*NEOECHINORHYNCHUSDALERI*N. SP. (ACANTHOCEPHALA: NEOECHINORHYNCHIDAE) IN THE MARINE FISH *MUGILCEPHALUS*(LINNAEUS, 1758) FROM KARACHI COAST, PAKISTAN

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خلاصہ

Neoechinorhynchus dalerin مچھلیوں کی ایک نئی نوع ہے۔جو کراچی کے ساحل پہ دریافت کی گئی۔ایک سمندری نوع Mugil cephalus جیسی ہے۔یہ نوع عمومی طور پر سمندری پانی کی نسبت میٹھے پانی میں زیادہ پائی جاتی ہے۔اس کے کچھ اقسام parasitize ٹرٹل کے نام سے بھی دریافت کی گئی ہے۔اس مچھلی کے مادہ اور نر کا جسامت ۷ ملی لیٹر سے کم ہوتا ہے. جبکہ پروبوسس پریں جانب سے بڑے یک سے جڑا ہوتا ہے۔جس کی جانبی لمبائی 0.16 – 0.098 ہوتی ہے۔اس کے چار نیوکلیائی جو تقریبا لمبائی میں ایک جیسے ہوتے ہیں اور سامنے سے نر تولیدءاعضاء(Testis) کو ڈھانپتے ہیں۔مرکزی Gonglion کروی ہوتے ہے جو پروبوسس ریسپٹیکل کے نیچے واقع ہوتے ہیں۔

یہ سائینورائنیس ڈرسوجینیٹس جیسے ہوتے ہے لیکن ان کی جسامت لمبائی کے اعتبار سے مختلف ہوتی ہے۔اس میں Leminus جانبی Testis کو نہیں ڈھانپتے۔اس میں بیضوی cametgland, Testis چھوٹے Bushra اور بغیر نیوکلیائی کے ہوتے ہیں۔

Abstract

*Neoechinorhynchus daleri*n. sp. is described from the marine fish *Mugil cephalus* (Linnaeus, 1758) from Karachi coast, Pakistan. The genus *Neoechinorhynchus* is relatively more common in freshwater fish than in marine environments and some species are known to parasitize turtles. The male and females of this species are less than 7 mm long, proboscis small in size, with the largest hooks being the anterior most 0.098-0.106 in length, lemnisci with 4 nuclei equal in length reaching the anterior testis. Body hypodermal nuclei are 2-3. Central ganglion is spherical and located at the base of proboscis receptacle. Lemnisciare equal in length reaching anterior testis, oval testes and in having a small bursa.

It is closest to *Neoechinorhynchus dorsovaginatus* but differs in having body size smaller, lemnisci does not overlap anterior testis, lemnisciare equal in length, oval testes, cement gland with no obvious nuclei and having smaller bursa.

Key Word: Neoechinorhynchus daleri, n.sp.,fish,small intestine.

Introduction

Parasitic worms cause great problem in Marine, freshwater fish and turtles (Barger, 2004). These worms besides causing direct losses resulting from mortality, these acanthocephala bring considerable impact on growth and finally lowering resistance of fish to secondary infections and stressing factors (Woo, 2006). The acanthocephala are worldwide in its geographical distribution and are found in both freshwater and marine fish. They have a complex life cycle involving arthropods as intermediate hosts and vertebrates as definite hosts (Crompton and Nickol, 1985). The freshwater and marine fish harbor a number of acanthocephala. They involve arthropods as intermediate hosts and also cause disease as well as mortality of fish (Nickol, 2006). Smaller sized fish are more susceptible to parasitism because they cannot support parasitic burden and thus die earlier than large fish (Krist and Lively, 1998).

In the present survey of marine fish (*Mugil cephalus* Linn., 1758) for acanthocephala, twelve worms were collected from a single fish belonging to the genus *Neoechinorhynchus* Stiles and Hassall, 1905. The species of the genus reported in different hosts from Pakistan are *N. johnii* (Yamaguti, 1939) Bilqees, 1972; *N. karachiensis* Bilqees, 1972; *N. form osanum* (Harada, 1938) Bilqees, 1972; *N. gibsoni* Khan and Bilqees, 1989; *N. nickoli* Khan *et al.*, 1999; *N. longiorchis* Khatoon and Bilqees, 2007; *N. brayi* Bilqees *et al.*, 2011; *N. macrorchis* Shaikh *et al.*, 2011 and *N. nawazi* Naqvi *et al.*, 2012.

Present study was made to identify the new species of acanthocephala and also this is the new information for the researchers who are working on acanthocephala of fish.

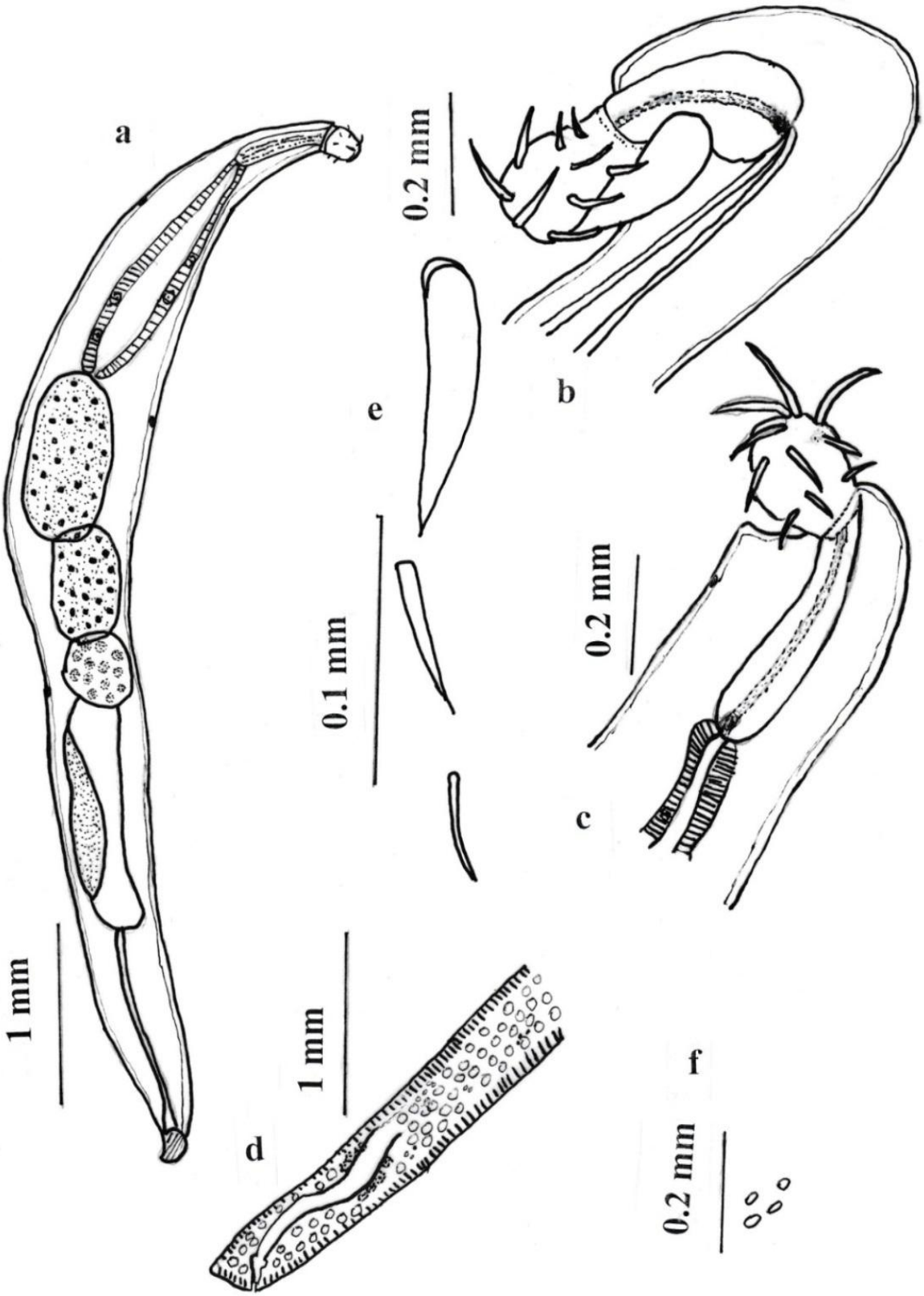

Fig. 1: ***Neoechinorhynchusdaleri*****n. sp.**
a. Male (Holotype); b. anterior end of trunk with a hump;
c. Proboscis with spines; d. Female end

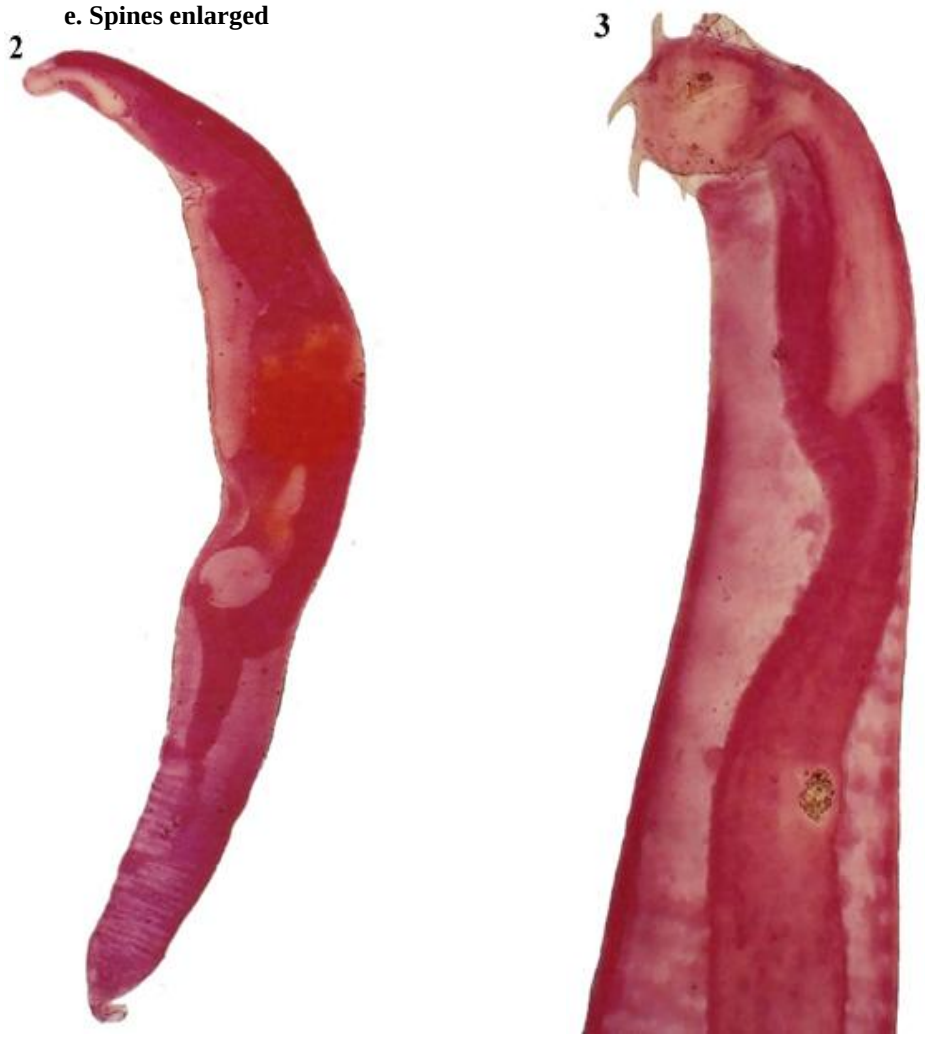

Fig. 2: Photomicrograph showing entire male.
Fig. 3: Photomicrograph of anterior end enlarged showing proboscis with spines, proboscis receptacle and lemnisci.

Materials and Methods

Worms were collected from the intestine of marine fish *Mugil cephalus* Linnaeus, 1758 infected by acanthocephalan of the genus *Neoechinorhynchus.*

These parasites were attached firmly to the tissue of the small intestine. All parasites were carefully removed and refrigerated overnight to extend the proboscis. The specimens were fixed in 70% ethanol for processing. Worms were subsequently stained in Mayer's carmalum, dehydrated in ascending concentrations of ethanol and mounted in Canada balsam. The measurements are in millimeters unless otherwise stated. Drawings were prepared with aid of camera Lucida. Type specimens are deposited in Museum, Department of Zoology, University of Karachi.

***Neoechinorhynchus daleri*n. sp.**
(Figs: 1-3)

Host:	Marine fish (*Mugil cephalus* Linnaeus, 1758)
Locality:	Karachi coast, Pakistan
Location of infection:	Small intestine
No. of fish examined:	50
No. of worms recovered:	10 males and 2 females from a single fish

Description

Neoechinorhynchidae; with characters of the genus *Neoechinorhynchus* Stiles and Hassall, 1905. Trunk aspinose, cylindrical with an anterior hump in most specimens. Proboscis globular to oval with 18 hooks distributed in 3 rows of 6 hooks. The first row hooks are largest followed by second and third row. Neck small. Proboscis receptacle with simple muscular layer. Cerebral ganglion spherical and located at the base of proboscis receptacle. Body hypodermic nuclei 2-3 present on the trunk. Lemnisci with 4 nuclei, equal in length, reaching the anterior testis. The two oval testes are contiguous. Cement gland is round to oval. Cement reservoir and saeffrigens pouch elongated. Bursa is small having striations. Genital pore sub terminal. Eggs small, few and oval in shape.

Male (based on 10 specimens)

Trunk 6.40-6.76 by 0.30-0.40.Proboscis small 0.15-0.16 by 0.15-0.16. Length of proboscis hooks in anterior circle 0.098-0.106 by 0.0038-0.010; the second row 0.057-0.128 by 0.0038 and the third row 0.022-0.026 by 0.0032-0.0038. Neck 0.015-0.022 in length. Proboscis receptacle 0.41-0.46 by 0.20-0.34.The right lemnisci measuring 0.82-1.32 by 0.12-0.13 and the left lemnisci 0.82-1.29 by 0.12-0.13.Anterior testis larger 0.67-0.69 by 0.39-0.43 than the posterior measuring 0.58-0.61 by 0.41-0.43.Cement gland 0.40-0.45 by 0.42-0.46.Cement reservoir 0.90-1.2 by 0.33-0.34, Saefftigens pouch 0.54-0.59 by 0.22-0.26.Bursa 0.13-0.15 by 0.097-0.12.

Female (based on 2 specimens)

Trunk 6.60-6.90 by 0.48-0.50.Proboscis 0.13-0.16 by 0.14-0.15. Hooks size same as in male specimens. Neck 0.015-0.023.Proboscis receptacle 0.40-0.46 by 0.21-0.24.Length of reproductive system from the genital pore to the uterine bell 0.92-1.20.Size of eggs 0.015-0.024 by 0.012-0.016.

Discussion

The morphological characteristics of the specimens from marine fish (*Mugilcephalus* Linn., 1758) which include shape and size of the proboscis, the number and position of proboscis hooks clearly differentiates it from other species within the genus *Neoechinorhynchus.* This genus is relatively large with a number of species described from the subcontinent. Naidu (2012) described a key to twenty three species of *Neoechinorhynchus* from India.

The present species is closest to *N. dorsovaginatus* Amin and Christison (2005) reported from the dusky Kob *Argyrosomusjaponicus* (Sciaenidae) on the southern coast of South Africa but differs in having body size smaller, lemnisci does not overlap anterior testis, lemnisci equal in length, oval testes, cement gland with no obvious nuclei and having smaller bursa. The body size of male (6.40-6.76 by 0.30-0.40) and female (6.60-6.90 by 0.48-0.50) is larger as compared to *N. austral* Van Cleave, 1931; *N. daleri* (Datta, 1936) Kaw, 1951; *N. didelphis* Amin, 2001; *N. longiorchis* Khatoon and Bilqees, 2007; *N. nematalosi* Tripathi, 1959; *N. gibsoni* Khan and Bilqees, 1989; *N. pimelodi* Brasil-Sato and Pavanelli, 1998; *N. nickoli* Khan *et al.,* 1999; *N. macrorchis* Shaikh *et al.,* 2011; *N. brayi* Bilqees *et al.,* 2011; *N. brentnickoli* Monks *et al.,* 2011; *N. pennahia* Amin *et al.,* 2011; *N. colastinense* Arredondo and Gil de Pertierra, 2012; *N. dighaensis* Gautam *et al.,* 2018; *N. nawazi* Naqvi *et al.,* 2012 and *N. veropesoi* Melo *et al.,* 2013. The present specimens differs from *N. buckneri* Amin and Heckmann, 2009 which have separated testes, from *N. carinatus* Buckner and Buckner, 1993 which have eggs with polar prolongations from *N. cristatus* Lynch, 1936 which have short and robust body, from *N. prolixoides* Bullock, 1963 which have smaller anterior most hooks; from *N. carassii* Roitman, 1961 which have anterior hooks three times as long as middle hooks and from *N. prolixus* Van Cleave and Timmons, 1952 with female having 2 integumentary lobes on either size of genital pore. As compared to Indian species , the hooks in the present species are different from *N. cyanophlyctis* Kaw, 1951 which has hooks equal in size in all the three rows, in hooks size from *N. hutchinsoni* Datta, 1936; from *N. johnii* Yamaguti, 1939; *N. topseyi* Podder, 1937; *N. bangoni* Tripathi, 1959; *N. argentatus* Chandra *et al.,* 1987 in having much larger body size and smaller proboscis and from *N. ovalis* Tripathi, 1959 and *N. nickoli* Khan *et al.,* 1999 which are larger in size; from *N. glyptosternumi* Fotedar and Dhar, 1977 in having bulky body in middle and sharply attenuated in anterior third, from *N. nematalosi* Tripathi, 1959 and *N. kallariensis* George and Nadakal, 1978; from *N. elongates* Tripathi, 1959 in having long testis; from *N. aminulhaquei* Chandra, 1983 which has much smaller body and short lemnisci; from *N. chilkaensis* which has larger body, lemnisci sub equal; from *N. cirrhinae* Gupta and Jain, 1979 which has smaller body size and hooks; from *N. dattai* which have larger eggs; from *N. devdevi* (Datta, 1936) Kaw, 1951 which has unequal lemnisci; from *N. form osanum* which are larger in body size and having smaller proboscis receptacle; from *N. gibsoni* Khan and Bilqees,1989 having smaller lemnisci not reaching anterior

testis; from *N. glyptosternumi* which has smaller proboscis; terminal hooks smaller than the present species; from *N. karachiensis* which has smaller proboscis, testes elongated; *N. oreini* Fotedar, 1968 in having larger body size, terminal hooks smaller lemnisci not reaching anterior testis; from *N. ovalis* Tripathi, 1959 in having smaller body size, lemnisci stout and not reaching anterior testis; from *N. rigidus* (Van Cleave, 1928) Kaw, 1951 in having larger size of anterior most row of hooks and eggs larger in size; from *N. rigidus* (Van Cleave, 1928) Kaw, 1951 in size of basal hooks and in having larger bursa; from *N. roonwali* Datta and Soota, 1963 in having smaller hooks and lemnisci overlapping; from *N. sootai* Bhattacharya, 1999 which has small body size and small lemnisci ending before anterior one third of the body, smaller cement gland; from *N. tylosuri* Yamaguti, 1939 which larger body size, smaller Saefftigens pouch and larger eggs. On the basis of diagnostic differences mentioned above between present and previously known species of the genus a new species of *Neoechinorhynchus* Stiles and Hassall, 1905 is proposed. The name of new species *N. daleri*is in honour of Late Dr. Daler Khan, University of Punjab, Lahore, Pakistan.

Conclusion

Based on these characteristics, the present work describes a new species of the genus *Neoechinorhynchus* (Hamman, 1892) parasitizing fish *Mugilcephalus* (Linnaeus, 1758). This is the tenth species of the genus being reported from Pakistan.

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