



First Record of Flesh-burrowing, Fish Parasitic Isopod Genus *Ichthyoxenos* Herklots, 1870 (Isopoda: Cymothoidae) from India with Morphological Description of a New Species

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

A new species of parasitic Isopod of the genus *Ichthyoxenos* Herklots, 1870, is described here based on six specimens collected from the oxbow lake at Purbashtali, of East Burdwan District of West Bengal, India. This cymothoid genus is recorded for the first time from India. The new species, *Ichthyoxenos aneeshi* sp. nov., can be easily separated from its congeners by its distinguishing morphological characters i.e., rounded body structure; semicircular head; eyes rectangular; pereonite 1 lateral margin straight; mandible broad, molar process covered in pectinate scales, maxilla 1 with 3 setae, maxilla 2 with three segments, maxilliped comprises 4 articles; antennules shorter than antenna, comprises 7 articles, reaches only middle of the eye; antenna hardly reaches up to the distal margin of pereonite 1; antennae comprises 9 articles, terminal article

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without setae; pereonite 3-7 posterior margin concave; pereonite 4 widest, pereonite 7 shortest; pleotelson 0.8 times as long as maximum width, free edge straight to gently convex, median part slightly concave, longitudinal dorso-median ridge prominent; uropodal endopod and exopods without serration, subequal. Detailed morphological description along with a comparison with nearest congeners is provided in this paper; short ecological observations are also incorporated here. This is the 24th species of the genus *Ichthyoxenos*, Herklots, 1870.

Keywords: Crustacea; West Bengal; cymothoidae; new species; taxonomy.

1. INTRODUCTION

The fish parasitic isopod genus *Ichthyoxenos* Herklots, 1870 is a poorly characterized and a primarily freshwater genus [1,2] that includes both flesh-burrowers as well as gill-attaching species. The genus is closely similar to the genus *Mothocia*, *Elthusa* and *Brucethoa* [3] but differing in having a pleon that is markedly narrower than pereonite 7, and also by its distinctive pereopods which have a relatively long ischium, short merus and carpus which are often distally expanded or weakly lobed [3]. This genus is distributed in Africa and Asian countries both in marine and freshwaters (both lentic and lotic waterbodies). The site of attachment is also diverse, for example, buccal attachment and flesh-burrowing. So far, this genus is represented by 24 nominal species, including this new species; of which 20 species recorded from freshwater habitat (Table 1).

Till today only a single species, *Ichthyoxenos montanus* Schioedte & Meinert, 1884 was described from the Indian subcontinent, with the recorded locality being 'Himalayan Mountains'. As the 'Himalayan Mountains' are distributed all over the five countries, i.e. Bhutan, China, India, Nepal and Pakistan, hence the actual country-wise distribution of that species remains questionable till today. Interestingly, the host fish of this parasitic isopod, *Puntius sophore*, (Hamilton, 1822) is distributed throughout all those countries. But there is no report of the *Ichthyoxenos montanus* Schioedte & Meinert, 1884, from any localities of 'Himalayan Mountain' except its first description.

So far, a total 15 species of *Ichthyoxenos* have been described to have a typical flesh-burrowing habit. Other species of *Ichthyoxenos* are gill attaching or buccal parasite of mostly freshwater and a few marine fishes (Table 1).

Ravichandran, 2007 erroneously recorded *Ichthyoxenos puhi* from India [4], but that species was *Mothocya* sp. [2].

Recently six specimens of *Ichthyoxenos* were collected from the low water bodies connected to

the Ox-bow Lake, locally called 'Chupi'- at Purbasthali, in Purba Bardhaman District of West Bengal. Both the male and female specimens were found in a pair within the body cavity of the host fish 'Pool Barb', *Puntius sophore* (Hamilton, 1822).

After examination and comparison with other congeners, those specimens appear to be new to science. The genus, *Ichthyoxenos* Herklots, 1870, is also a new addition to Indian fauna [5,6]. A detailed description of this new species is provided with a comparison with its nearest congeners.

2. MATERIALS AND METHODS

Puntius sophore (Hamilton, 1822), the host fishes, were captured from the wetland linked to the Ox-Bow lake at Purbashtali, Burdwan. This body of water is a lentic, shallow waterway previously connected to the river Bhagirathi-Hugli (Fig. 1). The presence of isopods in infested fishes, was determined by identifying external flesh-boring holes located at the base of the pectoral fin (Fig. 6. B, C, E, F). Isopods were carefully extracted from the hosts using needles. The maximum length (L) and width (W) of the isopods were measured using a vernier caliper, while the total length of the host fish was also recorded. Dissection of the isopods was conducted under a dissecting stereo-zoom binocular microscope (Leica SZ4), and photographic documentation was achieved with a Nikon P900 camera. Drawings were crafted with microscopic photography assistance. Morphological identification of specimens done by dissecting of mouthparts, pereopods and pleopods; observation and drawings of each are important for describing the new species. The ratio of pereonites and pleonites is also recorded during the identification process; detailed identification process was carried out with the help of literatures of relevant works [1,7,8,2]. Type specimens were deposited in the National Zoological collections of Crustacea Division (ZSI), Zoological Survey of India, Kolkata.

Table 1. List of *Ichthyoxenos* species recorded from different habitat, localities, host species and site of attachment

Serial No.	Name of the Isopod	Host Species	Site of Attachment	Habitat	Locality
1	<i>Ichthyoxenos africana</i> (Lincoln, 1972)	<i>Lepidiolamprologus elongates</i> (Boulenger, 1898) & <i>Lepidiolamprologus attenuates</i> (Steindachner, 1909)	Mouth cavity & gill attachment	Fresh water	Lake Tanganyika, Africa
2	<i>Ichthyoxenos amurensis</i> (Gerstfeldt, 1858)	<i>Cyprinus carpio</i> Linnaeus, 1758, <i>Rhodeus sericeus</i> (Pallas, 1776), <i>Hypophthalmichthys molitrix</i> (Valenciennes, 1844), <i>Elopichthys bambusa</i> (Richardson, 1845), <i>Leuciscus waleckii</i> (Dybowski, 1869), <i>Parabramis pekinensis</i> (Basilewsky, 1855), <i>Carassius gibelio</i> (Bloch, 1782) and <i>Ctenopharyngodon idella</i> . (Valenciennes, 1844)	Body cavity	Freshwater	Amur river basin, Russia
3	<i>Ichthyoxenos asymmetrica</i> Ahmed, 1970	<i>Cynoglossus lingua</i> Hamilton, 1822	Gill chamber	Marine	Iraq & Arabian Gulf
4	<i>Ichthyoxenos circularis</i> Shen, 1940	<i>Carassius auratus</i> (Linnaeus, 1758);	Body cavity	Fresh Water	Yunnan, China
5	<i>Ichthyoxenos dentimaxillus</i> Shen, 1940	<i>Carassius auratus</i> (Linnaeus, 1758)	Body cavity	Fresh Water	Yunnan, China
6	<i>Ichthyoxenos expansus</i> Van Name, 1920	<i>Eugnathichthy seetveldii</i> Boulenger, 1898	Buccal attachment	Fresh Water	Congo river basin, Africa
7	<i>Ichthyoxenos formosanus</i> Harada, [9]	<i>Carassius auratus</i> (Linnaeus, 1758)	Body cavity	Fresh Water	Lake Candidus, Central Taiwan
8	<i>Ichthyoxenos fushanensis</i> Tsai & Dai, 1999	<i>Varicorhinus barbatulus</i> (Pellegrin, 1908) = <i>Onychostoma barbatulum</i> (Pellegrin, 1908)	Body cavity	Fresh Water mountain stream	Northern Taiwan
9	<i>Ichthyoxenos geei</i> Boone, 1921	<i>Carassius auratus</i> (Linnaeus, 1758); <i>Cyprinus carpio</i> Linnaeus, 1758; <i>Oryzias latipes</i> (Temminck & Schlegel, 1846)	External body surface	Fresh Water	Soochow, Peiping, Yunnan China; China
10	<i>Ichthyoxenos hsiakowensis</i> S. Yu, 1935	Not documented	Buccal attachment	Marine	China
11	<i>Ichthyoxenos japonensis</i> Richardson, 1913	<i>Acheilognathus cyonostigma</i> (Jordan & Fowler, 1903); <i>Tanakia lanceolata</i> (Temminck & Schlegel, 1846); <i>Acheilognathus tabira</i> Jordan & Thompson, 1914; <i>Gnathopogon elongatus</i> (Temminck & Schlegel, 1846); <i>Acheilognathus rhombeum</i> (Temminck & Schlegel, 1846);	Body cavity	Fresh Water	Lake Biwa; Omi, Lake Yogo; Funayado, Kiusiu Japan

Serial No.	Name of the Isopod	Host Species	Site of Attachment	Habitat	Locality
12	<i>Ichthyoxenos jellinghausii</i> Herklots, 1870	<i>Tanakia limbata</i> (Temminck & Schlegel, 1846) <i>Nemacheilus fasciatus</i> (Valenciennes, 1846); <i>Tanakia limbata</i> (Temminck & Schlegel, 1846); <i>Barbodes maculatus</i>	Body cavity	Fresh Water	Bandong, Batavia, Java
13	<i>Ichthyoxenos longenditus</i> Shen, 1940	<i>Leiocassis</i> sp	Body cavity	Fresh water	Yunnan, China
14	<i>Ichthyoxenos micronyx</i> (Miers, 1880)	Not known	Buccal attachment	Marine	Mauritius
15	<i>Ichthyoxenos minabensis</i> (Shiino, 1951)	<i>Chaunax fimbriata</i> Hilgendorf, 1879	Buccal attachment	Marine	Off Minabe, Japan, Australia
16	<i>Ichthyoxenos montanus</i> Schioedte & Meinert, 1884	<i>Puntius sophore</i> (Hamilton, 1822)	Body cavity	Fresh Water	Himalayan Mountains
17	<i>Ichthyoxenos opisthopterygium</i> Ishii, 1916	<i>Acheilognathus tabira</i> Jordan & Thompson, 1914	Body cavity	Fresh Water	Hikone, Lake Biwa, Japan
18	<i>Ichthyoxenos puhii</i> (Bowman, 1962)	<i>Gymnothorax griseus</i> (Lacpède, 1803), <i>Gymnothorax eurostus</i> (Abbott, 1860), <i>Strongylura leiura</i> (Bleeker, 1850)	Gill Chamber	Marine	Mauritius, Hawaii
19	<i>Ichthyoxenos quadratus</i> Shen, 1940	<i>Leiocassis</i> sp; <i>Culter</i> sp.	Body cavity	Fresh water	Yunnan, China
20	<i>Ichthyoxenos sinensis</i> Shen, 1936	<i>Carassius auratus</i> (Linnaeus, 1758)	Body cavity	Fresh Water	Yunnan, China
21	<i>Ichthyoxenos tanganyikae</i> (Fryer, 1965)	<i>Simochromis diagramma</i> ((Günther, 1894)	Buccal attachment	Fresh water	Tanganyika Lake, Tanzania
22	<i>Ichthyoxenos tchangii</i> Yu, 1935	<i>Percocypris egain</i> (Tchang, 1935)	Body cavity	Fresh water	Yunnan, China
23	<i>Ichthyoxenos yunnanensis</i> Shen, 1940	<i>Carassius auratus</i> (Linnaeus, 1758);	Body cavity	Fresh Water	Yunnan, China
24	<i>Ichthyoxenos aneeshi</i> sp nov.	<i>Puntius sophore</i> (Hamilton, 1822)	Body cavity	Fresh Water	West Bengal, India



Fig. 1. Satellite image of the collection locality, Chupi wetland, situated in Purbashtali

2.1 Materials

Holotype: 1 Female (ovigerous), (L 12.01 mm, W 8.16 mm); collected from oxbow lake adjacent to River Hooghly at Purbashtali, East Burdwan District, West Bengal, India. 23.45092° N 88.32963° E; Coll. N. Malik & S. Mitra; dated 15.09.2018; Reg. No. C 9926/2

Paratype: 1 Male (L 7.90 mm, W 4.25 mm); collection data same as holotype; Reg. No. C 9927/2

Paratype: 2 females (L 10.5-11.6 mm, W 7.4 - 8.5 mm) and 2 males (L 5.7 mm -7.90 mm, W 3.8 mm-4.25mm); collection data same as holotype; Reg. No. C 9928/2

3. RESULTS AND DISCUSSION

Family Cymothoidae Leach, 1814

Genus *Ichthyoxenos* Herklots, 1870

***Ichthyoxenos aneeshi* sp. nov.**

Zoobank Reg. no. LSID urn: lsid: zoobank.org:

act:ACDC6133-404A-4CC6-B92C-

0A61812279A9

Diagnosis: (Based on female holotype) Body rounded to ovate, cephalon relatively small, semicircular, compound eyes rectangular, pereonite 1 lateral margin straight (Figs. 2A, 3A); mandible broad, molar process covered in pectinate scales, maxilla 1 with 3 setae, maxilla 2 with three segments, maxilliped comprises 4 articles, basal lobe broader than long, terminal lobe with 2 robust setae; antennules shorter than antenna, comprises 7 articles, reaches only middle of the eye; antenna comprises 9 articles, hardly reaches up to the distal margin of pereonite 1 (Fig. 2 A-C); pereonite 4 widest, pereonite 7 shortest (Figs. 2A, 3A); pleonites lobes increasing in size posteriorly, pereopods 1-7 gradually increasing in size, dactylus inwardly curved, basally stout, terminal part slender, carpus and merus wider than long (Fig. 4A-G); pleopod 2-5 lateral margins more convex; pleopod 5 endopod as long as exopod; pleopod 1-3 exopod distal margins truncated to gently convex, pleopod 4-5 distal margin medially convex (Fig. 5 F-J); pleotelson 0.8 as long as maximum width; uropod 0.7 as long as pleotelson, uropodal endopod and exopod subequal & not serrated, thinner than endopod (Figs. 2A, 3A).

Description of Holotype female: Body ovoid, 1.5 times as long as greatest width, widest at pereonite 4; pleonite 5 thinnest, median part of body 1.8 times wider than narrowest part; body slightly hunched on left, dorsal surface smooth, lateral margins distinctly convex; narrowest at pereonite 1; cephalon semicircular, 1.7 times wider than long, visible from dorsal view, posterior margin immersed in pereonite 1, semicircular, frontal margin rounded, median part slightly produced; eyes well developed, cornea sub-rectangular, widely spaced from each other (Fig. 2A, 3A). Antennules shorter than antenna, comprises 7 articles, reaches only middle of the eye; antenna hardly reaches up to the distal margin of pereonite 1; antennae comprise 9 articles, terminal article without setae (Fig. 5 E).

Mandible broad, molar process covered in pectinate scales (Fig. 5 A), maxilla 1 with 3 setae

(Fig. 5 C), maxilla 2 with three segments (Fig. 5 B); maxilliped comprises 4 articles, basal lobe broader than long, terminal lobe with 2 robust setae (Fig. 5 D).

Pereonite 1 lateral margin straight, antero lateral margin convex, rounded, postero lateral margin bluntly angular; dorsal surface depressed medially in transverse, posterior margin gently convex (Fig. 2A, 3A); pereonite 2 posterior margin straight, pereonite 3 to pereonite 7 posterior margin concave; pereonite 1 longest, pereonite 3-4 with rounded posterolateral lobe; pereonite 4 widest, pereonite 7 shortest; (Fig. 2A, 3A).

Coxae 2-7 visible in dorsal view, coxae 2-3 posterolateral margin not produced, coxae 4 posterolateral margin triangularly produced, coxae 5-7 posterolateral margin produced roundly, coxae 7 longest, produced longer than the posterolateral projection of pereonite 7 (Fig. 2A, C; 3A, B).

Pleonites lobes increasing in size posteriorly, lateral produced into rounded lobes, 1-2 lateral part totally, pleonite 2 with shortest length, length of pleonites increasing in 3-5; pleonite 3 anterior margin partially immersed in pereonite 7, pleonites 2-4 subequal in length, pleonite 5 with maximum length. (Fig. 2A, 3A).

Pereopods 1-7 gradually increase in size, dactylus inwardly curved, basally stout, terminal part slender, carpus and merus wider than long; pereopods 1 dactylus as long as propodus, propodus as long as wide, carpus subtriangular, merus produced into rounded process at proximal end, basis 2 times as long as greatest width, ischium 0.6 times as long as basis. pereopods 2 and 3, almost similar to pereopod 1; pereopod 4 with longest basis, basis 2.6 times as long as wide, ischium 0.5 times as long as basis; pereopods 5 basis 2.8 times as long as wide, ischium 0.7 times as long as basis, lateral margins straight, parallel to each other (Figs. 2 B-C, 4 A-G).

Pleopod 1 exopod 2 times as long as wide, lateral margins parallel to each other, distal margin truncated; endopod 2.5 times as long as wide, lateral margin convex; pleopod 2-5 lateral margins more convex; pleopod 5 endopod as long as exopods; pleopod 1-3 exopod distal margins truncate to gently convex, pleopod 4-5 distal margin medially convex (Fig. 5 F-J).

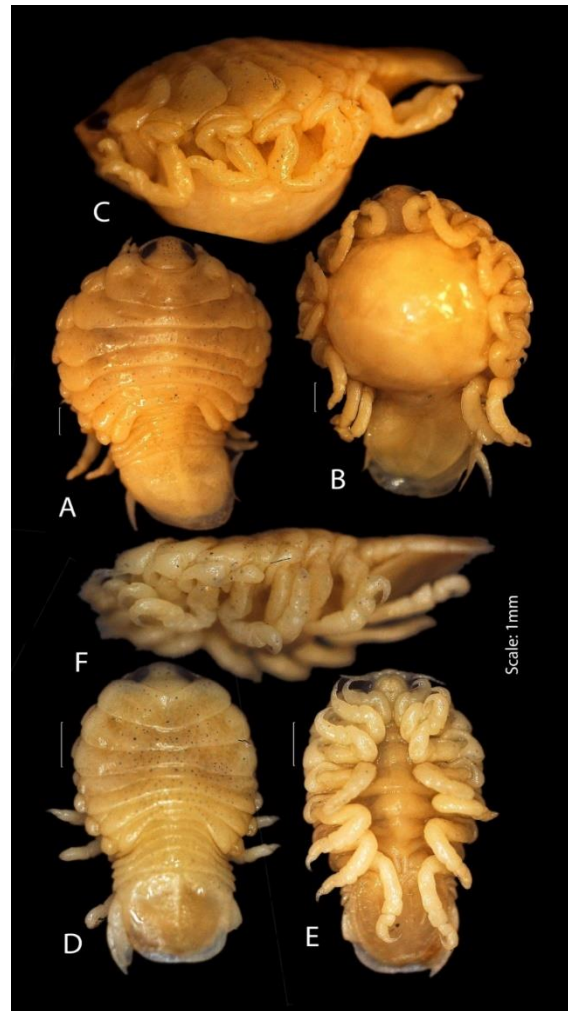


Fig. 2. *Ichthyoxenos aneeshi* sp. nov. ovigerous female (12.1 mm) (C 9926/2): (A-C); male (7.9 mm) (C 9927) (D-F). A. dorsal view; B. ventral view; C. lateral view; D. dorsal view; E. ventral view; F. lateral view

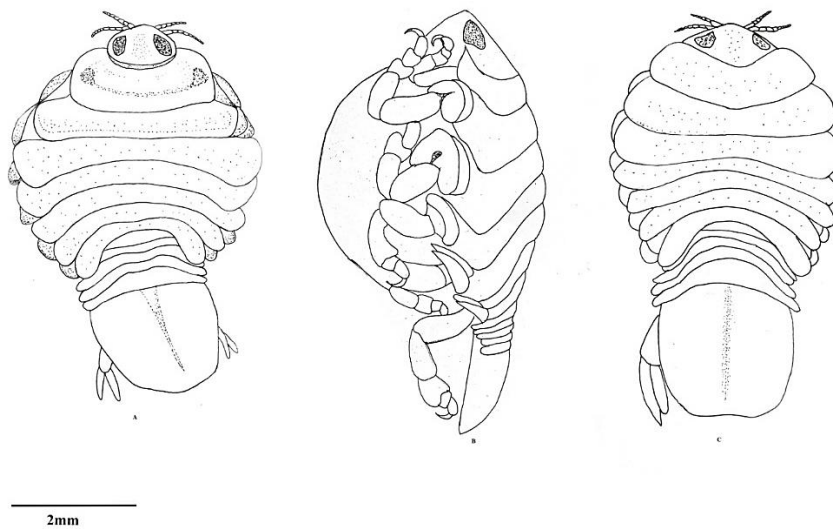


Fig. 3. *Ichthyoxenos aneeshi* sp. nov. holotype ovigerous female (12.1 mm) (C 9926/2): A. dorsal view B. lateral view. C. (Paratype male) (C 9927/2): dorsal view

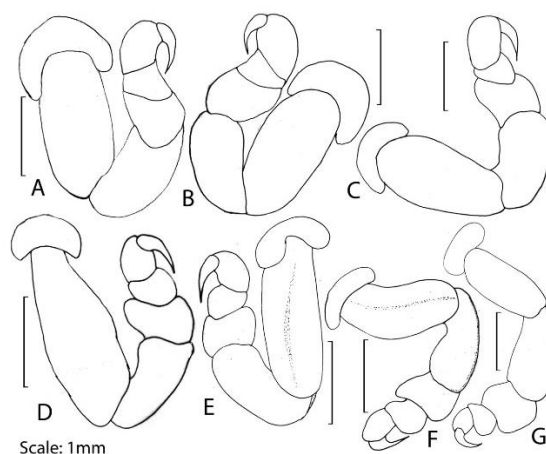


Fig. 4. *Ichthyoxenos aneeshi* sp nov. ovigerous female (12.1 mm) (ZSIC 9926/2): A-G, Pereopods 1-7, respectively

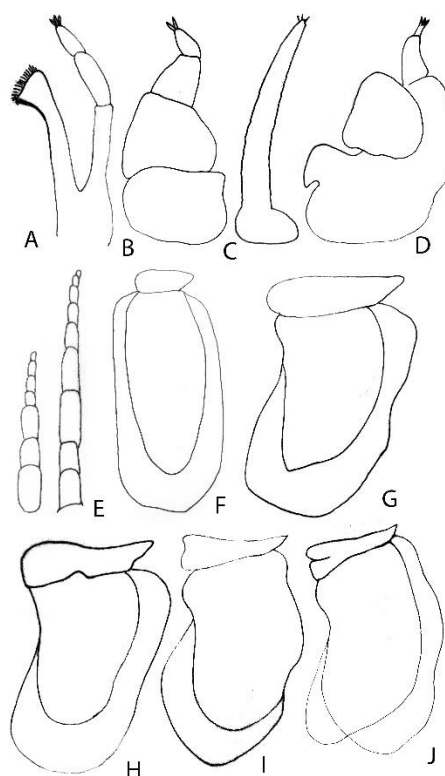


Fig. 5. *Ichthyoxenos aneeshi* sp nov. ovigerous female (12.1 mm) (C 9926/2): A. mandible; B. maxilla 1, C. maxilla 2, D. maxilliped, E. antennae 1 & 2, F-I, pleopods 1-5, respectively

Pleotelson 0.8 times as long as maximum width; free edge straight to gently convex, median part slight concave, lateral margins gently convex, longitudinal median ridge prominent in dorsal view, extended up to median point of pleotelson; uropod 0.7 as long as pleotelson, uropodal endopod and exopod subequal, endopod slightly broader

than exopod, exopod not serrated (Fig. 2A, 3A).

Variation: Male paratype (C 9926/2) is distinctly slender and smaller than female. It has some distinct morphological differences from the female; the male is 1.9 times as long as greatest width (vs. female holotype is 1.5 times as long as

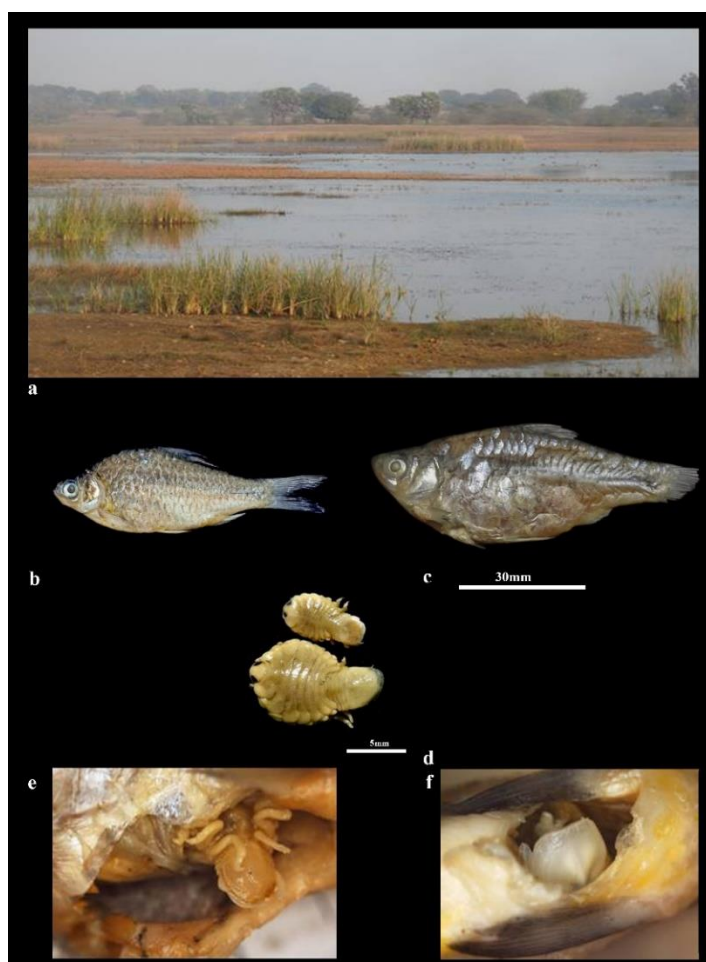


Fig. 6. *Ichthyoxenos aneeshi* sp. nov. **A.** Habitat **B.** Uninfected fish *Puntius sophore* **C.** Host fish *Puntius sophore* **D.** Female Holotype (larger) and male Paratype (Freshly collected); **E, F.** Isopod with host (in Situ)

greatest width); Pereonite 1 anterior margin medially angular, so the cephalon looks rhomboidal (vs. cephalon sub-oval in female); pereonite 1 posterior margin medially angular (vs. posterior margin straight in female); pleotelson posterior margin almost straight, slightly concave medially, lateral margins distinctly straight (vs. posterior margin slight convex, medially gently concave, lateral margins gently convex)(Figs. 2D-F,3C).Female paratypes are similar to the holotype.

Colour: Body surface in both males and females is tan yellow with scattered pigmentation of black dots, male has no pigmentation on head and middle of the pleotelson (Fig. 2 A-F), whereas the female has pigmentation on its head (Fig. 2 A-C).

Distribution: Known only from the Purbashtali oxbow lake (Fig. 1, 6A), West Bengal, India (type locality).

Host: Only known from the type host *Puntius sophore* (Hamilton, 1822) (Family: Cyprinidae) (Fig. 6 B, C).

Etymology: The species is named after Dr. Panakkool Thamban Aneesh, Associate professor at Hiroshima University, Japan; in recognition of his significant contribution in the taxonomy of fish parasitic isopods, specifically in cymothoidae of the Indian seas. Specific epithet is considered here as a noun in apposition.

Remarks: *Ichthyoxenos aneeshi* sp nov. is characterized by its rounded body structure, semicircular head, eyes rectangular, pereonite 1 lateral margin straight; mandible broad, molar process covered in pectinate scales, maxilla 1 with 3 setae, maxilla 2 with three segments, maxilliped comprises 4 articles, antennules shorter than the antenna, comprises 7 articles, reaches only middle of the eye; antenna hardly reaches up to the distal margin of pereonite 1;

antennae comprises 9 articles, terminal article without setae; pereonite 3-7 posterior margin concave; pereonite 4 widest, pereonite 7 shortest. Pleotelson 0.8 times as long as maximum width; free edge straight to gently convex, median part slightly concave, longitudinal dorso-median ridge prominent, Uropodal endopod and exopods without serration, subequal.

Many species of *Ichthyoxenos* were poorly described and required of redescription as per modern taxonomical consequence [1,10,2]. *I. montanus* Schiodte & Meinert, 1884, was described from the Himalayan Mountains, has more affinities with this new species than any other congeners.

Both these species have a similar host, *Puntius sophore*, and there are some similarities between these two species, but they can only be differentiated by the following characters: the ovigerous female of *I. aneeshi* sub-globose, relatively wider (L/W=1.47) (Fig. 2A, 3A), (vs. the ovigerous female of *I. montanus* is relatively narrower, elongated (L/W=1.66; Schiodte & Meinert, 1884: Pl. XXIX); Pereonite 7 fully covered the lateral margin of pleonite 1 and 2; whereas partly covers the pleonite 3 (Fig. 2A, 3A); (vs. in *I. montanus*, Pereonite 7 fully covers the pleonite 1, and partly covers the pleonite 2; Schiodte & Meinert, 1884); Pereonite 1 posterior margin convex, sinuate (Fig. 2A, 3A), (vs. Pereonite 1 posterior margin evenly concave; Schiodte & Meinert, 1884); pleon wider than long (vs. pleon much longer than wide); anterolateral corner of Pereonite 2-3 rounded, not produced (vs. anterolateral corner of pereonite 2-3 produced); posterolateral corner of pereonite 4-6 directed laterally (vs. posterolateral corner of pereonite 4-6 directed posteriorly). Pereonite 3, 4 convex, smooth (Fig. 2A, 3A) (vs. pereonite 3, 4 with a broad transverse excavation in *I. montanus*; Schiodte & Meinert, 1884), Pleotelson longer than broad, Fig. 2A, 3A) (vs. pleotelson broader than long in *I. montanus*; Schiodte & Meinert, [7]) (Table 2).

Ichthyoxenos aneeshi sp. nov. has some affinities with *Ichthyoxenos fushaensis* Tsai & Dai, 1999, but these two species have many morphological differentiations. *I. aneeshi* n. sp cephalon is distinctly broader than long, pleon also broad than its length, antennae 2 with 9 articles, pereopod 1 carpus broad, lateral margins of

basis parallel and straight (vs. *I. fushaensis* cephalon longer than broad, pleon narrow, longer than broad, antennae 2 with 7 articles, pereopod 1 carpus very short, narrow, basis lateral margins convex) [8]: Fig. 1 A, C, H).

I. Jellinghausii Herklots, 1870 and *I. japonensis* Richardson, 1995 have a distinctly elongated body (see Richardson, 1913: Fig. 1-5) (vs. relatively more rounded body shape in the new species).

Ecology: Out of the 24 species, a total 15 species of the genus *Ichthyoxenos* have an interesting mode of parasitic life. During the younger stage, the female and male pair enter into the abdominal cavity of a particular host fish by boring a hole just below the pectoral fins, and there they grow up and complete their life cycle until death [8].

Ichthyoxenos aneeshi sp nov. shows the flesh-burrowing habit. After making a burrow in the abdominal cavity of the host fish *Puntius sophore*, they induce a thin-walled membranous sac in the body cavity of the host fish. After their infestation, the isopods lie upside down within the sac with their posterior ends oriented toward the infested hole. The orifice, an opening of the sac directly to the outer environment, near the posterior ventral margin of the pectoral fin of the host fish, provides a channel for gas exchange, excretion of waste and release of mancas (Fig. 6C, E-F). These observations are almost similar to those of Tsai and Dai, 1999 and Chang *et al.* 2006 for the species of *Ichthyoxenos fushanensis*.

Ichthyoxenos amurensis was found to be parasitic on the body cavity of the Amur bitterling *Rhodeus sericeus* (Cypriniformes: Cyprinidae); interestingly parasitized fishes were collected from a lentic water body connected to the Amur River not the lotic water of Amur River [11-15]. Interestingly this isopod is only found as a parasite in the host fishes that live in the waterbodies of Chupi not from the river Bhagirathi-Hugli, maybe they prefer the lentic water of wetland over the fast-flowing river.

A high prevalence (17.3) of this new species has been noted in the local fish market at Purbasthali. Total 104 fishes (*Puntius sophore*) were examined, of which 18 fishes were found affected [16].

Table 2. Comparison between the new species and its nearest congeners

Morphological Characters	<i>Ichthyoxenus montanus</i> Schioedte & Meinert, [10]	<i>Ichthyoxenus aneeshi</i> sp. nov.
Shape of the adult female	relatively narrower, elongated (L/W=1.66)	sub-globose, relatively wider (L/W=1.47)
Pleotelson	broader than long	longer than broad
Pereonite 1	posterior margin evenly concave	posterior margin convex, sinuate
Pereonite 2 and 3	anterolateral corner of pereonite 2-3 produced	anterolateral corner of pereonite 2-3 rounded, not produced
Pereonite 4	with a broad transverse excavation	convex, smooth
Pereonite 7	fully covers the pleonite 1, and partly covers the pleonite 2	fully covered the lateral margin of pleonite 1 and 2

4. CONCLUSION

The presence of this flesh-burrowing parasitic isopod in India is significant concerning to the taxonomical and ecological view point, as *Ichthyoxenus* is reported from India for the first time. *Ichthyoxenus aneeshi* sp. nov. described here is also interesting in the zoogeographical aspect, as many migratory birds are wintering in this oxbow lake. This species may be introduced to this lake by migratory birds and then evolutionary and some adaptive changes might lead to the speciation here. Further investigation is needed to confirm these assumptions. The life history and pathogenicity may also have to be investigated for this parasitic species.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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