Australian location in which it was discovered.

Discussion

Amin (1985a) lists 75 species of *Neoechinorhynchus*. A further 12 have been described since, namely: *N. carinatus* Buckner & Buckner, 1993 (see Buckner & Buckner 1993), *N. dimorphospius* Amin & Sey, 1996 (see Amin & Sey 1996), *N. gibsoni* Khan & Bilqees, 1989 (see Khan & Bilqees 1989), *N. iduhoensis* Amin & Heckmann, 1992 (see Amin & Heckmann 1992), *N. lingulatus* Nickol & Ernst, 1987 (see Nickol & Ernst 1987), *N. nickoli* Khan, Bilqees, Noor-Un-Nisa, Ghazī & Ata-Ur-Rahim, 1999 (see Khan, *et al.* 1999), *N. pimelodi* Brasil-Sato & Pavanelli, 1998 (see Brasil-Sato & Pavanelli 1998), *N. plagiognathopirius* Wang & Zhang, 1987 (see Wang & Zhang 1987), *N. roberthaueri* Amin, 1985 (see Amin 1985b), *N. rostratum* Amin & Bullock, 1998 (see Amin & Bullock 1998), *N. saurogobi* Yu & Wu, 1989 (see Yu & Wu 1989) and *N. villotdoi* Vizcaino, 1992 (see Vizcaino 1992). Descriptions were examined for all species except *Neoechinorhynchus karachiensis* Bilqees, 1972, *N. quinghaiensis* Liu, Wang & Yang, 1981, *N. acanthuri* Farooqi, 1980 and *N. longissimus* Farooqi, 1980. *Neoechinorhynchus karachiensis* and *N. quinghaiensis* are listed by Amin (1985a) but could not be found in the literature. The only reference by Farooqi we could find which contained

the descriptions of *N. acanthuri* and *N. longissimus* was in the form of an abstract. If this is the only reference describing *N. acanthuri* and *N. longissimus*, then the species are *nomen nudum* because they have not been formally described.

Neoechinorhynchus ningalooensis sp. nov. has been placed in *Neoechinorhynchus* because it has three circles of six hooks on the proboscis, a single-walled proboscis receptacle, a single cement gland and no trunk spines. It can be distinguished from all other species by the combination of the following characters: large hooks of the anterior circle equal in size and measuring 66-68 (68) in length; hooks in the middle circle 50-58 (53), 79% smaller than anterior hooks; posterior hooks smallest, 40-44 (42); lemnisci equal in length and extending beyond the proboscis receptacle but not to the ovoid testes; the trunk without a terminal papilla.

Many *Neoechinorhynchus* species occur only in the Americas in either freshwater fishes or turtles and are therefore unlikely to be confused with *N. ningalooensis* which occurs in an Australian marine fish. There are 15 species that occur only outside Australia, which have equal sized hooks in the anterior circle on the proboscis and have anterior hooks (55-75 long) similar in length to the new species (66-68). Nine of these also have distinctly unequal lemnisci and/or the middle and posterior hooks about the same size (the posterior hooks are about 90% or more the length of the middle hooks in these species). *Neoechinorhynchus ningalooensis* has lemnisci of equal lengths and the posterior hooks are 78% the length of the middle hooks.

Six species are similar to the new Australian species. These are *N. formosanus* (Harada, 1938) Kaw, 1951, *N. longilemniscus* Yamaguti, 1939, *N. nigeriensis* Farooqi, 1981, *N. rigidus* (Van Cleave, 1928) Kaw, 1951, *N. saginatus* Van Cleave & Bangham, 1949 and *N. salmonis* Ching, 1984 (females only). The middle hooks of *N. formosanus*, *N. longilemniscus*, *N. nigeriensis*, *N. saginatus* and *N. salmonis* are about half the size of the anterior hooks (middle hook 50-57% of anterior hook lengths) whereas the middle hooks of *N. ningalooensis* are about 79% of the length of the anterior hooks. The very long lemnisci which extend almost to the posterior end of the trunk of *N. longilemniscus* also readily distinguish this species from *N. ningalooensis*. *Neoechinorhynchus nigeriensis* is further distinguished from the new species because its posterior hooks are half the size of its middle hooks.

The original description of *N. rigidus* from an Indian fish (*Schizothorax zarandnyi*) by Van Cleave (1928) is brief. Van Cleave (1928) gave the lengths of the anterior, middle and posterior hooks as 70, 47 and 41 μ m respectively but very little other

information. The similarity between the middle and posterior hook lengths in this species is sufficient to distinguish it from *N. ningalooensis*. Moravec & Amin (1978) described *N. rigidus* from fishes of Afghanistan and gave the length ranges for the anterior, middle and posterior hooks as 60-81, 45-63 and 42-60 respectively. Their figure of the hooks of *N. rigidus* (see Fig. 7 in Moravec & Amin (1978)) also shows the similarity between the middle and posterior hook lengths.

There are only three valid species of *Neoechinorhynchus* in Australia. *Neoechinorhynchus aldrichettiae* is known from *Aldrichetta forsteri* (Cuvier & Valenciennes) in South Australia and the other two species *N. tylosuri* and *N. agilis* are known from *Tylosurus* sp. and from *Cremnugil crenulatus* and *Mugil cephalus* (respectively) in Queensland (Edmonds 1989). *Neoechinorhynchus agilis* is also known from *M. cephalus* from Japan and Italy (type locality) (Edmonds 1971). *Neoechinorhynchus tylosuri* is a long slender worm with elongate testes, unequal lemnisci and its middle and posterior hooks are similar in length and about half the size of the anterior hooks (Edmonds 1982) whereas *N. ningalooensis* is more compact, has ovoid testes and its posterior hooks are smaller than its middle hooks. The anterior hooks of *N. agilis* described by Edmonds (1982) may be almost twice the size of those of *N. ningalooensis*. *Neoechinorhynchus aldrichettiae* can be distinguished easily from *N. ningalooensis* by the differences in the shape and size of the proboscis hooks and the relative lengths of the lemnisci. The middle and posterior hooks of *N. aldrichettiae* are more slender and smaller than its anterior robust hooks whereas the middle hooks of *N. ningalooensis* are more robust and larger than its posterior hooks. The lemnisci of *N. aldrichettiae* are about one third as long as the trunk (Edmonds 1982) whereas those of *N. ningalooensis* are about a seventh (15%) of the trunk length.

Neoechinorhynchus ningalooensis was recovered from *Scarus ghobban* (type host) and *S. psittacus*. This is the first record of an acanthocephalan infecting species of the family Scaridae. It is also the first record of an eoacanthocephalan from the Indian Ocean off the coast of Western Australia.

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