

SHORT COMMUNICATION

New species and first record of *Helotrephes* from India, and a check-list of Indian Helotrephidae (Hemiptera: Heteroptera)

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Abstract. *Helotrephes nainamalaii* sp. nov. from Meghalaya, India is described. Representatives of *Helotrephes* are so far known from southern China, Southeast Asia and Sundaland. The unexpected first record of *Helotrephes* from India expands their distribution more than 1,000 kilometres westward. The new species belongs to the *H. australis* species-group which is widespread in southern China and Southeast Asia. *Helotrephes nainamalaii* sp. nov. can be identified by the presence of a sub-basal protrusion on the genal plate, a characteristic apical hook on the aedeagus, and peculiarly shaped ventromedian carinae. The description is supplemented by a key to the species of the *Helotrephes australis* species-group. *Tiphotrephes indicus* (Distant, 1910) is recorded from Meghalaya for the first time. A check-list of Helotrephidae in India is given.

Key words. Heteroptera, Helotrephidae, Helotrephini, *Helotrephes australis* species-group, key, Meghalaya, India, Oriental Region

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Introduction

Fifteen species of Helotrephidae in six genera are so far known from India (see check-list, Tab. 1). The majority of the species (9) are distributed in south India (THIRUMALAI 2007, PAPÁČEK & ZETTEL 2008). There is no previous record of *Helotrephes* Stål, 1860 or even the tribe Helotrephini from India. Like most other Helotrephidae, species of *Helotrephes* usually inhabit shallow streams and rivers with low current. Their size may reach up to 3.8 mm, which is relatively large compared to most other members of the family. As usual in Helotrephidae, populations of its species are pterygopolymorphic. The brachypterous form can be differentiated from the macropterous form by the absence of claval and embolar sutures of the hemielytron (ZETTEL 2000b).

Helotrephes and *Hydrotrepes* China, 1935 are the two most speciose genera of the tribe Helotrephini (Helotrephidae: Helotrephinae) in Asia. They can be easily

distinguished by the presence (*Helotrephes*) or absence (*Hydrotrepes*), respectively, of median carinae on abdominal sterna 4–6 (ZETTEL & POLHEMUS 1998). *Helotrephes* reaches its greatest diversity on the Southeast Asian mainland and in the subtropical parts of China. Relatively few species are known from Sundaland (Sumatra, Java, Borneo). *Helotrephes* is unknown from the Malay Archipelago east of Wallace Line. In that area, its niches are occupied by species of *Hydrotrepes*, which – in contrary – is rare on the Asian mainland and has an unusual outpost on Sri Lanka. This paper records and describes a new species of the *Helotrephes australis* group from Meghalaya, northeast India. This record expands the known distribution of the genus considerably to the west.

So far thirty species and three subspecies have been recognized in the genus *Helotrephes* under seven species groups: *H. otoeis* group, *H. jendeki* group, *H. semiglobosus* group, *H. papaceki* group, *H. sausai* group, *H.*



australis group, and *H. confusus* group (STÅL 1860; ESAKI & MIYAMOTO 1943; ZETTEL 1995, 2000a, b, 2001, 2004a, b, 2005, 2009, 2012; ZETTEL & POLHEMUS 1998; NIESER & CHEN 1999; KOVAC & PAPÁČEK 2000; PAPÁČEK & KOVAC 2001; PAPÁČEK & ZETTEL 2005). ZETTEL & POLHEMUS (1998: 104–105) defined the *Helotrephes australis* group and published the first key that included only three species. Seven species from southern China, Laos, Vietnam, Thailand, and Malaysia have been hitherto identified in this species group (ZETTEL & POLHEMUS 1998; ZETTEL 2000a, 2004a, 2005). The updated key to the species of the *Helotrephes australis* group, including the new Indian species, is presented here.

Material and methods

Specimens of new species were collected by using a D-frame aquatic insect net and preserved in 75% ethanol. Specimens and their dissected genitalia were examined, and photographs and measurements were acquired via a Leica stereo zoom microscope (Leica M205A), using the software Leica application suite (LAS V3.8). All measurements are given in millimetres. The holotype specimen was card-mounted and the genitalia were mounted between cover glasses and kept under the specimen. The distribution map was prepared by DIVA-GIS (Figs 3A–B). Terminology follows ZETTEL & POLHEMUS (1998).

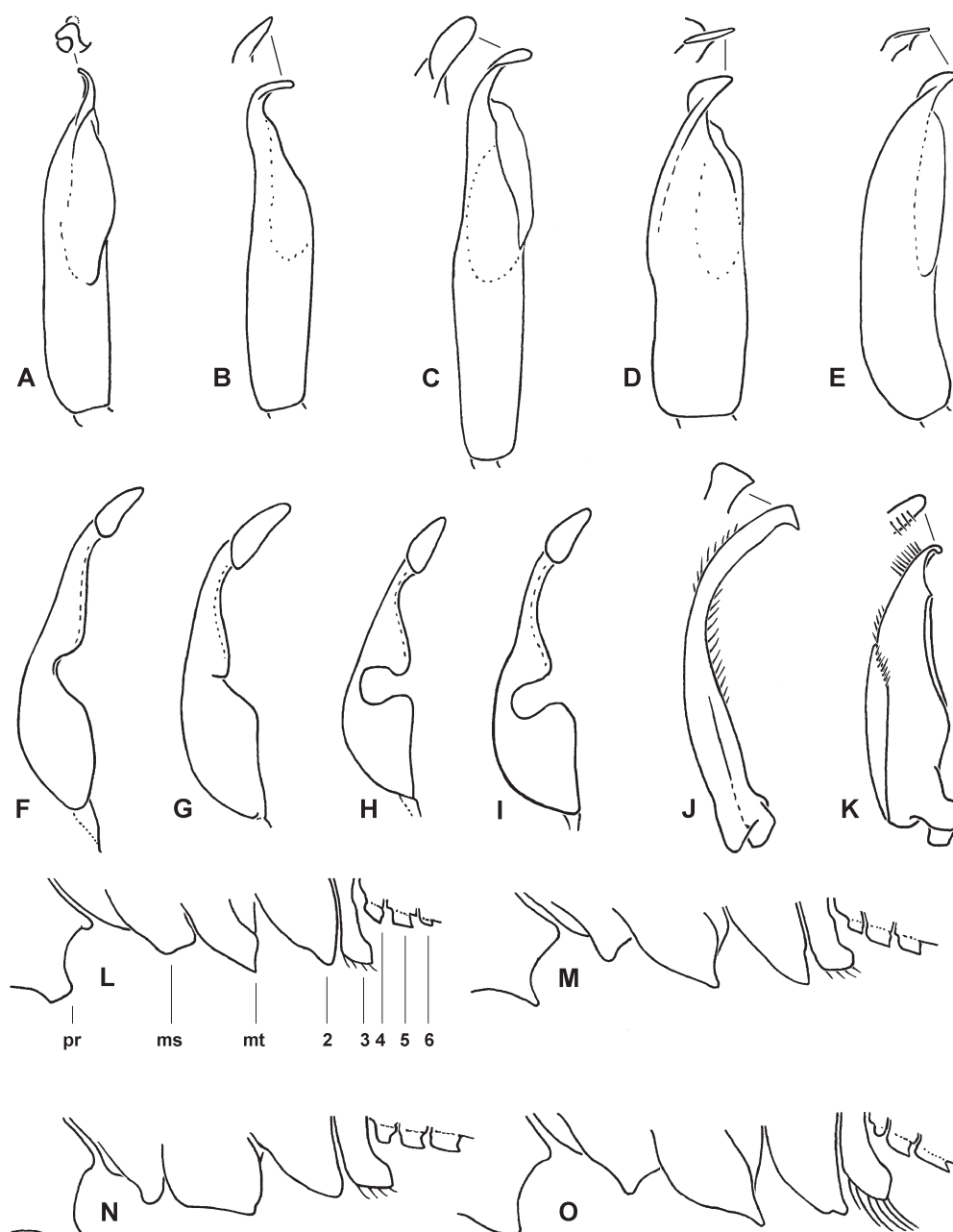


Fig. 1. Key characters of species belonging to the *Helotrephes australis* species-group. A–E – aedeagi in right side view: A – *H. recurvatus* Zettel, 2000; B – *H. australis* Zettel & Polhemus, 1998; C – *H. nieserianus* Zettel & Polhemus, 1998; D – *H. incisus* Zettel & Polhemus, 1998; E – *H. vietnamensis* Zettel, 2005. F–I – pronotal and genal plate: F – *H. recurvatus*; G – *H. globulus* Zettel, 2004; H – *H. australis*; I – *H. incisus*. J – right paramere of *H. australis*. K – left paramere of *H. australis*. L–O – medioventral carinae: L – *H. globulus*; M – *H. australis*; N – *H. recurvatus*; O – *H. incisus*. Abbreviations: pr – prosternum; ms – mesosternum; mt – metasternum; 2–6 – carinae of abdominal sterna 2–6. Figures not on scale. Redrawn (with slight modifications) from ZETTEL & POLHEMUS (1998): B–D, H–K, M, O; ZETTEL (2000a): A, F, N; ZETTEL (2004a): G, L; and ZETTEL (2005): E.

Taxonomy

Helotrephes Stål, 1860

Helotrephes australis species group

Diagnosis (modified from ZETTEL & POLHEMUS 1998): Small species, body length 2.4–2.8 mm. Cephalonotum with dense, medium sized punctation, matt. Hind margin of cephalonotum laterally without tubercles. Pronotal plate posteriorly not dilated, in most species with a deep and broad incision. Prosternal carina with acute posterior angle, emarginated posteriorly. Male genitalia: aedeagus slender, without apical plate; right paramere very slender; left paramere relatively broad. Female with rounded or truncate (never stalked) middle lobe of subgenital plate.

Key to the species of *Helotrephes australis* group

(only for males)

Note. *Helotrephes kantonensis* Zettel, 2004 is not included in the key applicable only for male adults, since it is known only from a single female. It can be identified by a deep and wide incision of the pronotal plate, an angular anterior projection of the prosternal carina, and slightly angular carinae of metasternum and abdominal sternum 2.

1. Apex of aedeagus hook-shaped and facing backward (Fig. 1A). Incision of pronotal plate deep and wide (Fig. 1F), or narrow and angular (Fig. 1G). 2
 - Apex of aedeagus facing forward (Figs 1B–E, 2G). Incision on pronotal plate round (Figs 1H–I, 2C). 3
2. Incision of pronotal plate narrow and angular (Fig. 1G). Anterior projection of prosternal carina blunt (Fig. 1L). China (Guangdong). *H. globulus* Zettel, 2004
 - Incision of pronotal plate deep and wide (Fig. 1F). Anterior projection of prosternal carina angulated (Fig. 1N). Borneo. *H. recurvatus* Zettel, 2000
3. Incision of pronotal plate constricted at mesal margin of plate (Fig. 1H). In apical view, aedeagus with apical lamina (Figs 1B–C, inserts). 4
 - Incision on the pronotal plate not constricted at mesal margin of plate (Figs 1I, 2C). In apical view, aedeagus sharp, without apical lamina (Figs 1D–E, inserts, 2G). 5
4. Anterior projection of prosternal carina spinous, pointed (Fig. 1M). Aedeagus as in Fig. 1B. China (Yunnan), Thailand, Laos, West Malaysia. *H. australis* Zettel & Polhemus, 1998
 - Anterior projection of prosternal carina weakly acute, not pointed (cf. Fig. 1O). Aedeagus as in Fig. 1C. China (Yunnan), Thailand, Laos. *H. nieserianus* Zettel & Polhemus, 1998
5. Apex of aedeagus hook-shaped (Fig. 2G). Anterior corner of prosternal carina strongly protruding (Fig. 2D). Metasternal carina with blunt apex (Fig. 2D). India (Meghalaya). *H. nainamalaii* sp. nov.
 - Apex of aedeagus beak-shaped (Figs 1D–E). Anterior corner of prosternal carina weakly protruding (Fig. 1O). Metasternal carina with pointed apex (Fig. 1O). 6

6. Carina of sternum 2 with small apical incision (Fig. 1O). Carina of sternum 3 with long setae (Figs 1O). China (Yunnan), Thailand. *H. incisus* Zettel & Polhemus, 1998
 - Carina of sternum 2 without apical incision. Carina of sternum 3 with short setae (cf. Fig. 1M). Vietnam. *H. vietnamensis* Zettel, 2005

Helotrephes nainamalaii sp. nov.

(Figs 2A–I)

Type material. HOLOTYPE (brachypterous male): INDIA: MEGHALAYA: East Khasi Hills District, Janiaw Village, Phudjynniaw Stream, 1042 m a.s.l., 25.25731° N, 91.5745° E, 4.iii.2016, Coll. E. E. Jehamalar. PARATYPE: 1 brachypterous male, same collection data as for holotype. Both specimens are deposited in the Central Entomological Laboratory (CEL), Zoological Survey of India (ZSI), New Alipore, Kolkata, West Bengal, India: holotype Reg. No. 5887/H15, paratype Reg. No. 5888/H15.

Description of brachypterous male (Figs 2A–I). Size (holotype is a smaller specimen): Body length: 2.28 / 2.45. Maximum body width at posterolateral angle of cephalonotum: 1.71 / 1.81.

Colour. Dark brown to black. Anteromedian region of pronotum pale brown (Fig. 2A). Head yellowish brown with irregular black mark (Fig. 2B), near eyes yellowish. Legs yellowish brown.

Structural characters. Head: vertex near posterior margin of eye rugulose; anterior part without distinct punctures. Cephalonotal suture sinuate and distinct (Fig. 2B). Eye length 0.59, width 0.28. Fourth rostral segment almost 3.0 times as long as third. Pronotal plate with a very large, almost squared incision (Fig. 2C). Genal plate narrow, sub-basally with a small protrusion.

Punctures on entire dorsum bearing yellowish brown setae; pronotum with dense, small and shallow punctures; scutellum and hemelytra with sparse, large, deep punctures; corium sub-laterally reticulated. Mesoscutellum, length 1.09, basal width 0.94.

Ventral carinae (Fig. 2D): Prosternal carina deeply notched posteriorly, strongly protruding anterior corner and blunt posterior corner. Mesosternal carina anteriorly knob-like, posteriorly rounded. Metasternal carina almost squared, anteriorly elevated, posteriorly with blunt corner. Carina of sternum 2 large and almost sigmoid. Carina of sternum 3 with apical part almost reniform, with sparse long thin setae. Carinae of abdominal sterna 4 to 6 small and basally with thick setae.

Genitalia. Genital capsule as in Fig. 2E. Aedeagus (Fig. 2G) medium-sized, stout, with slightly convex posterior margin; apex of characteristic hook-like shape. Right paramere (Fig. 2H) slightly shorter than left paramere, slender and curved, posteriorly with 13 long setae evenly distributed in distal two thirds; apex round, but in a more posterior view (Fig. 2F) angularly produced. Left paramere (Fig. 2I) broad, abruptly narrowed distally, with blunt tip, with some setae posteriorly and on medial face.

Differential diagnosis. *Helotrephes nainamalaii* sp. nov. belongs to the *H. australis* group sensu ZETTEL & POLHEMUS (1998). It can easily be distinguished from all the other known species of the *H. australis* group by the presence of a sub-basal tubercle on the genal plate (Fig. 2C), by a

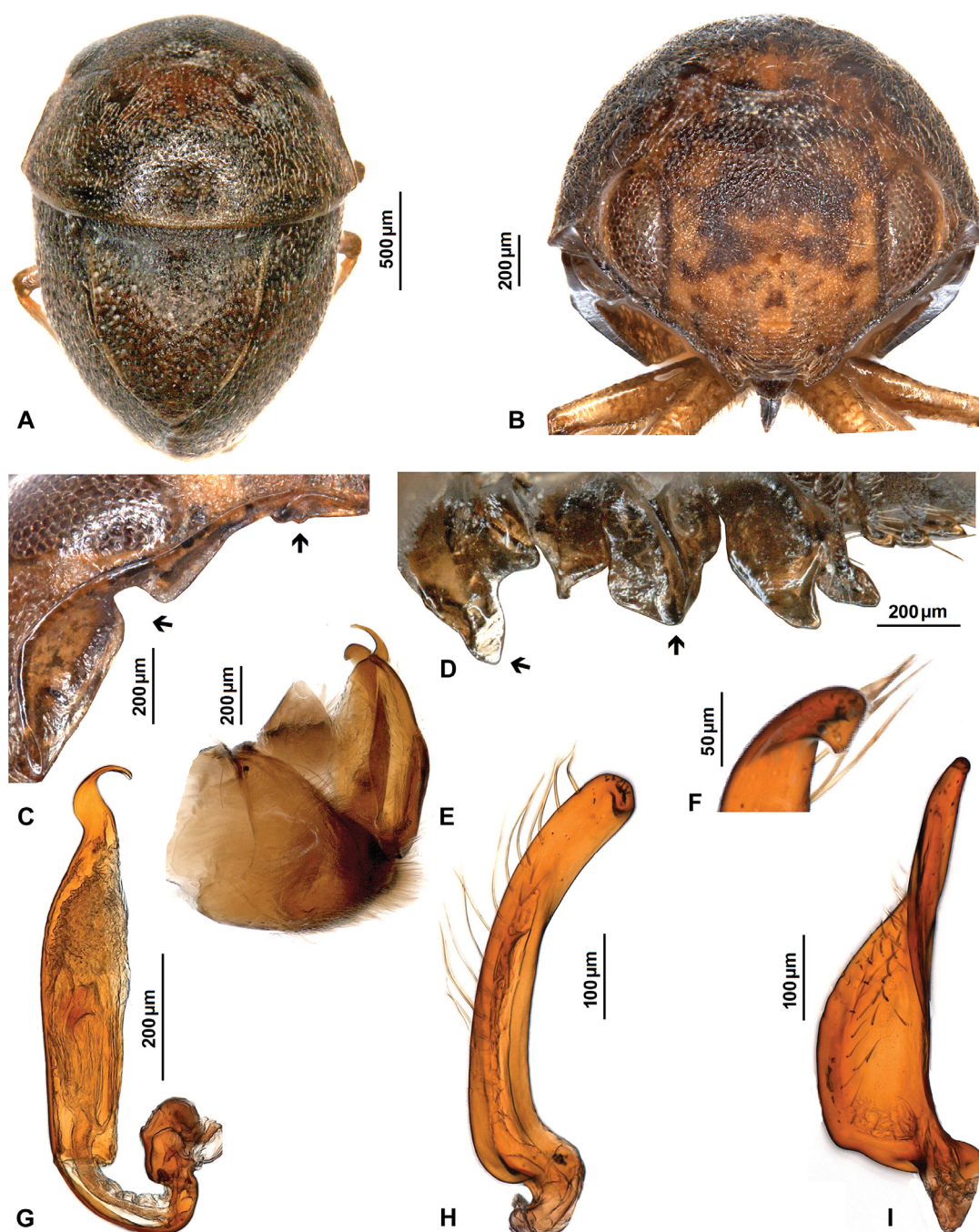


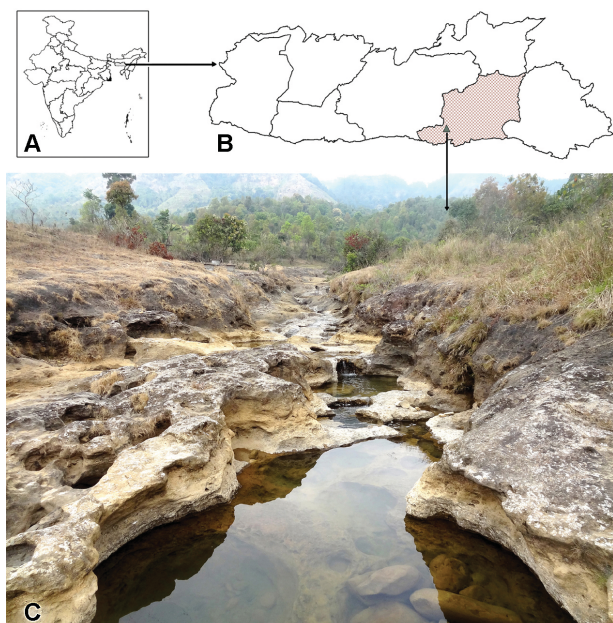
Fig. 2. *Helotrephes nainamalaii* sp. nov. (holotype, brachypterous male). A – habitus, dorsal view; B – head, frontal view; C – pronotal and genal plate, ventral view (arrows indicate incision of pronotal plate and sub-basal tubercle of genal plate); D – ventromedian carinae, lateral view (arrows indicate strongly protruded prosternal carina and blunt posterior corner of metasternal carina); E – genital capsule, lateral view; F – apex of right paramere, dorsolateral view; G – aedeagus, lateral view; H – right paramere, lateral view; I – left paramere, lateral view.

strongly protruding anterior corner of the prosternal carina (Fig. 2D), and by the apical hook of the aedeagus basally bent backward and then forward (Fig. 2G). The first two characters should probably easily facilitate the recognition of the hitherto unknown female. Although the hook-shaped apex of the aedeagus resembles that of *H. australis*, a common and widespread species in Southeast Asia, *H. nainamalaii* differs from *H. australis* by the apical hook of the aedeagus being bent backward and then curved forward (Fig. 2G), while in *H. australis* it is simply curved forward (Fig. 1B). Moreover in *H. australis* the right paramere

is very slender, and the left paramere has a curved apex (Figs 1J–K).

Etymology. *Helotrephes nainamalaii* is named after Mr. R. Nainamalai, Divisional Forest Officer, Jaintia Hills, Meghalaya, for arranging the field trip in the East Khasi Hills District.

Type locality and habitat (Figs 3A–C): Meghalaya is located between 25°01'N and 26°05'N latitude and 85°49'E and 92°52'E longitude. The East Khasi Hills district experiences an average annual rainfall of about 12,000 mm and is considered as one of the wettest regions on earth.



Figs 3A–C. Type locality of *Helotrephes nainamalaii* sp. nov. A – map of India; B – map of Meghalaya; triangle denotes the distribution of the new species; C – photograph of the type locality, Phudjynniaw Stream in Janiaw Village.

About 39% of the district's total area is forested (1067.52 km² out of 2748 km²). The district is dissected by plenty of streams; the streams and rivers in the north flow toward the Brahmaputra River and those in the south toward the Surma River of Bangladesh. Phudjynniaw Stream located in East Khasi Hills District, is the tributary of Umngi River,

which flows into Bangladesh and meets with Surma River. It is a limestone-bedded slow flowing shallow stream with an open canopy (Fig. 3C).

Distribution. Known only from the type locality, Phudjynniaw Stream in Janiaw Village, Mawsynram Block, East Khasi Hills District, Meghalaya, India.

New faunistic record

Tiphotrephes indicus (Distant, 1910)

Helotrephes indicus Distant, 1910: 338 (original description).

Tiphotrephes indicus: ESAKI & CHINA (1928): 153 (new combination).

Material examined. INDIA: MEGHALAYA: West Jaintia Hills, Nartiang Village, Umtisong Pond, 1183 m a.s.l., 25.57194° N, 92.21458° E 14.iii.2016, 3 ♀♀, Coll. E. E. Jehamalar. The specimens are deposited in National Zoological Collection, Hemiptera Section, ZSI-HQ, Kolkata. Reg. No. 6485/H15.

Distribution. India: Maharashtra, Uttar Pradesh (THIRUMALAI 2007), West Bengal (DISTANT 1910), Meghalaya (this paper), Assam (senior author's pers. observ.); Myanmar (DISTANT 1910); Thailand, Malaysia (Selangor, Perak), Singapore, Indonesia (Borneo) (PAPÁČEK & ZETTEL 2005). First record from Meghalaya.

Check-list of Indian Helotrephidae

Check-lists of the Helotrephidae of the world were published by POLHEMUS (1990) and PAPÁČEK & ZETTEL (2005). The updated checklist of Helotrephidae known from India is presented in Table 1.

Table 1. Checklist of Helotrephidae known from India. Note that the systematic position of *Indotrephes* Zettel, 1997 is uncertain. According to ZETTEL (1997a) it belongs either to the Idiocorinae (hitherto only known from Africa) or to Limnotrephini. PAPÁČEK & ZETTEL (2005) listed *Indotrephes* in Helotrephini by error.

Species	States of India	Other country records	References of Indian records
Subfamily Fischerotrephinae Zettel, 1994			
<i>Fischerotrephes indicus</i> Zettel, 1997	Kerala, Karnataka, Tamil Nadu		ZETTEL (1997a), PAPÁČEK & ZETTEL (2001)
Subfamily Helotrephinae Esaki & China, 1927			
<i>Helotrephes nainamalaii</i> Jehamalar, Chandra & Zettel, 2018	Meghalaya		this study
Subfamily Helotrephinae Esaki & China, 1927			
<i>Limnotrephes campbelli</i> Esaki & China, 1928	Karnataka		ESAKI & CHINA (1928)
<i>Mixotrephes</i> (s. str.) <i>kumaonis</i> (J. T. Polhemus, 1990)	Uttarakhand	Nepal	POLHEMUS (1990, in <i>Limnotrephes</i>), PAPÁČEK & ZETTEL (2003)
<i>Mixotrephes</i> (s. str.) <i>bengalensis</i> Papáček & Zettel, 2003	West Bengal		PAPÁČEK & ZETTEL (2003)
<i>Mixotrephes</i> (s. str.) <i>heissi</i> Papáček & Zettel, 2003	West Bengal	Bhutan	PAPÁČEK & ZETTEL (2003)
<i>Mixotrephes</i> (<i>Thermotrephes</i>) <i>punctatus</i> Papáček & Zettel, 2008	Meghalaya		PAPÁČEK & ZETTEL (2008, 2011)
<i>Nanotrephes boukali</i> Papáček & Zettel, 2001	Karnataka		PAPÁČEK & ZETTEL (2001)
<i>Nanotrephes duplicaturus</i> Papáček & Zettel, 2001	Kerala		PAPÁČEK & ZETTEL (2001)
<i>Nanotrephes idiomorphus</i> Papáček & Zettel, 2001	Kerala		PAPÁČEK & ZETTEL (2001)
<i>Nanotrephes minutissimus</i> (Zettel, 1997)	Kerala		ZETTEL (1997b, in <i>Limnotrephes</i>), PAPÁČEK & ZETTEL (2001)
<i>Nanotrephes tuberculatus</i> Papáček & Zettel, 2001	Kerala		PAPÁČEK & ZETTEL (2001)
<i>Tiphotrephes indicus</i> (Distant, 1910)	Maharashtra, Uttar Pradesh, West Bengal, Meghalaya*, Assam	Myanmar, Thailand, Malaysia, Singapore, Indonesia	DISTANT (1910), ESAKI & CHINA (1928), THIRUMALAI (2007), *present record
Subfamily incertae sedis			
<i>Indotrephes bufula</i> Zettel, 1997	Kerala		ZETTEL (1997a), PAPÁČEK & ZETTEL (2001)
<i>Indotrephes latus</i> Papáček & Zettel, 2001	Tamil Nadu		PAPÁČEK & ZETTEL (2001)

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