

ON A NEW SPECIES *NEOECHINORHYNCHUS CRIBBI* (EOACANTHOCEPHALA: NEOECHINORHYNCHIDAE) IN MARINE FISH *LIZA SUBVIRIDIS* (VALENCIENNES, 1836) FROM KARACHI COAST, PAKISTAN

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ABSTRACT

Neoechinorhynchus cribbi sp.n. (Neoechinorhynchidae) is described from the marine fish *Liza subviridis* (Valenciennes, 1836) from Karachi coast, Pakistan. The new species is distinguished from all other species of the genus *Neoechinorhynchus* by a combination of characters and the most significant being overlapping of the testes. It is specifically separated from all the other species of the genus *Neoechinorhynchus* by a combination of characters including body size, proboscis size, lengths of proboscis hooks, length of lemnisci, egg size and size of bursa. This is the tenth species of genus *Neoechinorhynchus* being reported from Pakistan.

Keywords: *Neoechinorhynchus cribbi* n. sp., fish, small intestine, Karachi coast, Pakistan.

INTRODUCTION

The genus *Neoechinorhynchus* erected by Stiles and Hassall, 1905 to accommodate acanthocephalans from freshwater, marine fish and turtles. Yamaguti 1963 listed forty species of the genus from different hosts. Later, during 2002, Amin revised the genus, out of 109 species he considered 88 were validated and assigned in one or two subgenera; *Neoechinorhynchus* having eggs without polar prolongation and *Hebesoma* with polar prolongation; ovoid or elliptical eggs. The species of the genus reported from Pakistan are *N. karachiensis* Bilqees, 1972; *N. johnii* (Yamaguti, 1939) Bilqees, 1972; *N. formosanum* (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; *N. nawazi* Naqvi *et al.*, 2012.

Recently, worms of a new species of *Neoechinorhynchus* Stiles and Hassall, 1905 were collected by one of us (M. I.) from Karachi coast from fish *Liza subviridis* (Valenciennes, 1836). This material is described herein as a new species of the genus *Neoechinorhynchus* Stiles and Hassall, 1905. This is the tenth species of the genus being reported from Pakistan.

MATERIALS AND METHODS

Fourteen fish were caught from the Karachi coast. Two fish were infected and yielded two worms each. The acanthocephalans on being removed from the intestine allowed dying in refrigerated tap water, fixed in Alcohol-Formaldehyde-Acetic Acid for 48 hours, then stored in 70% ethanol. Specimens were stained with Mayer's carmalum and mounted in Canada balsam for examination as whole mounts. Figures were drawn with the help of camera Lucida. Measurements are given in millimeters unless otherwise stated. Specimens are deposited in the museum, Department of Zoology, University of Karachi, Karachi-75270.

***Neoechinorhynchus cribbi* sp.n.**

(Figs. 1-4)

Host: *Liza subviridis* (Valenciennes, 1836)
Locality: Karachi coast, Pakistan
Location: Small intestine
No. of fish examined: 12
No. of worms recorded: 4 from 2 hosts

DESCRIPTION

Neoechinorhynchidae; with characters of the genus *Neoechinorhynchus* Stiles and Hassall, 1905. All females larger as compared to males. Body cylinder normally widest almost at anterior one third of the body, tapering posteriorly. Body wall having reticular lacunar system, containing 3 to 5 hypodermic nuclei. Proboscis small, round to oval. Neck very short. Hooks on proboscis arranged in 3 circular rows of 6 hooks each. Hooks of the first row largest followed by second and third row. Proboscis receptacle almost two times as long as proboscis with a large cephalic ganglion at the base.

Lemnisci large, sub equal, the longer almost reaching anterior testis. The two oval testes overlapping each other, almost similar in size. Cement gland elongate contiguous to posterior testis by its anterior end. Cement reservoir and saefftgen's pouch elongated. Bursa almost kidney shaped. Genital pore sub-terminal connected by a canal measuring 0.12-0.14 to the vagina. Eggs oval in shape without polar prolongation.

Male (based on two mature specimens): Trunk 6.5-7.4 by 1.12-1.20. Proboscis measuring 0.36-0.52 by 0.18-0.28 with 18 hooks in three rows of six each. The anterior measuring 0.13-0.14 by 0.028-0.032, the second row 0.078-0.082 by 0.012-0.014 and the third measure 0.070-0.072 by 0.008-0.010. Neck 0.04-0.42 long. Proboscis receptacle measuring 0.66-0.72 by 0.18-0.28. Lemnisci right measuring 2.79-3.25 by 0.11-0.13 and the left measuring 2.50-2.72 by 0.11-0.13. Testis the anterior measuring 0.80-0.88 by 0.46-0.51 and the posterior testis 0.80-0.92 by 0.40-0.46. Cement gland 1.12-1.32 by 0.38-0.42. Cement reservoir 0.90-0.96 by 0.36-0.42. Saeftgen's pouch 1.15-1.18 by 0.32-0.39. Bursa measuring 0.68-0.74 by 0.38-0.46.

Female (based on 2 gravid specimens): Trunk 8.2-15.8 by 1.24-1.32. Proboscis 0.12-0.35 by 0.21-0.30, with spines of three rows same in size as in males. Neck 0.04 long. Proboscis receptacle 0.28-0.48 by 0.18-0.29. Lemnisci right measuring 3.52-3.86 by 0.12-0.14. Lemnisci left measuring 2.64-2.76 by 0.10-0.11. Eggs measuring 0.078-0.088 by 0.048-0.054.

DISCUSSION

Neoechinorhynchus cribbi n.sp. is distinguished from all the other species of the genus in having, proboscis small, round to oval, both the testes are overlapping each other. The body size of male (6.5-7.4 by 1.12-1.20) is larger as compared to *N. australe* Van Cleave, 1931; *N. zacconis* Yamaguti, 1935; *N. devdevi* (Datta, 1936) Kaw, 1951; *N. nematalosi* Tripathi, 1959; *N. gibsoni* Khan and Bilqees, 1989; *N. pimelodi* Brasil-Sato and Pavanelli, 1998; *N. nickoli* Khan et al., 1999; *N. didelphis* Amin, 2001; *N. longiorchis* Khatoon and Bilqees, 2007; *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. nawazi* Naqvi et al., 2012; *N. veropesoi* Melo et al., 2013 and *N. dighanensis* Gautum et al., 2018.

The proboscis (Male 0.36-0.52 by 0.18-0.28; Female 0.12-0.35 by 0.21-0.30) is larger as compared to *N. idahoensis* Amin and Heckmann, 1992; *N. dimorphospinus* Amin and Sey, 1996; *N. pimelodi* Brasil-Sato and Pavanelli, 1998; *N. didelphis* Amin 2001; *N. iraqensis* Amin et al., 2001; *N. qatarensis* Amin et al., 2002; *N. zabensis* Amin et al., 2003; *N. buckneri* Amin and Heckmann, 2009; *N. chimalapasensis* Salgado-Maldonado et al., 2010; *N. longinucleatus* Amin et al., 2011; *N. pennahia* Amin et al., 2011; *N. ascus* Amin et al., 2011; *N. brentnickoli* Monks et al., 2011; *N. colastinense* Arredondo and Gil de Pertierra, 2012; *N. vittiformis* Smales, 2013; *N. bryanti* Smales, 2013; *N. veropesoi* Melo et al., 2013 and *N. yamagutii* Tkach et al., 2014.

The lemnisci in the present specimen is sub equal while they are equal in *N. topseyi* Podder, 1937; *N. africanus* Troncy, 1969 whereas, they are larger in size as compared to *N. idahoensis* Amin and Heckmann, 1992; *N. didelphis* Amin 2001; *N. buckneri* Amin and Heckmann, 2009; *N. chimalapasensis* Salgado-Maldonado et al., 2010; *N. brentnickoli* Monks et al., 2011; *N. plaquensis* Amin et al., 2011; *N. manubriensis* Amin et al., 2011; *N. colastinense* Arredondo and Gil de Pertierra, 2012; *N. veropesoi* Melo et al., 2013 and when compared to other species the proboscis hooks in the present specimens are larger compared to *N. gibsoni* Khan and Bilqees, 1989; *N. idahoensis* Amin and Heckmann, 1992; *N. dimorphospinus* Amin and Sey, 1996; *N. rostratum* Amin and Bullock, 1998; *N. nickoli* Khan et al., 1999; *N. didelphis* Amin 2001; *N. iraqensis* Amin et al., 2001; *N. qatarensis* Amin et al., 2002; *N. zabensis* Amin et al., 2003; *N. dorsovaginatus* Amin and Christison, 2005; *N. buckneri* Amin and Heckmann, 2009; *N. indicus* Gudivada et al., 2010; *N. brayi* Bilqees et al., 2011; *N. macrorchis* Shaikh et al., 2011; *N. ascus* Amin et al., 2011; *N. longinucleatus* Amin et al., 2011; *N. manubriensis* Amin et al., 2011; *N. brentnickoli* Monks et al., 2011; *N. colastinense* Arredondo and Gil de Pertierra, 2012; *N. yamagutii* Tkach et al., 2014 and *N. costarricense* Pinacho-Pinacho et al., 2018.

The eggs in the present specimens measure (0.078-0.088 by 0.048-0.054) which are larger as compared to *N. idahoensis*; *N. dimorphospinus*; *N. rostratum*; *N. pimelodi*; *N. iraqensis*; *N. qatarensis*; *N. zabensis*; *N. dorsovaginatus*; *N. buckneri*; *N. chimalapasensis*; *N. longinucleatus*; *N. plaquensis*; *N. colastinense*; *N. bryanti*; *N. veropesoi*; *N. personatus*; *N. yamagutii*; *N. costarricense* and *N. dighanensis*.

Almost complete overlapping of the testes has not been seen in any previous described species of the genus. Based on these characteristics, the present work describes a new species *N. cribbi* from Pakistan. Thus the present work contributes to the knowledge of Pakistani parasites by adding a new species. The species is named in honour of eminent Parasitologist Dr. Thomas Cribb, Australia.

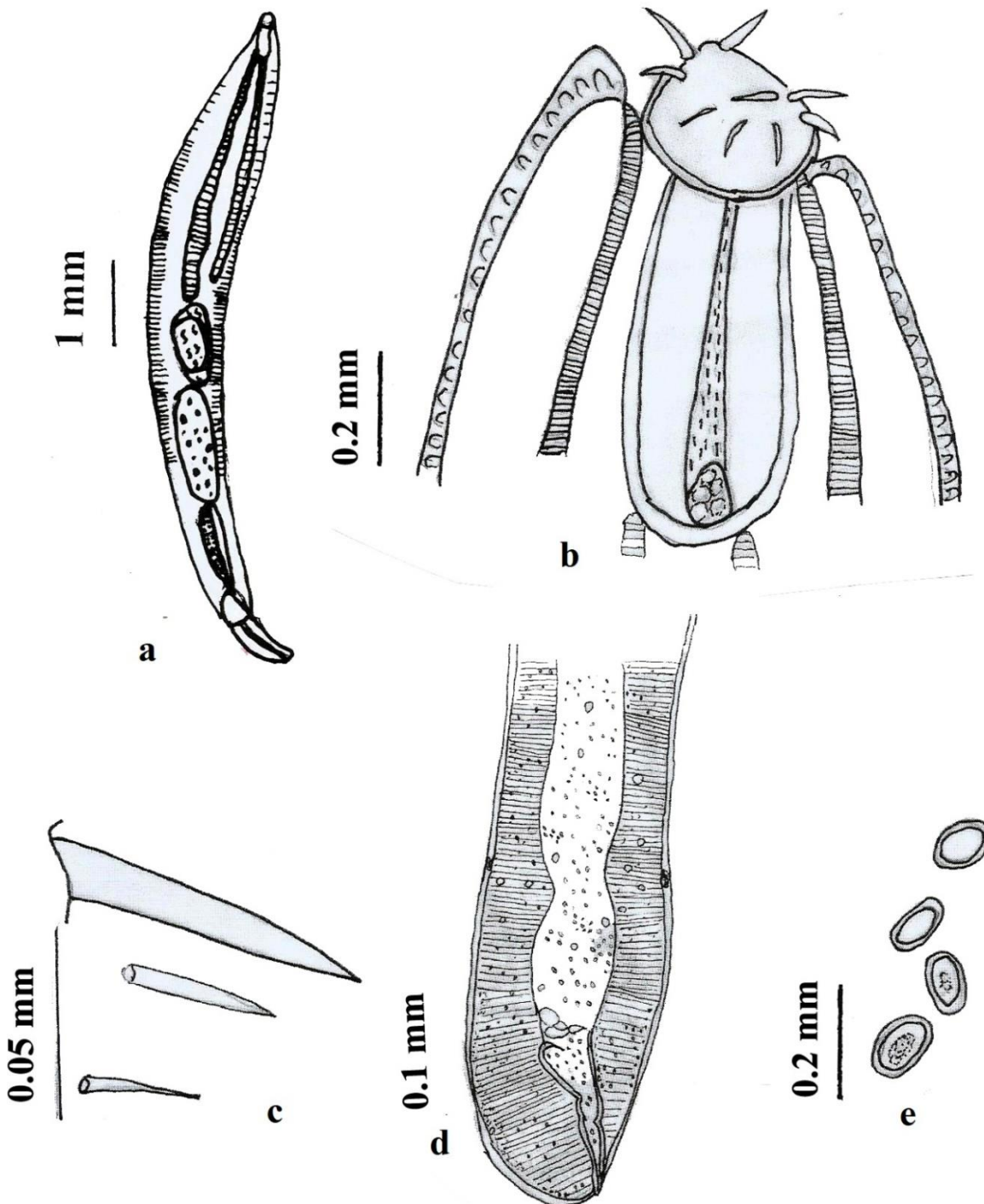


Fig. 1(a-e): Camera Lucida drawings of *Neoechinorhynchus cribbi* sp.n., showing a. Entire Male Holotype; b. Proboscis enlarged; c. Hooks enlarged d. Posterior region of female; e. Egg

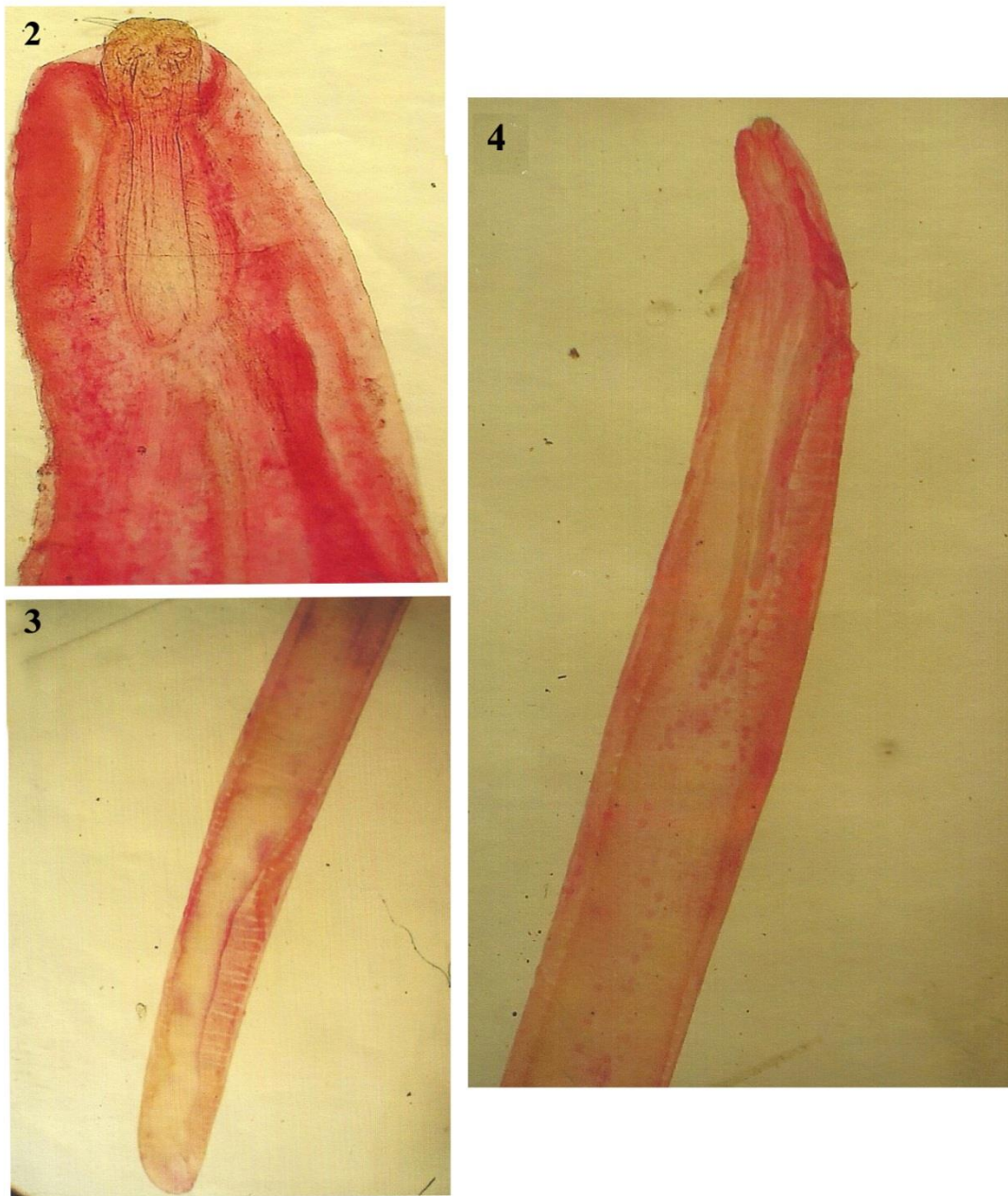


Fig. 2. Photomicrograph showing anterior region of *Neoechinorhynchus cribbi* sp.n.

Fig. 3. Photomicrograph showing sub equal lemnisci.

Fig. 4. Photomicrograph showing posterior end of female.

REFERENCES

- Amin, O.M. (2001). *Neoechinorhynchus didelphis* sp.n. (Acanthocephala: Neoechinorhynchidae) from the Redfin Pickerel, *Esox americanus*, in Georgia, U.S.A. *Comp. Parasitol.*, 68: 103-107.
- Amin, O.M. and K.W. Christison (2005). *Neoechinorhynchus (Neoechinorhynchus) dorsovaginatus* n.sp. (Acanthocephala: Neoechinorhynchidae) from the dusky kob *Argyrosomus japonicus* (Sciaenidae) on the southern coast of South Africa. *Systematic Parasitology*, 61: 173-179.

- Amin, O.M. and O. Sey (1996). Acanthocephala from Arabian Gulf fishes off Kuwait, with descriptions of *Neoechinorhynchus dimorphospinus* sp. n. (Neoechinorhynchidae), *Tegorhynchus holospinosus* sp. n. (Illiosentidae), *Micracanthorhynchina kuwaitensis* sp. n. (Rhadinorhynchidae), and *Slendrorhynchus breviclaviproboscis* gen. n., sp. n. (Diplosentidae); and key to species of the genus *Micracanthorhynchina*. *J. Helminthol. Soc. Wash.*, 63: 201-210.
- Amin, O.M. and R.A. Heckmann (1992). Description and pathology of *Neoechinorhynchus idahoensis* n.sp. (Acanthocephala: Neoechinorhynchidae) in *Catostomus columbianus* from Idaho. *J. Parasitol.*, 78: 34-39.
- Amin, O.M. and R.A. Heckmann (2009). Description of *Neoechinorhynchus* (*Neoechinorhynchus*) *buckneri* n.sp. (Acanthocephala: Neoechinorhynchidae) from the Blacktail Redhorse *Moxostoma poecilurum* (Catostomidae) in the Tchoutacabouffa River, body wall thickness. *Com. Parasitol.*, 76: 154-161.
- Amin, O.M. and W.L. Bullock (1998). *Neoechinorhynchus rostratum* sp.n. (Acanthocephala: Neoechinorhynchidae) from the Eel, *Anguilla rostrata*, in estuarine waters of northeastern North America. *J. Helminthol. Soc. Wash.*, 65: 169-173.
- Amin, O.M., M.F.A. Saoud and K.S.R. Alkuwari (2002). *Neoechinorhynchus qatarensis* sp.n. (Acanthocephala: Neoechinorhynchidae) from the blue-barred flame parrot fish, *Scarus ghobban* Forsskal, 1775, in Qatar waters of the Arabian Gulf. *Parasitology International*, 51: 171-176.
- Amin, O.M., N.V. Ha and D.N. Ha (2011). First report of *Neoechinorhynchus* (Acanthocephala: Neoechinorhynchidae) from marine fish of the eastern seaboard of Vietnam, with the description of six new species. *Parasite*, 18: 21-34.
- Amin, O.M., R.S. Al-Sady, F.T. Mhaisen and S.F. Bassat (2001). *Neoechinorhynchus iraqensis* sp.n. (Acanthocephala: Neoechinorhynchidae) from the freshwater mullets, *Liza abu* (Heckel), in Iraq. *Comp. Parasitol.*, 68: 108-111.
- Amin, O.M., Sh.M.A. Abdullah and F.T. Mhaisen (2003). *Neoechinorhynchus* (*Neoechinorhynchus*) *zabensis* sp. n. (Acanthocephala: Neoechinorhynchidae) from freshwater fish in northern Iraq. *Folia Parasitologica*, 50: 293-297.
- Arredondo, N.J. and A.A. Gil de Pertierra (2012). A new species of *Neoechinorhynchus* (Eoacanthocephala: Neoechinorhynchidae) from *Pachyurus bonariensis* (Perciformes: Sciaenidae) from the Parana River basin in Argentina, with comments on two other species of the genus. *Revue Suisse De Zoologie*, 119: 425-439.
- Bilqees, F.M. (1972). Description of two acanthocephala including a new species *Neoechinorhynchus karachiensis* (Neoechinorhynchidae: Neoechinorhynchida) from marine fishes of Karachi. *Sind. Uni. Res. J.*, 6: 93-100.
- Bilqees, F.M., G.S. Shaikh and A. Khan (2011). *Neoechinorhynchus brayi* sp. n. (Acanthocephala: Neoechinorhynchidae) in freshwater fish *Catla catla* L. from Sindh, Pakistan. *Int. J. Biol. Biotech.*, 8: 491-494.
- Brasil-Sato, M.de.C. and G.C. Pavanelli (1998). *Neoechinorhynchus pimelodi* sp. n. (Eoacanthocephala, Neoechinorhynchidae) parasitizing *Pimelodus maculatus* Lacepede, "Mandi Amarelo" (Siluroidei, Pimelodidae) from the Basin of the Sao Francisco River, Tres Marias, Minas Gerais, Brazil. *Revta Bras. Zool.*, 15: 1003-1011.
- Datta, M.N. (1936). Scientific results of the Yale North India Expedition Biological Report no. 20. Helminth parasites of fishes from North India, with special reference to acanthocephalans. *Rec. Ind. Mus.*, 38: 211-229.
- Gautam, N.K., A. Mohapatra and A.M. Saxena (2018). On a new species of *Neoechinorhynchus* Hamann, 1892 (Neoechinorhynchinae Travassos, 1926) from *Eleutheronema tetradactylum* (Shaw, 1804) from Digha coast, West Bengal, India. *J. Parasit. Dis.*, 42: 462-466.
- Gudivada, M., V. Chikkam and A.P. Vankara (2010). On a new species of *Neoechinorhynchus* Hamann, 1892 (Acanthocephala: Neoechinorhynchidae Southwell et Macfie, 1925) from Indian threadfin fish, *Leptomelanosoma indicum* Shaw, 1804 from Visakhapatnam coast, Andhra Pradesh, India. *J. Parasit. Dis.*, 34: 89-93.
- Harada, I. (1938). Acanthocephala of Formosa. *Annot. Zool. Jap.*, 17: 419-427.
- Kaw, B.I. (1951). Studies in helminthology: Helminth parasites of Kashmir. Part II. Acanthocephala. *Ind. J. Helm.*, 3: 117-132.
- Khan, A. and F.M. Bilqees (1989). On a new acanthocephala *Neoechinorhynchus gibsoni*, new species from a freshwater fish, *Labeo rohita* (Ham.). *Proc. Pakistan Congr. Zool.*, 9: 259-264.
- Khan, A., F.M. Bilqees, Noor-Un-Nisa, R.R. Ghazi and Ata-Ur-Rahim (1999). *Neoechinorhynchus nickoli*, new species (Acanthocephala: Neoechinorhynchidae) from *Labeo boga* (Ham.) of Punjab, Pakistan. *Pakistan J. Zool.*, 31: 241-243.
- Khatoun, S. and F.M. Bilqees (2007). Description of a new acanthocephalan species *Neoechinorhynchus longiorchis* n. sp. (Neoechinorhynchidae) from the fish *Otolithus argenteus* (Sciaenidae) from Karachi coast, Karachi, Pakistan. *Int. J. Biol. Biotech.*, 4: 307-309.

- Melo, F.T.V., P.A.F.B. Costa, E.G. Giese, S.L. Gardner and J.N. Santos (2013). A description of *Neoechinorhynchus (Neoechinorhynchus) veropesoi* n. sp. (Acanthocephala: Neoechinorhynchidae) from the intestine of the silver croaker fish *Plagioscion squamosissimus* (Heckel, 1840) (Osteichthyes: Sciaenidae) off the east coast of Brazil. Faculty publications from the Harold W. Manter Laboratory of Parasitology. 763pp.
- Monks, S., G. Pulido-Flores and J. Violante-Gonzalez (2011). A new species of *Neoechinorhynchus* (Acanthocephala: Neoechinorhynchidae) in *Dormitator latifrons* (Perciformes: Eleotridae) from the Pacific Coast of Mexico. *Com. Parasitol.*, 78(1): 21-28.
- Naqvi, S.M.H.M., A. Khan, R.R. Ghazi and Noor-Un-Nisa (2012). A new acanthocephala, *Neoechinorhynchus nawazi* sp. nov. (Neoechinorhynchidae) from a freshwater fish *Cirrhinus mrigala* (Ham.). *Int. J. Biol. Biotech.*, 9: 195-199.
- Pinacho-Pinacho, C.D., A.L. Sereno-Uribe, M. Garcia-Varela and G.P.P. de Leon (2018). A closer look at the morphological and molecular diversity of *Neoechinorhynchus* (Acanthocephala) in Middle American cichlids (Osteichthyes: Cichlidae), with the description of a new species from Costa Rica. *J. Helminthol.*, 94: e23. doi: 10.1017/S0022149X18001141.
- Podder, T.N. (1937). A new species of Acanthocephala; *Neoechinorhynchus topseyi* n.sp., from a Calcutta fish, *Polynemus heptadactylus* (Cuv.et val). *Parasit.*, 29(3): 365-369.
- Salgado-Maldonado, G., J.M. Caspeta-Mandujano and E. Martinez-Ramirez (2010). *Neoechinorhynchus (Neoechinorhynchus) chimalapasensis* n. sp. (Acanthocephala: Neoechinorhynchidae) from the freshwater fish *Awaous banana* (Valenciennes) (Gobiidae) in Mexico. *Systematic Parasitology*, 75: 231-237.
- Shaikh, G.S., A. Khan and F.M. Bilqees (2011). On a new acanthocephalan *Neoechinorhynchus macrorchis* sp. nov. (Neoechinorhynchidae) from a freshwater fish of Halaji Lake, Sindh, Pakistan. *Int. J. Biol. Biotech.*, 8: 333-336.
- Smales, L.R. (2013). A review of the genus *Neoechinorhynchus* (Acanthocephala: Neoechinorhynchidae) from Australia with the description of two new species. *The Journal of Parasitology*, 99: 1106-1112.
- Stiles, C.W. and A. Hassall (1905). The determination of generic types and a list of roundworm genera, with their original and type species. *Bulletin of the Bureau of Animal Industry, United States Department of Agriculture*, 79: 1-150.
- Tkach, Ie.V., V.L. Sarabeev and L.S. Shvetsova (2014). Taxonomic status of *Neoechinorhynchus agilis* (Acanthocephala, Neoechinorhynchidae), with a description of two new species of the genus from the Atlantic and Pacific mullets (Teleostei, Mugilidae). *Vestnik Zoologii*, 48: 291-306.
- Tripathi, Y.R. (1959). Studies on parasites of Indian fishes, V. Acanthocephala. *Rec. Ind. Mus.*, 54: 61-99.
- Troncy, P.M. (1969). Contribution à l'étude des helminthes d'Afrique, principalement du Tchad. Acanthocephales. *Bulletin du Muséum National d'Histoire Naturelle*, 41: 1487-1511.
- Valenciennes, A. (1836). *Histoire naturelle des Poissons*. Paris. Vol. 11. 506pp.
- Van Cleave, H.J. (1931). New acanthocephala from fishes of Mississippi and a taxonomic reconsideration of forms with unusual numbers of cement glands. *Tr. Amer. Micro. Soc.*, 50: 348-363.
- Yamaguti, S. (1935). Studies on the helminth fauna of Japan. Part. 8. Acanthocephala. I. Japan. *Jap. J. Zool.*, 6: 247-278.
- Yamaguti, S. (1939). Studies on the helminth fauna of Japan. Part 29th. Acanthocephala II. Japan. *Jap. J. Zool.*, 8(3): 317-351.
- Yamaguti, S. (1963). *Systema Helminthum*. Vol. 5. Acanthocephala. New York Wiley Intersci., 423pp.

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