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A new species of *Neorhadiorhynchus* (Acanthocephala: Cavisomidae) from *Platax teira* (Ephippidae) from Iraqi marine waters

Lesley R. Smales^a, Hayder A. H. Al-Hasson^b, Khalidah S. Al-Niaeem^c and Suzan A. Al-Azizz^b

^aParasitology Section, South Australian Museum, Adelaide 5000, South Australia, Australia; ^bDepartment of Microbiology and Veterinary Parasitology, College of Veterinary Medicine, University of Basrah, Basrah, Iraq; ^cDepartment of Fisheries and Marine Resources, College of Agriculture, University of Basrah, Basrah, Iraq

ABSTRACT

A new species of *Neorhadiorhynchus* (Acanthocephala: Cavisomidae), *N. basrahiensis*, is described from the small intestine of the longfin batfish *Platax teira* Forskål, 1775, from Iraqi marine waters. The new species is distinguished from its congeners by the proboscis armature of 12 rows of 8–10 hooks, the largest hooks being up to a third larger than the largest hooks previously described for the genus. It is first record of the genus in the Ephippidae and from Iraqi marine waters; the fourth species of the genus *Neorhadiorhynchus* to be described from the Indian Ocean.

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Neorhadiorhynchus; new species; *Platax*; Iraqi marine waters; Acanthocephala; fish

Introduction

The genus *Neorhadiorhynchus* (Yamaguti, 1939) (Cavisomidae) comprises seven species, six of which occur in fishes (*Prionurus scalprum* Valenciennes, 1835, Acanthuridae; *Trachurus japonicus* Temminck & Schlegel, 1844, Carangidae; a myctophid species; *Euthynnus affinis* Cantor, 1859; *Rastrelliger kanagurta* Cuvier 1816, Scombridae; *Siganus vermicularis* Valenciennes, 1835; and *S. fuscescens* Houttuyn, 1782, Siganidae) (Amin, 2013; Amin & Nahhas, 1994; Amin & Van Ha, 2011; Golvan, 1969). *Neorhadiorhynchids* are distributed from the Atlantic Ocean, down the eastern coast of Africa and across the Indo-Pacific to Japan, Taiwan and the Fiji Islands in the Pacific Ocean. The exception, *Neorhadiorhynchus atlanticus* (Gaevskaya, 1977), is found in the stomach of the orange-back squid, *Sthenoteuthis pteropus* (Steenstrup, 1855), from the Atlantic Ocean (Gaevskaya, 1977). The genus is characterised morphologically by a cylindrical aspinose trunk, a relatively long cylindrical proboscis with many hooks, with simple posteriorly directed roots in longitudinal rows, with the hooks usually with ventrodorsal size differentiation. The lemnisci are digitiform, equal and usually shorter than the double-walled proboscis receptacle (Yamaguti, 1939). Three species, *Neorhadiorhynchus madagascariensis* (Golvan, 1969), *N. nudum* (Harada, 1938) and *N. atypicalis* (Amin & Van Ha, 2011), have hitherto been reported from fishes across the Indian Ocean and as far east as the Pacific Ocean; from off Madagascar

in the west to the coast of Taiwan in the east (Amin & Van Ha, 2011; Golvan, 1969; Hassanine, 2006). In this paper we report the first species to be described from the longfin batfish, *Platax teira* Forsskål, 1775 (Ephippidae), from Iraqi marine waters.

Materials and methods

Fish, including 14 individuals of *Platax teira* were collected in Iraqi marine waters between 30° 00' to 30° 50' N, 47° 30' to 48° 30' E on the 26 October 2013 and the 13 May 2014 and frozen for storage. On subsequent dissection the acanthocephalans described below were recovered from two individuals of *P. teira*, fixed in 5% formalin and stored in 70% alcohol. Specimens were cleared in beechwood creosote prior to microscopic examination as temporary wet mounts and drawings were made with a drawing tube attached to an Olympus BH-2 microscope. Measurements are presented in µm unless otherwise indicated as the range, followed, in parentheses, by the mean where four measurements were taken. Where fewer than four measurements were taken the number of individuals measured (n) is given. All specimens were deposited in the South Australian Museum (SAM).

Results

Neorhadinorhynchus basrahiensis n. sp.

(Figures 1 and 2)

Types: holotype SAM AHC47662, allotype SAM AHC47663; 2 males, 1 female paratypes SAM AHC 47563; 1 male 2 females, I anterior end vouchers SAM AHC 47542.

Type host: *Platax teira* Forsskål, 1775 (Perciformes: Ephippidae).

Site in host: intestine.

Type locality: Iraqi marine waters (30° 50' to 30° 00' N, 47° 30' to 48° 30' E).

Description

Males smaller than females: trunk slender, cylindrical, tegument aspinose, covered with small sclerotized plaques (Figure 1). Proboscis cylindrical to clavate, with 12 longitudinal rows of 9–10 hooks. Hooks with simple roots, not as long as blades gradually decreasing in size posteriorly, posterior 3 hooks with discoid roots; blades decreasing in size posteriorly, basal hooks forming ring. Neck short, wider than long. Proboscis receptacle double walled, originates at base of proboscis. Cerebral ganglion at mid region of proboscis receptacle. Lemnisci digitiform, extend nearly to posterior end of proboscis receptacle.

Male (Measurements of 4 specimens). Trunk 10–14 (12.5) mm long, 340–680 (498) wide. Proboscis 804–1105 (915) long, 268–340 (301) wide. Serial hook lengths 2 rows measured from the anterior –, –; 158.4, –; 138.6, 113.9; 141.9, 120.6; 132.0, 120.6; 118.8, 100.5; 115.5, 100.5; 99.0, 93.8; 72.6, 87.1; 72.6, 87.1. Neck 174–302 (244) long, 268–402 (338) wide at base. Proboscis receptacle 1700–2295 (2064) long, 134–435 (300) wide. Lemnisci 1100, 1320 (1232) long. Testes in posterior ¼ trunk, ovoid, tandem, contiguous; anterior testis 469–603 (547) long, 100–147 (117) wide; posterior testis 402–603 (503)

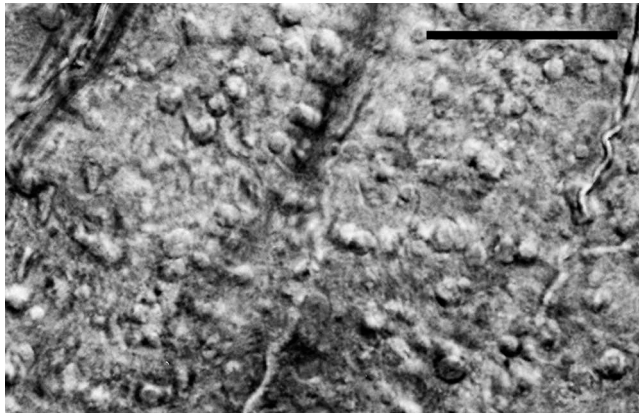


Figure 1. *Neorhadinorhynchus basrahiensis* from *Platax teira*. Light micrograph of the trunk of a male showing tegumental plaques. Scale bar: 100 μ m.

long, 100–161 (122.8) wide. Cement glands 4, 300, 450 ($n = 2$) long; Saeffitgen's pouch 469–637 (514) long. Bursa relatively small; genital pore sub-terminal.

Female (Measurements of 4 specimens). Trunk 13–20 (16) long, 536–556 (545) wide. Proboscis 850, 1020 ($n = 2$) long, 374, 408 ($n = 2$) wide. Serial hook lengths, 2 rows measured from the anterior –, –; 122.1, 115.5; 122.1, 132.0; 132.0, 128.7; 125.4, 122.1; 115.5, 108.9; 102.2, 99.0; 95.7, 92.4; 89.1, 85.8. Neck 201–289 (248) long, 374–402 (388) wide. Proboscis receptacle 2006–2605 (2287) long, 272–362 (217) wide. Lemnisci 1411, 1710 ($n = 2$). Female reproductive system 2380–3400 (2947) long; vagina 180–250 (207); genital pore terminal. Germ cell balls present but no mature eggs found.

Discussion

Neorhadinorhynchus basrahiensis n. sp. demonstrates the characters of the genus as given by Yamaguti (1939) and Hassanine (2006) but differs from all seven described species in having sclerotized plaques covering most of the trunk. Consideration of a key to six of the seven presently known species of *Neorhadinorhynchus* (see Amin & Nahhas, 1994) resulted in *N. basrahiensis* falling into the group of species with 12–14 longitudinal rows of hooks on the proboscis: namely *N. nudum*, *N. atlanticus*, *N. myctophumi* (Mordvinova, 1988) and *N. macrospinus* (Amin & Nahhas, 1994). Having a proboscis armature of only 9–10 hooks in each longitudinal row as compared with 24–25, 14–15, 17 or 15–16 hooks, respectively, further distinguishes *N. basrahiensis* from all four species (Amin & Nahhas, 1994; Gaevskaya, 1977; Mordvinova, 1988; Yamaguti, 1939). Further the largest hooks of *N. basrahiensis*, up to 158 long are much larger than the largest hooks, 86 for *M. macrospinus*, previously reported for the genus (Amin & Nahhas, 1994). Since the key was published an additional species, *N. atypicalis*, has been described. *Neorhadinorhynchus basrahiensis* differs from *N. atypicalis* in having a proboscis armature of 12–14 rows of 9–10 hooks, the largest 158, compared with 14 rows of 27 hooks per row, the largest 50 (Amin & Van Ha, 2011).

The presence of sclerotized plaques in the anterior wall of the trunk was considered by Schmidt and Paperna (1978) to be characteristic of the genus *Sclerocollum* and

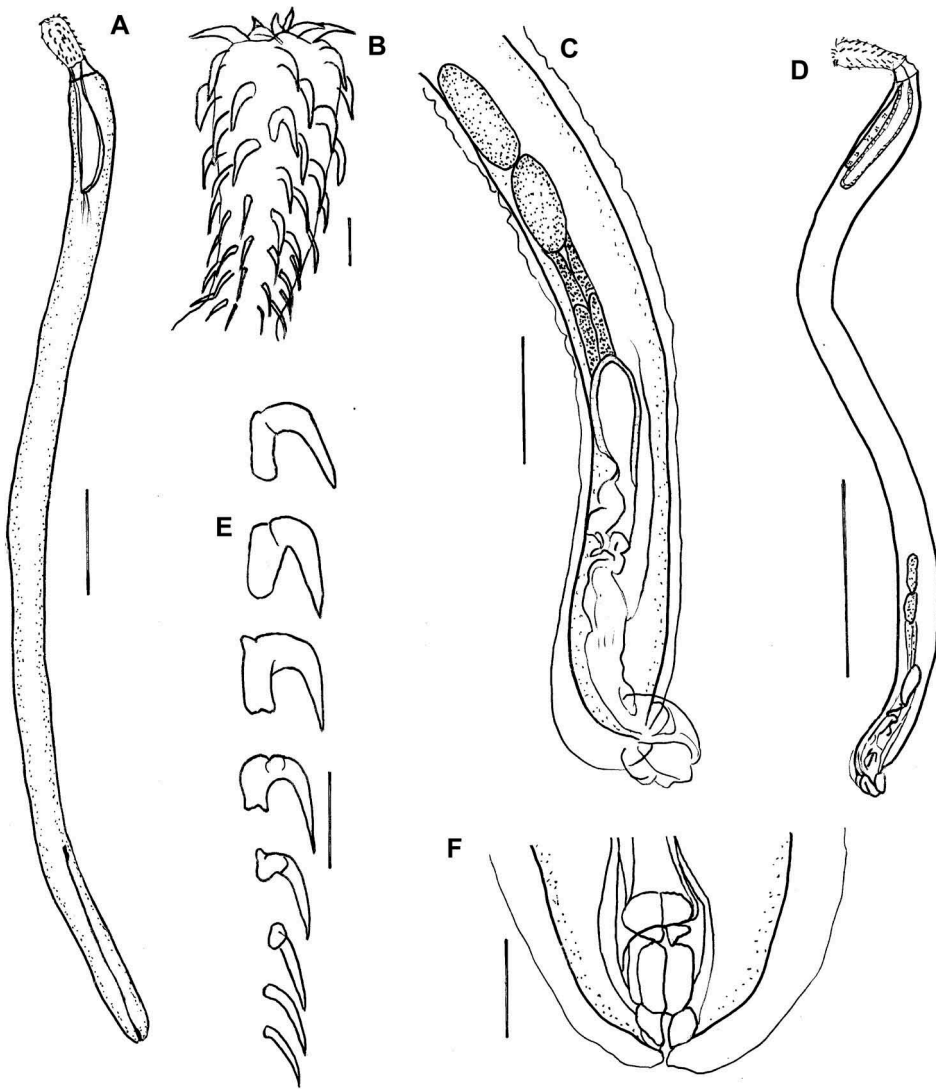


Figure 2. *Neorhadinorhynchus basrahiensis* from *Platax teira*. A. Female. B. Proboscis, male. C. Posterior end, male. D. Male. E. Proboscis hooks, longitudinal row hooks 2–9. F. Posterior end, female. Scale bars: 2, 1.5 mm, 3, 6, 7, 100 μ m, 4, 400 μ m, 5, 2.0 mm.

lacking in the genus *Neorhadinorhynchus*. Subsequently, Pichelin and Cribb (2001) found that the number of plaques on individuals of *Sclerocollum* varied from none to many and plaques were also present on some of the individuals of *N. aspinosus* they examined. Therefore, the presence or absence of plaques does not appear to be a defining characteristic of either genus. The presence of plaques on the trunk of *N. basrahiensis* as with on *N. aspinosus* is consistent with the allocation of *N. basrahiensis* to the genus *Neorhadinorhynchus*.

The finding of *N. basrahiensis* in *P. teira* is the first record of the genus occurring in the Ehippidae. *Neorhadinorhynchus madagascariensis* from Madagascan waters, *N.*

nudum (reported as *Diplosetis nudus*) from the Red Sea and *N. atypicalis* from Vietnamese waters have previously been reported from the Indian Ocean but this is the first record of the genus from Iraqi marine waters (Amin & Van Ha, 2011; Golvan, 1969; Hassanine, 2006). *Neorhadinorhynchus nudum* was originally described from Taiwan and has subsequently been reported from the Fiji Islands and the Red Sea, suggesting that it may be widely distributed across the Indian Ocean and into the Pacific (Amin & Nahhas, 1994; Hassanine, 2006; Yamaguti, 1939). Moreover, such a wide distribution may be possible because *N. nudum* is able to utilise hosts from at least two families of fishes, Carangidae and Scombridae. In contrast *N. madagascariensis* has a limited distribution, being known only from Madagascar and occurring in a single host species (Golvan, 1969). *Platax teira*, the host of *N. basrahiensis*, has a wide geographical distribution extending across the Indo-Pacific region. More collecting of fish species across the region is needed to determine whether the distribution of *N. basrahiensis* is limited to a single host species from Iraqi marine waters or has a wider host range and geographical distribution.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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