

A Monograph of the *Helotrephidae*, subfamily *Helotrepinae*
(Hem. Heteroptera)

BY

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Since the family *Helotrephidae* was described ¹, the authors have been able to borrow (thanks to the courtesy of Prof. Bouvier and Dr. Séguy, of the National Museum of Natural History, Paris, and of Dr. Bischoff, of the Zoological Museum, Berlin), the type material of *Helotrepes bouvieri* Kirk. and *H. martini* Kirk., a specimen of *H. eremita* Horv., and a new species which it is proposed to describe as *H. kirkaldyi*.

The type of *H. semiglobosus* Stål, for which the genus *Helotrepes* was founded, has apparently been lost ², but from a study of Kirkaldy's and Horvath's species, and of Stål's description, it is clear that *Helotrepes indicus* belongs to an entirely new genus. Although the subfamily *Helotrepinae* was based on this new genus, and not on *Helotrepes*, it is unnecessary to make any considerable alterations in the subfamily diagnosis, as it covers both the genera equally well.

¹ *Trans. Ent. Soc. London*, 1927, part II, pp. 279-295.

² Dr. Roman of the Naturhistoriska Riksmuseum, Stockholm, has informed us that the type was loaned to Kirkaldy while he was engaged on his revision of the Notonectidae (before 1904), and was never returned. After Kirkaldy's death his collection was split up. Part was presented by Mrs. Kirkaldy to the British Museum, a part apparently loaned by her to Mr. J. R. de la Torre Bueno, whence it has found its way to the United States National Museum, Washington, and a part left in Honolulu. *Helotrepes semiglobosus* is not to be found in the British Museum, and Mr. W. L. Mc Atee informs us that it is not at Washington. If it still exists it is probably at Honolulu. (It has lately been found in Mr. Torre-Bueno's collection. T. E.)

Subfamily **Helotrephinae** E. & C.

1927. Esaki and China, *Trans. Ent. Soc. London*, 1927, part II, p. 280.

Water bugs of small size, head and prothorax completely fused together, boundary between them indicated by a dorsal shallow linear impression. Antennae placed on ventral surface of head between base of rostrum and eyes, directed posteriorly, much reduced, two-

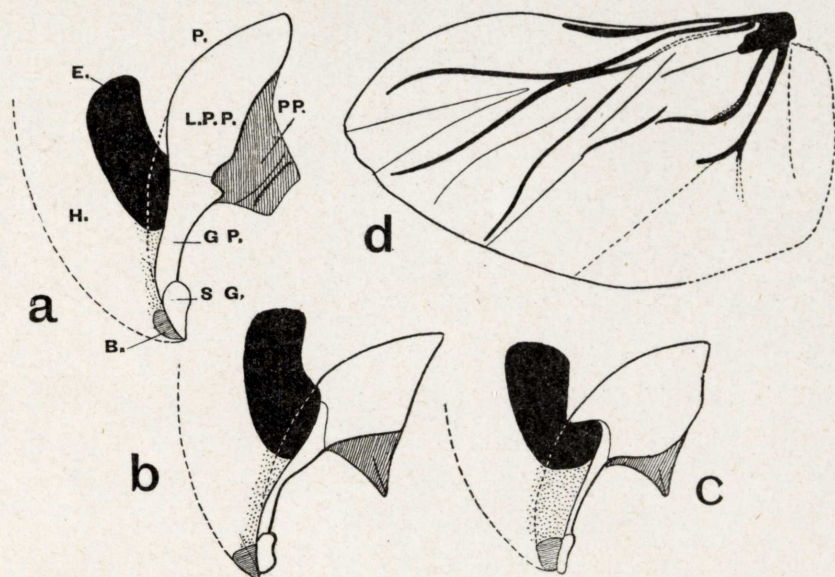


Fig. 1.—Side view of cephalonotum: *a*, *Helotrephes bouvieri*, Kirk.; *b*, *Tiphotrephes indicus*, Dist.; *c*, *Limnotrephes campbelli*, E. & C.; *B*, buccula; *E*, eye; *GP*, genal plate; *H*, head; *L. P. P.*, lateral pronotal plate; *P*, pronotum; *PP*, prothorax; *SG.*, subgena; *d*, Hind wing of *Helotrephes bouvieri*, Kirk.

segmented, distinctly flattened, the apical segment furnished with long setae. Eyes small, elliptical, imbedded dorso-laterally. Ocelli absent. Rostrum four-jointed. Lateral margins of cephalonotum seen from above convexly rounded, seen in profile, rectangularly curved. Pronotum deflexed laterally to form a shining concave sub-ventral lateral area (lateral plate) separated from the dorsal area by a distinct, sometimes laminate carina. This area apparently extends

anteriorly along the side of the head to the triangular subgena¹, but is actually separated from the anterior portion (which we propose to call the genal plate), by a continuation of the dorsal W-shaped linear impression between head and pronotum, which sweeps round the base of the eye, and so on to the concave lateral plate (fig. 1, *a*). This part of the suture is sometimes very obscure, but is clearly seen in *H. eremita*. Genal plate long and narrow, its surface shining, separated from dorsal surface of head by more or less distinct carina².

Scutellum strongly developed, very large and broad, sides convexly sinuate, margined on underside with a shallow groove into which the inner margins of the elytra fit. Pro, meso- and metasterna each with a distinct median laminate keel (the metasternal keel is absent in the *Idiocorinae*). Pro-coxal cavities open³. Elytra reaching the apex of abdomen, interlocking along apical margin; claval suture sometimes present, in which case there is also another suture separating a small triangular area (fig. 4, *c*) at the basal angle of costal area of the hemelytron (clavulus), the apex of the clavus is acute, and ends in the middle of the lateral margin of the scutellum, and the wings are fully developed; no distinct venation, membrane represented only in left elytron by a small interlocking structure. Hind-wings when absent represented by a small vestigial structure.

One tarsal segment in anterior and intermediate legs, two in posterior legs⁴, all tarsi with two equal claws. Abdomen with ten segments, six abdominal (first segment is not visible), three modified genital, and one anal. Male genital segments strongly asymmetrical. Larvae with a single unpaired dorsal abdominal gland opening on the second tergite.

Type genus: *Helotrepes* Stål.

¹ Bergroth calls these sclerites «subgenal appendices» (*Phil. Jour. Sci.*, XIII, Sect. D, p. 126, 1918), which name we have modified to *subgenae*.

² In the *Idiocorinae* there is no distinctly separated genal plate, this region being continuous with the dorsal surface of the head, and distinguished only by its peculiar granulate surface.

³ In our paper on the *Helotrepidae*, we omitted to state that the pro-coxal cavities in the *Idiocorinae* are open posteriorly (see fig. 1, *e*).

⁴ Stål in his description of the genus *Helotrepes* stated «tarsis omnibus dimeris», but in his figure, Pl. III, fig. 7, the tarsi are shown correctly, i. e. 1, 1, 2.

This subfamily may be divided into three distinct genera distinguishable as follows:

- 1 (2). Large rather dull species, 2.5-3 mm. Eyes comparatively smaller, less elongate. Rostrum extending well beyond the anterior coxae, the last segment very long and slender, twice as long as the third (fig. 7, *c*). Central curve of W-shaped suture separating head and pronotum, placed some distance behind a line drawn between posterior margins of eyes, not reaching within half the length of an eye from that line (fig. 6, *a-d*). Lateral margin of cephalonotum, seen in profile, curving some distance behind the lateral margin of the eye, not forming an angle at the eye (fig. 4, *a-f*). Propleuron truncate along interior margin (fig. 1, *a*). Fourth and fifth abdominal sternites without median tubercles. Parameres greatly unequal in length. Aedeagus long, narrow and tubular..... **Helotrephes** Stål.
- 2 (1). Small shining species less than 1.5 mm. Eyes larger, more elongate. Rostrum short robust, not extending beyond the anterior coxae, the last segment only slightly longer than third (fig. 9, *c*). Central curve of W-shaped suture separating head and pronotum at least reaching a line drawn between posterior margins of eyes (fig. 6, *e*). Propleuron angular interiorly (fig. 1, *b-c*). Parameres more nearly equal in length. Aedeagus short and broad..... 3
- 3 (4). Strongly convex seen in profile (fig. 4, *h*), dorsal surface almost glabrous; lateral margin of pronotum seen in profile, curving at and with the lateral margin of eye, not extending on to surface of eye; carinate but not dilated. Centre curve of cephalonotal suture just reaching a line drawn between posterior margins of eyes. Mesosternal carina small, slightly elevated (fig. 8, *e*). Costal margin of elytra simple. Fifth (actual) abdominal sternite with a median tubercle (fig. 8, *e*). Hind tarsus and claws together not longer than tibia. Pygofer in ♂ with the posterior ventral margin produced into a thick spur directed to the left (fig. 10, *b*). Aedeagus with the phallosoma laterally dilated on both sides, ejaculatory reservoir small. **Tiphotrephes** gen. nov.
- 4 (3). Only moderately convex seen in profile (fig. 4, *g*), dorsal surface with a long easily detachable depressed hair arising from each puncture. Lateral margin of pronotum strongly dilated into a laminate carina, which extends anteriorly on to the surface of the eye (fig. 4, *g*). Mesosternal carina, strongly elevated, as high as the pro- and metasternal carinae (fig. 8, *f*). Costal margins of elytra laminately reflexed. Fifth (actual) abdominal sternite without median tubercle (fig. 8, *f*). Hind tarsus and claws together much longer than tibia. Pygofer in ♂ without a spur (fig. 10, *c*). Aedeagus with the phallosoma not laterally dilated, ejaculatory reservoir large..... **Limnotrephes** gen. nov.

Genus *Helotrephes* Stål.

1895. Stål, Eugenie's Resa, *Zool.*, 1, Ins., p. 267.
 1904. Kirkaldy, *Wien. Ent. Zeit.*, xxiii, p. 129 and p. 135.
 1910. Distant, *Faun. Brit. Ind. Rhyn.*, v, p. 338.
 1918. Bergroth, *Phil. Journ. Sci.*, xiii, Sec. D, p. 126.
 1927. Esaki and China, *Trans. Ent. Soc. London*, 1927, part II, pp. 280-281.

Both sexes of same size, not less than 2,5 mm. in length. Body oval, broadest across base of cephalonotum, dorsally strongly convex (fig. 4, *a-f*), more or less globular, with a semi-glossy very finely punctate surface. In profile, semicircular in outline. Head and pronotum fused together into a single sclerite (cephalonotum), the head separated from pronotum dorsally by a W-shaped linear impression, the centre curve of which approaches a line drawn between the posterior margins of the eyes only within a distance equal to half the length of an eye (fig. 6). Eyes comparatively small, elliptical, imbedded dorso-laterally in the cephalonotum, not extending on to the ventral surface of head. Ocelli absent. Antennae placed on ventral side of head close to lateral margin in front of eyes, comparatively small, two-segmented, somewhat flattened, each segment distinctly longer than broad, the apical segment not articulated in a line with the axis of the first segment (fig. 7, *a-b*); more or less covered with long, curved, flattened hairs which are dilated in the middle, and with two long hairs at the apex. Rostrum four-jointed, moderately long, extending beyond the anterior coxae. First segment and part of second hidden by apex of clypeus, bucculae, and subgenae, third a little longer than second, very robust, fourth long and slender, about twice as long as third and with an apical labellum (fig. 7, *c*). Lateral margin of cephalonotum, seen in profile, curving some distance behind the lateral margin of eye thence running more or less parallel with the axis of eye, and not forming any distinct angle (fig. 4, *a-f*). Lateral plate, formed by fusion of genal plate and lateral pronotal plate, with a distinct sinuation on the internal margin opposite the eye (fig. 1, *a*). Propleuron truncate interiorly with a distinct ridge parallel with lateral margin (fig. 1, *a*); prosternum with a median laminate keel; mesopleuron very large, extending extero-posteriorly to the pleurite of the second abdominal

segment, more or less pointed apically; mesosternum represented by a median keel sometimes feebly elevated; meta-pleuron small, extending posteriorly and partly covering the second abdominal sternite;

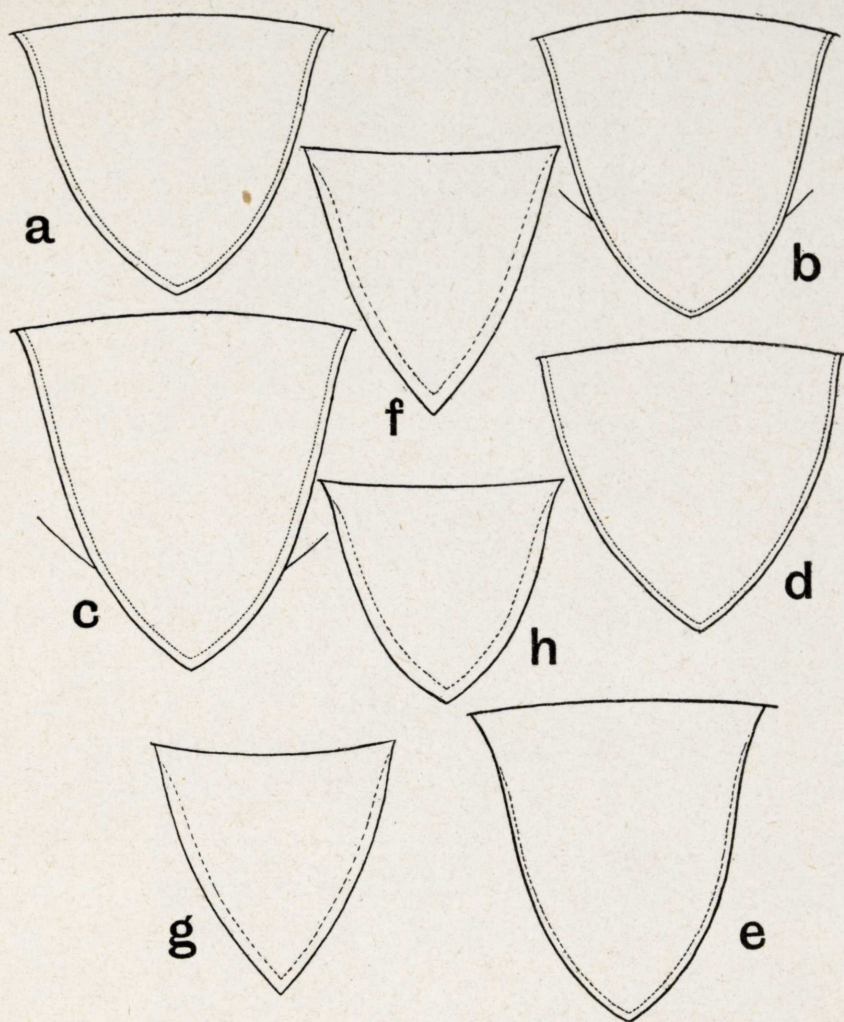


Fig. 2.—Scutellum in full view: *a*, *Helotrephes eremita*, Horv.; *b*, *Helotrephes kirkaldyi*, E. & C.; *c*, *Helotrephes bouvieri*, Kirk.; *d*, *Helotrephes martini*, Kirk.; *e*, *Helotrephes hungerfordi*, E. & C.; *f*, *Limnotrephes campbelli*, E. & C. (form with long scutellum); *g*, *Limnotrephes campbelli*, E. & C. (form with short scutellum); *h*, *Tiphotrephes indicus*, Dist.

metasternum represented by an elevated keel. Scutellum broad triangular, distinctly convex, the lateral margins convexly sinuate, and with a distinct marginal groove into which inner margins of elytra fit. Elytra well developed, covering the whole abdomen; finely but sparsely punctate, covered with very short hairs, which are longer towards the

apex, the costal margin with a row of minute short spines, extending the entire length; clavus sometimes fused with corium, in which case the wings are vestigial, sometimes separated by a distinct claval suture in which case a small triangular piece (the *clavulus*¹) at the base of the costal margin (fig. 4, *a*) is also separated by a distinct suture, and the wings are fully developed; when the claval suture is absent, the distinction between the *clavulus* and *corium* is usually obscure; no dis-

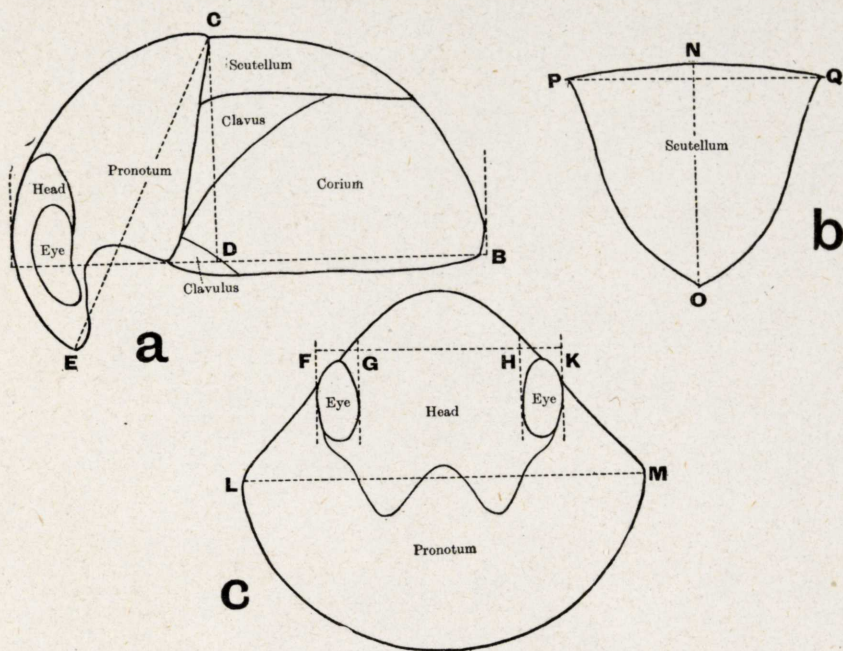


Fig. 3.—Diagrams to illustrate tables of measurements: *a*, *Helotrephes* in profile; *b*, cephalonotum viewed directly from above; *d*, scutellum.

tinct venation, membrane represented by an interlocking device. Legs ambulatory, similar to those of *Idiocoris*, but intermediate femur with a row of long bristles along the basal half of the interior margin, hind femur with two rows of very short spines; hind tibia and tarsus with two rows of long swimming hairs extending the whole length of tibia and tarsus. All tarsi with equal claws, and provided with a median elongate membranous pulvillus; that on the hind tarsus very short².

¹ This piece, which it is proposed to call the *clavulus*, is possibly homologous with the embolium of *Notonecta* and *Corixa*.

² In our description of *Idiocoris lithophilus*, p. 287, we omitted to describe the middle tarsal pulvillus, and did not state that the pulvillus of the hind tarsus was much shorter than in the other legs.

Abdomen with five visible segments, three modified genital segments and one anal segment; the second abdominal sternite almost divided into two lateral parts, provided in the middle with a median carinate process extending between the posterior coxae; the third sternite very short also with a carinate process which is curved backwards from the process of the second sternite (fig. 8, *a*).

Fourth and fifth sternites without processes. Genital segments in male similar in fundamental structure to those of *Idiocoris* E. & C., the ventral paramere much longer than the dorsal one, the aedeagus¹ very long and narrow, and barbed at apex (at least in *H. bouvieri*); ejaculatory reservoir very small. Genital segments in female apparently similar to those in *Idiocoris*, but owing to lack of material it has only been possible to examine single dried female specimens of the different species. The ♀ genital structure has therefore remained unknown.

Genotype: *Helotrephes semiglobosus* Stål².

Key to species.

- 1 (2). Scutellum longer than wide at base (fig. 2, *c*); claval suture present.. 3
 2 (1). Scutellum not longer than wide at base (fig. 2, *a*); claval suture absent..... 7
 3 (4). Apex of scutellum rounded (fig. 2, *b*); marginal groove³ narrow. Ceylon..... **H. kirkaldyi** sp. nov.
 4 (3). Apex of scutellum angular (fig. 2, *c* & *h*)..... 5
 5 (6). Prosternal carina angular posteriorly, mesosternal carina strongly elevated (fig. 8, *a*). Celebes..... **H. bouvieri** Kirk.
 6 (5). Prosternal carina rounded posteriorly, mesosternal carina feebly elevated (fig. 8, *g*). C. Africa..... **H. hungerfordi** sp. nov.

¹ The description of the aedeagus of *Helotrephes* in the footnote on page 292 of our previous paper actually refers to *Limnotrephes campbelli* sp. nov.

² The above generic description, although modified from that of Stål, is mainly based on *H. bouvieri* Kirk., and not on *H. semiglobosus* Stål, which, as has been pointed out, is not available. It is assumed that these species are congeneric. *H. bouvieri*, of which only males were available, was chosen because it was possible to make microscopic preparations of this species.

³ The marginal groove runs along the ventral side of the edge of the scutellum, but can be seen from the dorsal side through the semi-transparent chitin. Into the groove fit the margins of the hemielytra.

- 7 (8). Scutellum distinctly shorter than broad at base (fig. 2, *a*), lateral margins distinctly convex, at the base curving outwards. Madagascar **H. eremita** Horv.
- 8 (7). Scutellum equally long as broad at base (fig. 2, *d*); lateral margins less convex, straight at the base. 9
- 9(10). Lateral margin of cephalonotum behind the eye deeply sinuate (fig. 4, *e*). Sumatra and Philippines. **H. martini** Kirk. (= *H. balnearius* Bergr.)
- 10 (9). Lateral margin of cephalonotum behind the eye not deeply sinuate (fig. 4, *b*). Kwang-Tung Prov. China. **H. semiglobosus** Stål¹.

Table of Measurements of *Helotrepes* species.

Owing to the fact that measurements in this genus vary according to the point of view, a standard system of measurements has been adopted. For key to letters see fig. 3.

Very distinctive proportions are indicated in thicker type.

	IN PROFILE				Width of head across eyes	Width of vertex between eyes	Width across humeral angles	Length of scutellum . . .	Width of scutellum at base	Relative proportions of first and second segments of hind tarsus .
	Total length .	Length of Cephalonotum .	Height from Costa	Greatest length of Cephalonotum						
	AB	AD	CD	CE	FK	GH	LM	NO	PQ	T ₁ : T ₂
<i>H. martini</i>	78	35	34	59	38	25	56	32	32	22 : 20
<i>H. kirkaldyi</i>	75	27	32	54	36	22	52	35	32	21 : 20
<i>H. bouvieri</i>	82	27	37	60	41	26	58	42	38	25 : 20
<i>H. eremita</i>	70	28	34	51	38	25	50	30	33	16 : 16
<i>H. hungerfordi</i>	75	27	30	53	38	23	50	37	33	20 : 18

29 = 1 mm. (except in case of T₁ and T₂.)

¹ In separating this species it has been assumed that Stål's figures of *H. semiglobosus* (*Eug. Res. Ins.*, Pl. III, figs. 7 and 7, *b*) are accurate, especially the absence of a deep lateral sinuation of margin of cephalonotum seen in profile.

1. **Helotrephes semiglobosus** Stål (fig. 4, *b*).

1859. *Helotrephes semiglobosus* Stål, *Eugen. Resa, Zool. I, Ins.*, p. 268, Pl. III, figs. 7, 7, *b*.
 1904. *Helotrephes semiglobosus* Kirkaldy, *Wien. Ent. Zeit.*, xxiii, p. 129 and 135.
 1927. *Helotrephes semiglobosus* Esaki and China, *Trans. Ent. Soc. London*, 1927, part II, p. 281.

«Flavo testaceus, subtiliter punctatus, parce fusco-irroratus; maculis irregulari capitatis, posterioribus thoracis confluentibus, basi scutelli tegminorumque fuscis, his rarius et densius punctatis.

Long., 3; lat., 2,5 millim.

Patria: China (Wampoa).»

Type apparently in collection of Mr. Torre-Bueno.

This species is unknown to us except from the description (quoted above), and figures of Stål. To his specific description may be added the following characters taken from his figures which it has been assumed are accurate. Scutellum about as long as broad at base. Lateral margin of cephalonotum not deeply arcuately sinuate (fig. 4, *b*), as in other species of the genus.

Clavus and corium fused, claval suture absent.

Habitat: S. China, Kwang-Tung Province, Wampoa (between Macao and Canton).

2. **Helotrephes martini** Kirkaldy (figs. 2, *d*; 4, *e*; 6, *c*; 7, *b*; 8, *b*).

1904. *Helotrephes martini* Kirkaldy, *Wien. Ent. Zeit.*, xxiii, p. 130 and p. 135.
 1918. *Helotrephes balnearius* Bergroth, *Philipp. Journ. Sci.*, xiii, Sec. D., p. 125 (syn. nov.)
 1927. *Helotrephes martini* et *Helotrephes balnearius*, Esaki and China, *Trans. Ent. Soc. London*, 1927, part II, p. 281.

Colour: ♀. Dorsal surface pale yellowish brown marked with darker brown. Head dark brown with nine round spots arranged more or less distinctly in three rows of 2,5 and 2 respectively between the eyes (fig. 6, *c*), brownish yellow; eyes brownish yellow; rostrum dark

brown. Pronotum brownish yellow with a transverse dark brown band anteriorly more or less following the curve of the suture between

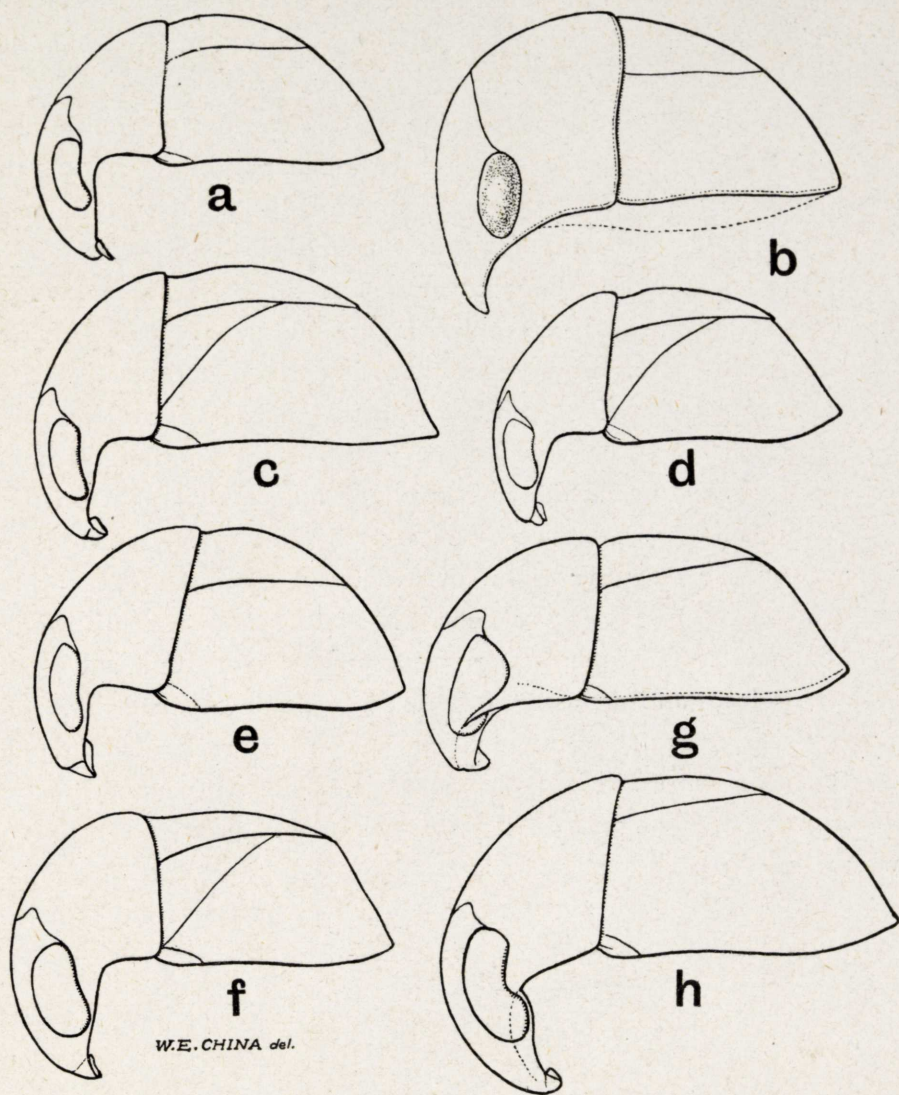


Fig. 4.—Profile views showing difference in shape of cephalonotum: *a*, *Helotrephes eremita*, Horv.; *b*, *H. semiglobosus*, Stål (after Stål); *c*, *H. bouwieri*, Kirk.; *d*, *H. kirkaldyi*, E. & C.; *e*, *H. martini*, Kirk.; *f*, *H. hungerfordi*, E. & C.; *g*, *Limnotrephes campbelli*, E. & C.; *h*, *Tiphotrephes indicus*, Dist.

the head and pronotum, and continuous with the dark brown base of the head, and with numerous dark brown spots irregularly placed on the posterior disc, except for a narrow band along posterior margin. Scutellum brownish yellow with obscure dark brown irrorations, ex-

cept for two round pale spots in basal angles, and a narrow dark brown transverse band along the basal margin. Sternum greyish brown. Elytra brownish yellow with obscure dark brown irrorations. Legs brownish yellow, coxae greyish brown, apices of femora, tibiae and tarsi darker brown. Venter greyish brown.

Structure: ♀. Seen in profile the lateral margin of pronotum and lateral margin of head with a respective inclination of about 90°, the actual angle between the two margins rounded (fig. 4, *e*). Basal segment of antenna short and thick, the extreme base constricted above point of articulation to form a collar at right angles to the main axis of the segment, one side of segment long and strongly convex. Second segment longer and broader than first, rounded apically, flattened, spatulate, the surface concave with the apical half covered with long curved flattened hairs which are widest in the middle and pointed apically (fig. 7, *b*); at the apex two long filiform divergent bristles. Scutellum as long as broad at base (70 : 70) (fig. 2, *d*). Claval suture absent, clavus fused with corium. Clavulus not separated from corium by a distinct suture. Wings absent. Median prosternal keel strongly elevated; seen from side rectangular posteriorly, very thin and semi-hyaline. Meso- and metasternal keels strongly elevated seen in profile somewhat irregular in outline; median keel of second abdominal sternite, seen in profile, very broad at base, apically acute, directed posteriorly. Median process of third abdominal sternite consisting of two parts, a broad apically rounded basal portion, directed posteriorly, and a smaller pointed spur-like portion projecting from the first (fig. 8, *b*). Right hand elytron with the costal margin towards the apex strongly dilated, forming a lobe-like projection as in females of *Idiocoris*, but rather less prominent.

Total length in profile, 2,68 mm.

Breadth across humeral angles, 1,93 mm.

Other measurements (fig. 3) see page 137.

Habitat: Sumatra, Palembang (Donckier, 1898). Mus. Paris. Philippines, Luzon, Los Baños (C. F. Baker). Mus. Washington.

The above description is based on the unique type female preserved in the National Museum of Natural History, Paris. This type was carefully compared with Bergroth's description of *H. balnearius*, and was found to be identical except for the more or less obscure markings

on the head. Bergroth's species has therefore been temporarily synonymised with that of Kirkaldy¹. Bergroth remarks upon the deep lateral sinuosity of the body (as seen in profile) in *H. balnearius*, but this is present in all species except *H. semiglobosus* (assuming that Stål's figure is correct). Bergroth also says «possibly more allied to *H. martini*» (than to *H. indicus* and *H. semiglobosus*).

3. **Helotrephes kirkaldyi** sp. nov. (figs. 2, *b*; 4, *d*; 6, *b*; 8, *c*).

Colour: ♀. Dorsal surface pale yellowish brown marked with darker brown. Head dark brown with the apex, a median stripe between the eyes, a small transverse spot at middle of cephalonotal suture, and five pairs of spots, three around the posterior and inner margins of the eyes, and two on the disc between the eyes on each side of the median stripe, brownish yellow (fig. 6, *b*); eyes dark brown; rostrum dark brown. Pronotum brownish yellow with a transverse dark brown band anteriorly, more or less following the curve of the cephalonotal suture, and continuous with the dark brown vertex, and with numerous brown spots on the disc, concentrated posteriorly; posterior margin narrowly pale. Scutellum brownish yellow with obscure dark brown, scattered irrorations, and with a broad dark brown transverse band across base. Sternum dark brown. Elytra brownish yellow with scattered rather fine dark brown irrorations and with a brown patch at the inner and apical angles of the clavus respectively, and over the clavulus. Legs brownish yellow, the coxae, trochanters, bases of femora, apices of tibiae, and of tarsi, dark brown. Venter dark brown.

Structure: ♀. Seen in profile, the lateral margin of pronotum and lateral margin of head with a respective inclination of about 130°, the actual angle between the two margins, rounded (fig. 4, *d*). Scutellum longer than broad at base, apex rounded, marginal groove very narrow (fig. 2, *b*). Claval suture present, clavulus distinctly separated from the corium by a suture. Wings present. Median prosternal keel moderately elevated; seen from side, obtuse-angular posteriorly. Me-

¹ Bergroth's type cannot be found in Helsingfors but may be in the Baker collection now being sent to Washington. (It has recently arrived in Washington, T. E.)

sosternal keel not strongly elevated. Metasternal keel, seen in profile, broad at base and obtusely rounded at apex. Median keel of second abdominal sternite seen in profile, with the apex acute directed posteriorly. Median process of third abdominal sternite laminate, very broad seen in profile posteriorly acute and serrated along margin (figura 8, c). Costal margin of right hand elytron without a lobe-like dilation.

Total length (in profile), 2,58 mm.

Breadth across humeral angles, 1,78 mm.

Other measurements (fig. 3) see page 137.

Habitat: Ceylon. 1 ♀ (Nietner).

Type in Zoological Museum, University of Berlin.

This species is respectfully dedicated to the late G. W. Kirkaldy, well known for his work on the aquatic Heteroptera.

4. *Helotrephes eremita* Horv. (figs. 2, a; 4, a; 6, d; 8, d).

1899. *Helotrephes eremita* Horváth, *Termész. Füzetek*, xxii, p. 268.

1899. *Helopephes eremita* Kirkaldy, *Ann. Soc. Ent. France*, lxviii, p. 108.

1904. *Helotrephes eremita* Kirkaldy, *Wien. Ent. Zeit.*, xxiii, p. 129.

1927. *Helotrephes eremita* Esaki and China, *Trans. Ent. Soc. Lond.*, 1927, part II, p. 281.

Colour: ♀. Dorsal surface pale yellowish brown with dark chocolate brown markings. Cephalonotum yellowish brown, the head with a broad median vitta at the apex and a thick V-shaped mark with its base resting on the middle of the cephalonotal suture, dark chocolate brown; each side of the V-shaped mark continued on to the pronotum and sweeping round along the suture until it reaches the posterior margin of the eye, thence turning posteriorly and interiorly to unite in the middle of the disc of the pronotum with the corresponding fascia (fig. 6, d). Disc posteriorly irrorated with dark brown, and with two dark brown spots, one in each posterior-lateral angle. Scutellum brownish yellow with obscure dark brown irrorations, an irregular transverse spot in the middle and a broad dark brown transverse band along the base. Sternum yellowish brown. Elytra brownish yellow with confused dark brown irrorations. Legs yellowish brown with coxae, trochanters, bases of femora, apices of tibiae and of tarsi dark brown. Venter yellowish brown, darker apically.

Structure: ♀. Seen in profile the lateral margin of pronotum and lateral margin of head with a respective inclination of 90° , the actual angle between the two margins broadly rounded (fig. 4, *a*). Subgenae strongly developed, very acute apically. Scutellum distinctly shorter than broad at base (30 : 33) (fig. 2, *a*); lateral margins distinctly convex, apex obtuse-angular. Claval suture absent, the clavus fused with corium. Clavulus more or less distinctly separated from corium by a carina not by a suture. Wings absent. Median prosternal keel strongly elevated, seen from side acute-angular posteriorly, very thin and semi-hyaline. Mesosternal keel small not visible in normal position. Metasternal keel, seen in profile, erect and truncate, the posterior angle acute, apical margin in the middle concave (fig. 8, *d*). Median keels of second and third abdominal sternites, broad and large of equal dimensions, apically acute and directed posteriorly. Right hand elytron without a costal dilation.

Total length, 2,41 mm.

Breadth across humeral angles, 1,72 mm.

Other measurements (fig. 3) see page 137.

Habitat: Madagascar, Baie d'Antongil (A. Mocquerys), Mus. Hung.

Although a search was made in the Museum at Budapest, no trace could be found of the type of Horváth's species ¹.

The above description is based on a specimen from the Fairmaire collection, collected by Perrier in Madagascar. This specimen which has been determined and labelled as *H. eremita* Horv. by some unknown person (probably Kirkaldy), agrees fairly well with Horváth's description, except for colour of cephalonotum.

5. **Helotrephes bouvieri** Kirk. (figs. 1, *a* & *d*; 2, *c*; 4, *c*; 5, *a*; 6, *a*; 7, *a* & *c*; 8, *a*; 10, *a* & *d*).

1904. *Helotrephes bouvieri* Kirkaldy, *Wien. Ent. Zeit.*, xxiii, p. 129.

1927. *Helotrephes bouvieri* Esaki and China, *Trans. Ent. Soc. Lond.*, 1927, part II, p. 281.

Colour: ♂. Dorsal surface pale yellowish brown marked with darker brown. Head dark brown, with the antero-lateral areas, and a

¹ It is possible that this type was borrowed by Kirkaldy. See footnote on page 129.

narrow irregular area behind each eye, paler (fig. 6, *a*); eyes and rostrum dark brown. Pronotum pale brownish yellow with a transverse dark brown band anteriorly more or less following the curve of the cephalonotal suture, and continuous with the dark brown head, and with the posterior disc irregularly clouded with brown. Scutellum brownish yellow with a broad transverse dark brown band along the basal margin extending down over the centre of the disc, in a triangular patch. Sternum brownish yellow. Elytra pale yellowish brown, more or less clouded with darker brown, the claval suture and the clavulus dark brown. Legs brownish yellow with apices of tibiae and of the tarsi brown. Venter brownish yellow.

Structure: ♂¹. Seen in profile, the lateral margin of pronotum and lateral margin of head with a respective inclination of about 110°, the actual angle between the two margins rounded (fig. 4, *c*). Rostrum long, reaching the intermediate coxae (fig. 7, *c*). Antenna with the first segment fusiform with a few scattered hairs; second segment longer than the first, distinctly flattened, trapezoidal with the shortest side at the base, and the longest parallel to the axis of the antenna; covered over apical two thirds with long strong curved pointed hairs, each with a median dilation, the apex with two very long filiform hairs which are longer than second segment (fig. 7, *a*); the two segments articulated by a very short cylindrical stalk, much narrower and less chitinised than the segments themselves. Scutellum much longer than broad at base (40 : 35) (fig. 2, *c*). Hemelytra very similar to those in *Idiocoris*, thick and leathery, strongly convex, finely punctate, a small hair arising from each puncture; a distinct claval suture present separating clavus from corium, and with an additional small plate, the clavulus, separated from the base of the costal margin of the corium by a distinct suture; costal margin with a continuous row of short spine-like bristles. Wings present, whitish hyaline, very broad with complicated folds, and several strongly chitinised longitudinal veins (fig. 1, *d*).

Median prosternal keel strongly elevated, semi-hyaline in profile, rectangular posteriorly. Meso- and meta-sternal keels strongly eleva-

¹ As several specimens were available it was possible to make microscopic dissections and consequently it has been possible to write a much fuller description of this species.

ted, semi-hyaline, seen in profile, more or less parallel sided, the sides sinuate the apices rounded and truncate, respectively (fig. 8, *a*).

Front legs longer than middle legs; the coxa more than twice as

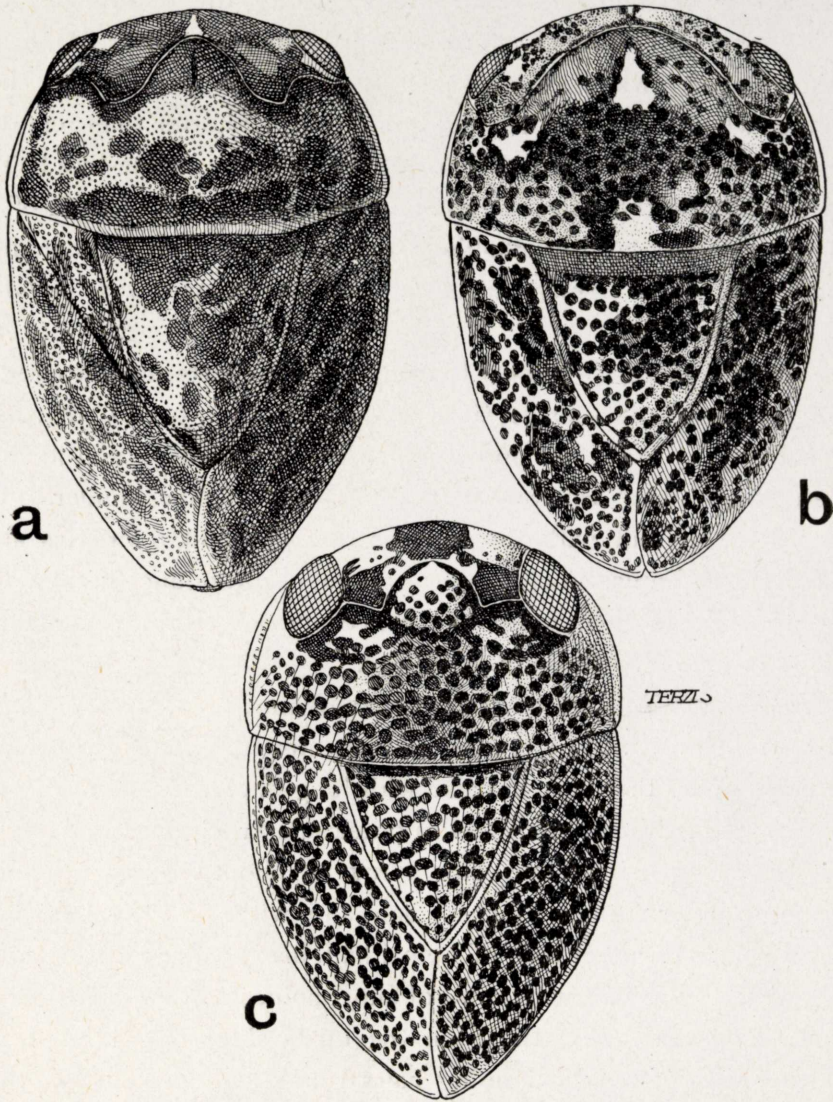


Fig. 5.—*a*, *Helotrephes bouvieri*, Kirk., Celebes; *b*, *Tiphotrephes indicus*, Dist., India, Burma and Malay Peninsula; *c*, *Limnotrephes campbelli*, E. & C., S. India; A. J. E. Terzi del.

long as broad, narrowed apically, the surface of the apical half covered with small round tubercles and short hooked hairs; trochanter similar in shape to that in *Idiocoris* with a row of short spines and a few comb-headed bristles; femur moderately incrassate, more than four

times as long as broad (9 : 2), armed along inner side with longitudinal irregular rows of short conical spines, long comb-headed bristles, and long pointed bristles (the latter especially long on basal half), and with a row of long depressed bristles along the outer side; tibia slightly shorter and much more slender than femur (78 : 81), armed with irregular rows of very stout spines, alternately long and short, some of which are comb-headed; tarsus a little shorter than one third the length of the tibia (26 : 85) armed with a row of spine-like bristles and comb-headed bristles; claws less than one third the length of tarsus, at their base with bristle-like arolia and a median slender membranous pulvillus. Apical structure of tarsus similar to that in *Idiocoris lithophilus*.

Intermediate legs: Similar to front legs but shorter and stouter; relative lengths of coxa, femur, tibia, tarsus and claws, 50 : 85 : 67 : 28 : 8 respectively; coxa shorter and stouter than in front leg, with identical tubercles and hairs; armature of trochanter and femur, similar to that in the front leg, but with the interior row of pointed bristles along basal half of femur, much longer and more pronounced; tibia with long stout spines down inner side, especially on the apical half; tarsus and claws similar to those of front legs.

Hind legs: Relative lengths of coxa, femur, tibia, tarsal segments and claws, 55 : 85 : 105 : 37 : 28 : 9, respectively. Coxa with tubercles and hairs as in other legs, but also with long depressed hairs over surface, the hooked hairs restricted to outer side; trochanter sparsely covered with long hairs; femur with a row of about ten long spine-like bristles on inner surface of basal half, and with an irregular row of shorter spines on inner side of apical half, also sparsely covered with long hairs; tibia armed with rows of short spines and long bristles (especially long near apex), those on the inner side comb-headed, also with two rows of long swimming hairs running the whole length of the tibia; tarsus armed with rows of short spines and with two rows of long swimming hairs; claws at base with bristle-like arolia, and with a very short median pulvillus.

Abdomen similar to that in *Idiocoris lithophilus*, with the spiracles in similar positions, but, with the exception of the second spiracle, which is placed on the lateral margin of the sternite, not opening laterally into the membrane between the pleurite and sternite; those of

the third to sixth segments placed more in the centre of the pleurite, seen ventrally: Second and third sternites very narrow in the middle

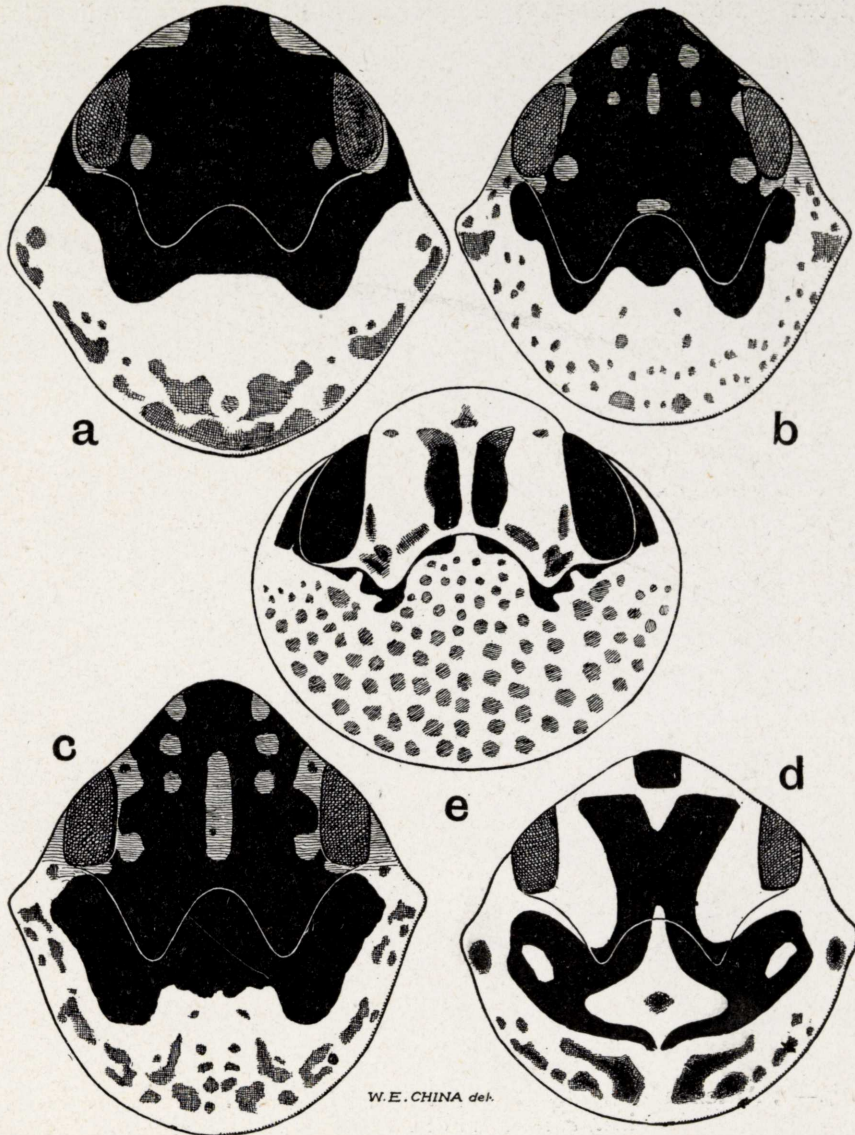


Fig. 6.—Diagrammatic view of cephalonotum to show shape of suture and colour pattern: a, *Helotrephes bouvieri*, Kirk.; b, *H. kirkaldyi*, E. & C.; c, *H. martini*, Kirk.; d, *H. eremita*, Horv.; e, *Limnotrephes campbelli*, E. & C.

provided with median processes extending between the hind coxae, the median process of the third sternite posteriorly produced over the fourth sternite; posterior margin of the sixth segment asymmetrically concave as in *Paskia minutissima*, but to a less extent; posterior mar-

gins of abdominal sternites in line with posterior margins of pleurites as in *Paskia minutissima*. Genital segments strongly asymmetric, and twisted to the left so that the normal dorsal median line lies along

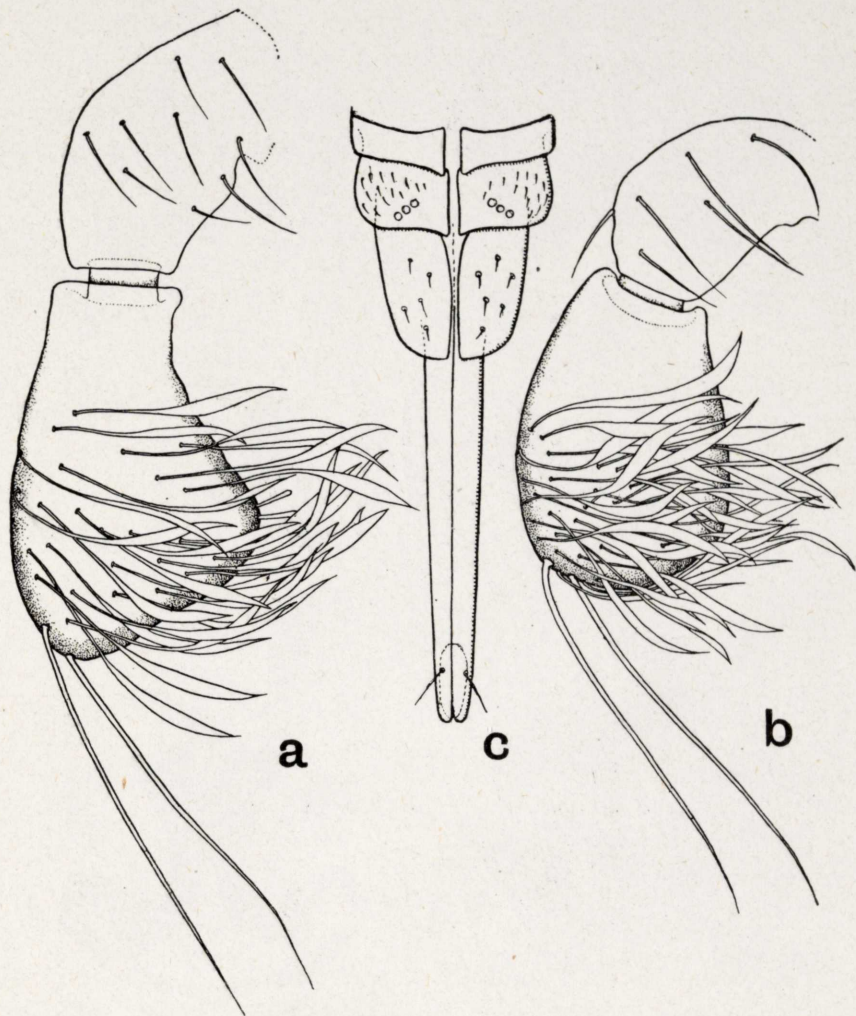


Fig. 7.—*a*, Antenna of *Helotrephes bouvieri*, Kirk.; *b*, antenna of *H. martini*, Kirk.; *c*, rostrum of *H. bouvieri*, Kirk.

the left side; seventh and eighth abdominal segments with peculiar foliate processes on dorsal (left) side, and posteriorly produced V-shaped processes of their posterior margins on the ventral (right) side, both these processes in each segment containing a spiracle (fig. 10, *a*). Ninth segment (pygofer) bearing genital armature, which consists as in *Idiocoris lithophilus* of a long pointed curved right hand (ventral)

paramere, strongly thickened at base, a shorter apically truncated left-hand (dorsal) paramere also swollen at base, and a long aedeagus between the parameres which is as long as the right hand paramere. The aedeagus differs from that in *Idiocoris* in several respects. It consists of a strongly chitinised hammer-headed phallosoma, the dorsal side of the hammer-head blunt, the ventral side acute and directed backwards along the line of the aedeagus to form a strong barb (fig. 10, *d*). The phallosoma mouth forms an irregular opening on the dorsal side towards the blunt apex, and the invaginable conjunctiva is strongly developed, but the vesica is apparently represented only by a very small chitinous rod. Position and structure of basal plates is very similar to that in *Idiocoris*.

Total length, 2,83 mm.

Breadth across humeral angles, 2,0 mm.

Other measurements (fig. 3) see page 137.

Habitat: Celebes, 4 ♂♂ and 2 unseen specimens of unknown sex (*De la Savinière*, 1877), Mus. Paris.

The above description is based on the type material preserved in the National Museum of Natural History, Paris.

6. *Helotrephes hungerfordi* sp. nov. (figs. 2, *e*; 4, *f*, and 8, *g*).

Colour: ♀. Dark ferruginous brown with yellowish spots and markings. Head dark brown with a pair of large obscure spots anterior to, but between the eyes, a small spot at the inner margin of each eye, and another small spot below the inner angle of each eye, deep yellow; eyes brown, rostrum reddish brown. Pronotum dark brown mottled with yellow, the mottling forming an irregular transverse band below the hind angles of the suture. Scutellum ferruginous brown, marbled with deep yellow, a broad transverse band at the base almost black. Sternum greyish brown. Elytra ferruginous brown regularly mottled with dark yellow, except along inner edge of clavus where there is a distinct dark brown spot. Legs deep yellow, the coxae, trochanters, bases of femora (especially hind femora) and of tibiae, and apices of tarsi, brown. Venter ferruginous brown.

Structure: ♀. Seen in profile the lateral margin of pronotum and lateral margin of head with a respective inclination of about 110° , the actual angle between the two margins rounded (fig. 4, *f*). Scutellum longer than broad at base, its apex angular (fig. 2, *e*), marginal groove moderately narrow. Claval suture present, clavulus distinctly separated from the corium by a suture. Wings present. Median prosternal keel strongly elevated, seen from side, broadly rounded posteriorly. Mesosternal keel feebly elevated. Metasternal keel, seen in profile, very broad and strongly elevated; apical margin irregular (fig. 8, *g*). Median keel of second abdominal sternite, with its anterior margin strongly sinuate, its apex more or less dentate. Median process of third abdominal sternite comparatively small, apically acute and posteriorly directed. Right hand elytra with the costal margin towards the apex, distinctly dilated into a slightly prominent lobe, similar to that in *H. martini*.

Total length (in profile), 2,58 mm.

Breadth across humeral angles, 1,72 mm.

Other measurements, see table on page 137.

Habitat: French Equatorial Africa, Ouibangui Chari, Dar Banda Meridionale, Krébedjé (Fort Sibut) (Dr. J. Decorse, Mission Chari-Tchad, November, 1904).

The above description is based on a unique type ♀ belonging to the National Museum of Natural History, Paris, and brought to our notice by Prof. H. B. Hungerford of Kansas University, well known for his work on the aquatic Heteroptera, to whom this species is respectfully dedicated.

Ovum of *H. hungerfordi*: Taken from abdomen of female.

Cylindrical, rounded at each end, two and a half times longer than broad, and provided with a moderately large circular lid placed slightly below and hinging at the apex of the egg, at which is a small thickened tubercle similar to, but less prominent than the micropylar process in the eggs of *Notonecta* and *Plea*. Surface reticulate and very finely shagreened, the reticulations larger around the circular lid.

Total length, 0,812 mm., breadth in middle, 0,312 mm.

Genus **Tiphotrephes** nov.

1910. *Helotrephes* Distant nec Stål, *Faun. Brit. Ind. Rhyn.*, v, p. 338, fig. 199.

1927. *Helotrephes* Esaki and China, *partim*, *Trans. Ent. Soc. London*, 1927, part II, pp. 280-281.

Both sexes of same size, less than 1,5 mm. in length. Body oval, broadest across base of cephalonotum, dorsally strongly convex, but not quite so globular as *Helotrephes* with a very shiny, finely punctate surface. In profile semicircular in outline. Head and pronotum fused together into a single sclerite (cephalonotum), the head separated from pronotum dorsally by a W-shaped linear impression, the central curve of which reaches a line drawn between the posterior margins of the eyes, and the posterior angles of which are obtuse. Eyes comparatively large and elongate, imbedded dorso-laterally in the cephalonotum, not extending on to the ventral surface of the head. Ocelli absent. Antennae placed on ventral side of head close to lateral margin in front of eyes; comparatively large, two-segmented, somewhat flattened, each segment more or less broadly oval in shape, and covered with long hairs, the second segment not articulated in line with the axis of first segment, its apex with several very long hairs. Rostrum four segmented, very short and robust, conical, not extending beyond the anterior coxae, the last segment only slightly longer than third, with an apical labellum (fig. 9, *c*). Lateral margin of cephalonotum, seen in profile, curving at and with the lateral margin of the eye, forming a more or less acute angle at the eye (fig. 4, *h*). Lateral plate formed by fusion of genal plate and lateral pronotal plate, without a distinct sinuation on the internal margin opposite the eye. Area between genal plate and lateral ridge of head, narrow. Propleuron interiorly acute angular (fig. 1, *b*). Prosternum with a median laminate keel; mesopleuron large extending extero-posteriorly to the pleurite of the second abdominal segment, distinctly pointed apically; mesosternum represented by a shallow median keel; meta-pleuron small, extending posteriorly and partly covering the second abdominal sternite; metasternum represented by an elevated keel. Scutellum as long as broad, triangular, distinctly convex, the lateral margins more or less convex, with a distinct groove into which inner

margins of elytra fit. Elytra well developed, covering the whole abdomen, finely but sparsely punctate, covered with very short hairs arising from the punctures, the costal margin without the row of minute short spines found in *Helotrephes*; clavus sometimes fused with corium, in which case wings are vestigial, sometimes separated by a distinct claval suture in which case a small triangular piece (the clavulus) at the base of the costal margin is also separated by a distinct

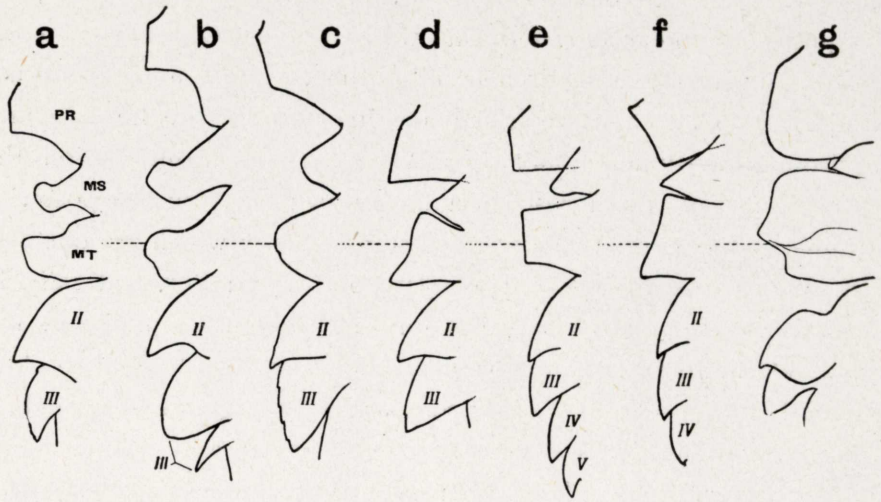


Fig. 8.—Lateral view of median sternal and ventral carinae: a, *Helotrephes bouvieri*, Kirk.; b, *H. martini*, Kirk.; c, *H. kirkaldyi*, E. & C.; d, *H. eremita*, Horv.; e, *Tiphotrephes indicus*, Dist.; f, *Limnotrephes campbelli*, E. & C.; g, *Helotrephes hungerfordi*, E. & C.

suture, and the wings are fully developed; no distinct venation. Membrane represented by an interlocking device. Legs ambulatory, similar to those of *Helotrephes*, but with the row of bristles on the middle femur much more robust, resembling those in *Idiocoris*. Abdomen similar to that in *Helotrephes*, but the fourth and fifth sternites with tubercle-like median processes. Male genitalia on same plan as in *Helotrephes*, but differing in the shape and size of the aedeagus and parameres, the ventral paramere only slightly longer than the dorsal one, the aedeagus short and broad. Phallosoma laterally dilated into a transparent keel of irregular outline, its mouth small; ejaculatory reservoir small. Female genitalia very similar to those in *Idiocoris*.

Genotype: *Helotrephes indicus* Distant.

1. **Tiphotrephes indicus** Dist. (figs. 1, *b*; 2, *h*; 4, *h*; 5, *b*; 8, *e*; 9, *a*; 10, *be*; 11, *b*; 12, *a*).

1910. *Helotrephes indicus* Distant, *Faun. Brit. Ind. Rhyn.*, v, p. 338, fig. 199¹.

1927. *Helotrephes indicus* Esaki and China, *Trans. Ent. Soc. London*, part II, p. 281, fig. 1 *a, b* and *c*.

Colour: ♂ and ♀. Brilliantly shining. Pale yellow more or less regularly covered with small dark brown spots which are obsolete or absent on the head and along the lateral margins of pronotum beneath the eyes. A small elongate spot on each side of anterior margin of head, disc of pronotum, a narrow transverse band across base of scutellum, and various obscure irrorations on elytra and scutellum, dark brown. Five more or less distinct white spots², one along the inner margin of each eye, one in the centre of the anterior margin of pronotum, and one on each side of it below the eyes, all three spots placed along anterior margin of the dark brown area of the disc. Eyes black, rostrum dark brown. Pleura and legs pale yellow, the apices of tibiae and of tarsi, the claws, and sometimes the coxae, dark brown.

Venter dark brown with the pleurites pale yellow.

Structure: ♂ and ♀. Central curve of cephalonotal suture reaching a line drawn between posterior margins of eyes; the posterior angles of the suture obtuse. Lateral margin of pronotum carinate, but the carina not lamellate, and not extending on to the surface of the eye, seen in profile, forming a distinct angle (at the middle of eye) with the lateral margin of the head (fig. 4, *h*). Rostrum conical, ex-

¹ This figure comprised a pictorial representation and a lateral view in outline. These are both very inaccurate. The first is drawn from a broken specimen, so that the insect is given a *Plea*-like appearance, and the suture between the head and pronotum is also inaccurate. The second is apparently a bad copy of Stål's figure of *Helotrephes semiglobosus*, at any rate it does not represent *H. indicus* Dist.

² These spots, which are due to some opaque substance beneath the semi-transparent chitin of the cephalonotum, are very distinct in the specimens from the Malay Peninsula, but are sometimes almost obliterated in the Rangoon and Belgaum specimens.

tending to anterior coxae (fig. 9, *c*). Antenna with the first segment thickened, short, about one and a half times as long as broad, with a few scattered hairs, second segment oval, distinctly flattened with the lower surface distinctly concave, with numerous long bristle-like hairs, becoming longer and more dense near the apex; much larger than

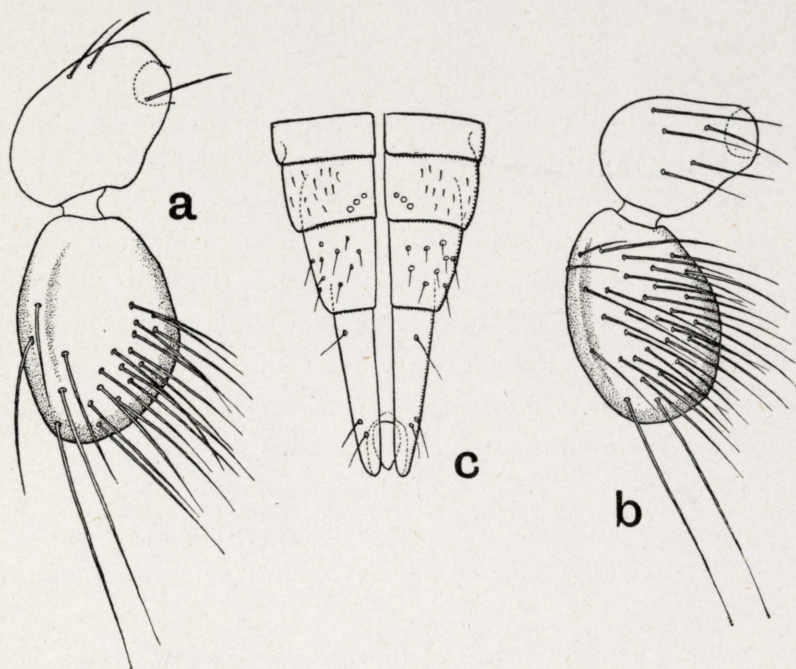


Fig. 9.—*a*, Antenna of *Tiphotrephes indicus*, Dist.; *b*, antenna of *Limnotrephes campbelli*, E. & C.; *c*, rostrum of *Tiphotrephes indicus*, Dist.

first segment, and connected to it a little below the apex by a small membranous annular articulation, both segments thus forming an obtuse angle (fig. 9, *a*). Scutellum (fig. 2, *h*) about as long as broad (31 : 32). Hemielytra very similar to those in *Helotrephes*, but costal margin without a row of short spines. Clavus sometimes separated from corium by a distinct suture, in which case wings are normal. Sometimes fused with corium, in which case wings are greatly reduced, and are represented by a membranous pad.

Wings, when present, whitish hyaline, venation as in *Helotrephes*. Clavulus small and narrow. Median prosternal keel strongly elevated, hyaline, posteriorly rectangular seen in profile, anteriorly obtuse. Mesosternal keel small as in *H. eremita*, forming a double fold

enclosing the prosternal keel. Metasternal keel elevated to level of the prosternal keel, rectangular seen in profile, its apex truncate (fig. 8, e).

Front legs: Front legs more slender than middle legs, the coxa more than twice as long as broad, sparsely covered with long curved hairs, and minute tubercles; trochanter with a row of three short spines and a few comb-headed bristles, base covered with hairs; femur about four times as long as broad (30 : 8), armed along inner side with a few short conical spines, and several long bristles, and with a row of long depressed bristles along the outer side; tibia distinctly shorter than the femur (24 : 30), irregularly armed along inner side with short spines, long bristles and comb-headed bristles; tarsus a little less than one half the length of the tibia (11 : 24), armed along inner side with spines and bristles; claws about half the length of tarsus (5 : 11), at their base with bristle-like arolia and a median slender membranous pulvillus, extending half the length of claws.

Intermediate legs: Similar to front-legs, but shorter and more robust; coxa more robust than in front legs, twice as long as broad, covered with long curved hairs, tuberculation obsolete; trochanter and femur similar to those in front leg, the femur more than three times as long as broad (31 : 9), armed along inner side with two rows of bristles, those of the posterior row the longest, and the bristles towards base longest in each case; on the upper side armed with a row of short conical spines; tibia with long stout spines down inner side, especially on apical half; tarsus and claws with pulvillus similar to those of front legs.

Hind legs: Coxa nearly twice as long as broad; covered with short hooked hairs and tubercles; trochanter similar to that of middle leg; femur about four times as long as broad (30 : 8), armed along inner side with an irregular row of bristles; tibia armed along inner side with rows of spines and bristles, some of which are comb-headed, also with two rows of long swimming hairs; running the whole length of the tibia; tarsus armed with rows of spines and bristles and with two rows of long swimming hairs; claws at base with bristle-like arolia, but pulvillus apparently absent.

Relative measurements ¹.

	Coxa	Troch.	Femur	Tibia	Tars	Claw
Front legs.....	20	10	30	24	11	5
Middle legs....	20	12	31	22	11	6
Hind legs.....	22	13	30	30	12, 11	5

Abdomen similar to that in *Idiocoris lithophilus*, with the spiracles in similar positions, that of the first segment, very large. Second and third sternites almost divided into two halves, but each with a median laminate process which is posteriorly produced, the two processes more or less fused into one thorn-like structure, seen in profile; fourth and fifth sternites each with a median elevated process, that of the fourth longer than that of the fifth, and posteriorly produced above it (fig. 8, *e*). Posterior margin of sixth sternite in male, slightly asymmetrically concave, the right hand pleurite much longer than left hand one. Posterior margins of sternites in line with posterior margins of pleurites. Male genital segments twisted to the left as in *Idiocoris*, the seventh and eighth segments with the peculiar laminate lobes on dorsal (left) side, and posteriorly directed, V-shaped processes of their posterior margins on the ventral (right) side, both these processes in each segment bearing a spiracle (fig. 11, *b*). Ninth segment in male (pygofer) with the posterior ventral margin produced into a thick spur directed towards the left (fig. 10, *b*). Left hand dorsal paramere distinctly shorter than aedeagus, more or less truncated at apex; right hand ventral paramere distinctly longer than aedeagus, strongly dilated at base, sinuate and pointed at apex. Aedeagus short and thick; phallosoma bottle-shaped, broad towards base, dilated on each side into a semi-transparent lamination of irregular outline (fig. 10, *e*); its mouth apical; the vesica more or less obsolete. Female genitalia similar to those in *Idiocoris*, but the seventh sterni-

¹ In divisions of micrometer eye-piece.

te¹ split into three lobes, a large tongue-shaped middle lobe and two smaller, shorter lateral lobes (see fig. 11, *b*).

Total length (♂ & ♀), 1,25 mm.; width across humeral angles (♂ & ♀), 0,87 mm.

Measurements:

(For key to measurements see fig. 3 and p. 137).

AB	AD	CD	CE	FK	GH	LM	NO	PQ	T ₁ :T ₂
80	33	34	57	46	27	56	31	32	18:16

64 = 1 mm. except for T₁ and T₂

Larva. Presumably of last instar (fig. 12, *a*).

Colour: Pale whitish yellow, sparsely covered with small brown spots. Rostrum brown, eyes pale in dried specimen. Legs whitish yellow, the apices of tarsi and claws brown, venter pale brown.

Structure: Head and pronotum fused as in imago, but the suture between them extending between inner posterior angles of the eyes in an almost straight line only slightly anteriorly sinuate in middle².

Angle formed by lateral margin of pronotum, at the eye, very acute, the eye appearing to extend on to ventral surface of head. Lateral plate of cephalonotum broad as in *Idiocoris*, subgenal plate large. Rostrum four segmented. Antennae represented by a single oval plate as in *Idiocoris*, covered with stout setae and with the curious circular structure typical of *Idiocoris* placed near the anterior margin. Pro-, meso- and metasterna very broad, the coxae widely separated, the median carinae, represented by tubercles. Legs shorter and more robust than in imago, all tarsi with a single segment.

Armature of anterior leg similar to that of imago, but with fewer

¹ In the figure of *Idiocoris lithophilus*, female genital segments, ventral view (*Trans. Ent. Soc. Lond.*, 1927, p. 290, fig. 9, *a*), the segments are wrongly numbered. VII, VIII, and IX should read VI, VII, and VIII respectively. In fig. 9, *c*. (*Paskia minutissima*) the spiracles of the VIIth and VIIIth pleurites have been omitted.

² In larva of earlier instar this median situation is absent, and the suture is slightly anteriorly curved throughout.

spines on the inner side of femur; pulvillus and arolia present. Middle leg similar to that of imago, but coxa with tubercles as in front leg,

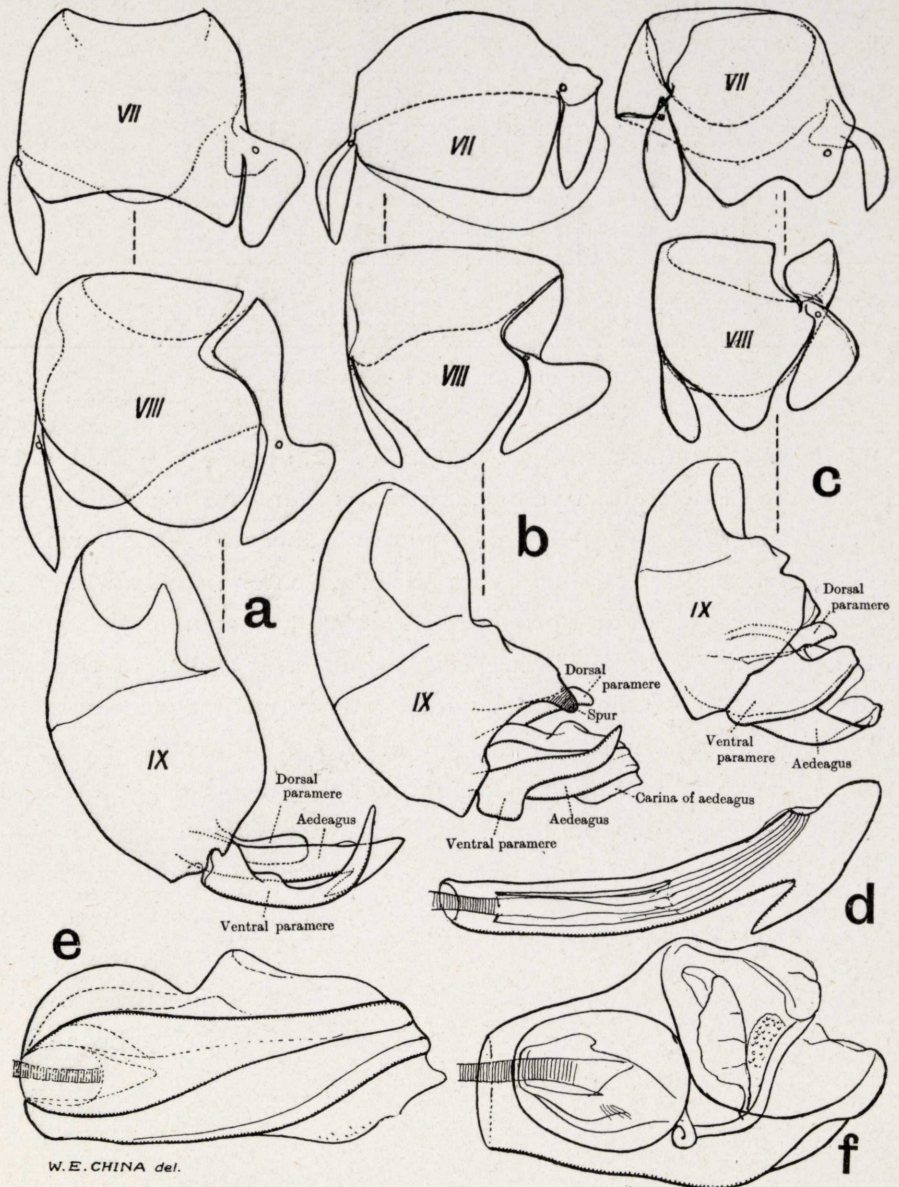


Fig. 10.—Ventral view of asymmetrical genital segments, showing modified pleurites and twisted pygofer with genitalia: a, *Helotrephes bouvieri*, Kirk.; b, *Tiphotrephes indicus*, Dist.; c, *Limnotrephes campbelli*, E. & C. Lateral view of aedeagus: d, *H. bouvieri*, Kirk.; e, *T. indicus*, Dist.; f, *L. campbelli*, E. & C.

and with numerous long hairs; trochanter with four or five stout conical spines on outer margin, femur also with several conical tubercles

near base, and with stout spines as in *Idiocoris*. Pulvillus and arolia present. Hind leg: coxa with tubercles and long hairs; trochanter also with long hairs; femur at base, and along inner side, with a few bristles; tibia and tarsus armed along inner side with bristles and spines, and with two rows of long swimming hairs; tarsus with a single segment; claws moderately long with a very short median pulvillus at their base.

Relative measurements:

	Coxa.	Trochanter.	Femur.	Tibia.	Tarsus.	Claws.
Front leg.....	19	11	26	21	11	5
Middle leg.....	19	14	25	17	10	4
Hind leg.....	21	15	27	25	23	7

Segmentation of abdomen obscure, the pleurites fused with one another (except 2 and 3) and with the sternites. First segment greatly reduced, but with very large spiracle. Posterior margin of third (2nd apparent) tergite with a single slit-like opening of the dorsal gland. Lateral area of 4th, 5th and 6th (3rd-5th apparent) tergites covered with coarse granulations. Median processes of second and third sternites separated, not joined as in adult, fourth sternite with median tubercle, fifth without such a process.

Total length of larva, 1,12 mm. Humeral width, 0,81 mm.

Habitat ¹: Burma, Rangoon; Type ♂ and 5 ♂ paratypes, «muddy pond», 26-XI-1908 (N. Annandale).

Malay Peninsula, Selangor, Kuala Lumpur, Setapak Ponds, 3 ♂♂, 1 ♀, and two larvae, 30-VI, 30-VII, 12, 18 and 24-VIII, 1926 (C. Dover). Selangor, Pond near Ampang Water Works, 1 larva, 29-VIII-1926 (C. Dover).

India, Bombay Province, Belgaum N. 4 ♂♂ and 2 ♀♀ (H. E. Andrewes).

The specimens from Burma and Malay Peninsula have the claval suture absent, and the hind wings vestigial; those from India have the claval suture present and hind wings fully developed.

¹ Distant included Calcutta, based on a larval specimen of *Plea pallescens* found in a Museum tank at Calcutta, 14-VIII-1906, which he wrongly determined as *Helotrephes indicus*.

Genus *Limnotrephes* nov.

Both sexes varying in size to a slight extent, less than 1,5 mm. in length. Body elliptical seen from above, somewhat pointed posteriorly, lateral margins of pronotum parallel; seen in profile much less convex than *Tiphotrephes* (fig. 4, *g*), intermediate in shape between *Tiphotrephes* and *Idiocoris*; surface very shiny, finely punctate, each puncture giving rise to a long depressed hair. Cephalonotal suture with the central curve extending in front of a line drawn between posterior margins of eyes (fig. 6, *e*) its posterior angles acute, eyes, rostrum and antennae similar to those in *Tiphotrephes*. Lateral margin of pronotum strongly elevated in a laminate carina which extends on to the surface of the eye (fig. 4, *g*). Lateral pronotal plate, below the carina, very broad, without a distinct sinuation on the internal margin opposite eye, genal plate very narrow; propleuron interiorly acute-angular; area between genal plate and lateral ridge of head very broad, about one fourth the area of the eye extending ventrally on to this area (fig. 1, *c*). Mesosternal keel much more strongly elevated than in *Tiphotrephes*, reaching the same level as those of the pro- and metasterna.

Scutellum as long or longer than broad (fig. 2, *f* & *g*). Elytra as in *Tiphotrephes*, but the punctures with long hairs, and costal margins laminately reflexed. Legs similar to those in *Tiphotrephes*, but longer with spines on intermediate femora shorter and stouter, claws longer; hind tarsus and claws together longer than tibia.

Fifth abdominal sternite without a median tubercle. Posterior ventral margin of pygofer in male not produced into a strong spur (fig. 10, *c*), otherwise genital segments similar to those in *Tiphotrephes*, but the phallosoma short and thick, apically pointed, without lateral laminations, the phallosoma mouth large, opening dorsally, ejaculatory reservoir large and spherical; vesica and conjunctiva not well differentiated. Female genitalia as in *Tiphotrephes*, with the seventh sternite differently shaped.

Genotype: *Limnotrephes campbelli* sp. nov.

1. **Limnotrephes campbelli** sp. nov. (figs. 1, *c*; 2, *f* & *g*; 4, *g*; 5, *c*; 6, *e*; 8, *f*; 9, *b*; 10, *c* & *f*; 11, *a*; 12, *b*).

Colour: ♂ and ♀. Brilliantly shining, sparsely covered with minute punctures bearing long stout depressed hairs. Pale yellow, more or less regularly covered with small dark brown spots which surround the punctures. Head pale yellow, disc with a median V-shaped mark with transverse lateral branches in front and behind (sometimes more or less obliterated), and with two spots placed one above the other between the V-shaped mark, and the apex of head, dark brown (fig. 6, *e*); eyes black; rostrum dark brown. Pronotum pale yellow, irregularly margined anteriorly along the suture, with dark brown and scattered with dark brown spots except laterally beneath the eyes. Scutellum pale yellow, with brown spots, the latter obsolete along basal margin; sometimes a dark brown transverse band exposed at base by shrinking of cephalonotum. Pleura pale yellow. Hemielytra pale yellow scattered with dark brown spots except along costal margin, the extreme base and the interlocking area of left elytron dark brown. Legs pale yellow with coxae, apices of tibiae and of tarsi and claws brown. Venter brown.

Structure: ♂ & ♀. Cephalonotal suture slightly variable in shape, with the central curve very broad, anteriorly reaching to about one fifth of the length of an eye in front of a line drawn between the posterior margins of eyes (fig. 6, *e*); the curves acute, the outer branches more or less parallel to the inner margins of eyes. Eyes large, anteriorly extending ventrally on to area between lateral ridge of head and genal plate (fig. 1, *c*), so that seen dorsally the eye appears much narrowed anteriorly; posterior margins truncate. Antenna similar to that in *Tiphotrephes indicus*, but the first segment smaller, the second articulated well below apex of first, so that the axes of the two segments form an acute angle; first segment small (18 : 12) covered with bristles, second segment larger, oval (24 : 17) with lower surface concave, covered with long bristles (fig. 9, *b*). Rostrum conical extending to anterior coxae. Lateral margin of pronotum dilated into a reflexed laminate carina extending on to surface of eye. Scutellum slightly variable in breadth, sometimes as long as broad, sometimes distinctly

longer than broad (fig. 2, *f* & *g*). Hemielytra with costal margin strongly dilated, and reflexed, without the marginal row of short spines present in *Helotrephes*. Clavus and clavulus fused with corium, claval suture absent. Wings vestigial, represented by a small membranous lobe. Median prosternal keel strongly elevated, hyaline, posteriorly rectangular (seen in profile), anteriorly acute. Mesosternal keel stron-

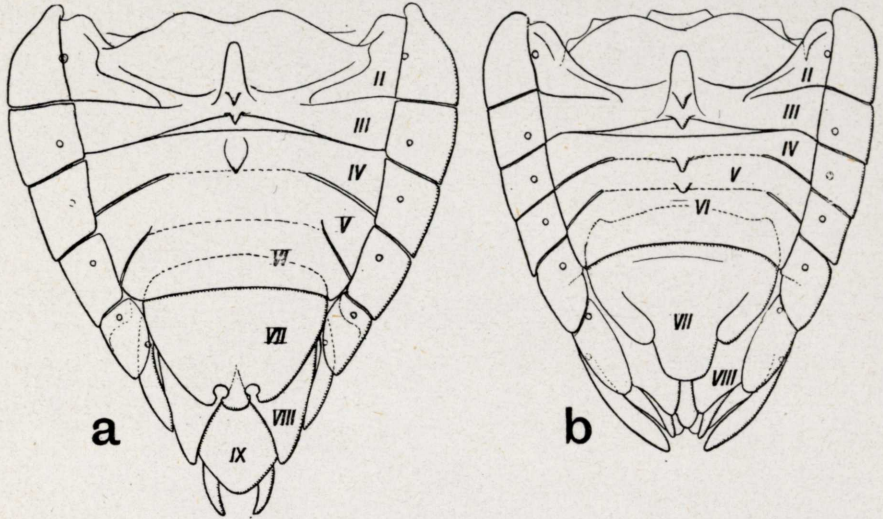


Fig. 11.—Ventral view of female abdomen of: *a*, *Limnotrephes campbelli*, E. & C.; *b*, *Tiphotrephes indicus*, Dist. showing difference in shape of VIIth abdominal sternite.

gly elevated, reaching slightly above posterior level of prosternal keel, seen in profile, strongly angular at apex, anteriorly enfolding the prosternal keel. Metasternal keel very well developed, posteriorly elevated above the level of the prosternal keel (seen in profile), anteriorly acute, posteriorly rectangular (fig. 8, *f*). Armature of legs similar to that in *Tiphotrephes indicus*, but the intermediate femur with the row of spines along basal two thirds of inner side, very stout and curved. Hind tarsi and claws much longer than hind tibia.

Relative measurements:

	Coxa.	Trochanter.	Femur.	Tibia.	Tarsus.	Claws.
Front leg	20	11	32	24	12	7
Middle leg	20	12	33	20	12	7
Hind leg	25	15	33	36	17 + 19	12

Abdomen resembling that in *Tiphotrephes indicus*, but without a median tubercle on the fifth abdominal sternite. Venter covered with longer hairs than in *T. indicus*. Male genital segments similar in general plan to those of *Tiphotrephes*, but the pygofer without a spur and aedeagus very different in shape (fig. 10, c). Aedeagus similar to that in *Idiocoris lithophilus*, but shorter; pointed apically, with the mouth opening dorsally well below the apex. Endosoma not differentiated into vesica and conjunctiva, but forming a sac at the mouth of the phallosoma into the middle of which the ejaculatory duct opens; ejaculatory duct twisted and then swollen near base into a large spherical chitinised ejaculatory reservoir (fig. 10, f). Right hand (ventral) paramere very broad at base, concave on one side, truncated at apex. Left hand (dorsal) paramere, narrow, sinuate. Female genital segments similar in general plan to those of *Tiphotrephes indicus*, but the seventh sternite with its posterior margin in the form of a parabola directed posteriorly, with two circular holes close to apical margin on each side, both connected to margin by a narrow channel, thus forming a very striking pattern (fig. 11, a).

Total length: ♂, 1,31 mm.; ♀, 1,40-1,48 mm.

Width across humeral angles ♂, 0,93 mm.; ♀, 0,95 mm.

Table of measurements (see fig. 3, p. 137) ♀.

AB	AD	CD	CE	FK	GH	LM	NO	PQ	T ₁ : T ₂
94	40	35	61	47	28	63	35	33	26 : 22

64 = 1 mm. except for T₁ and T₂

In some specimens the scutellum is comparatively narrow. For instance in one male, *NO : PQ* is 34 : 28, instead of 35 : 33.

Larva. Presumably of last instar (fig. 12, b).

Colour: Pale yellow, with brown markings; brown markings of head similar to those in imago, otherwise dorsal surface with irregular but symmetrical brown suffusions. Eyes black, rostrum brown, legs yellow with coxae, apices of tibiae and of tarsi, brownish. Claws brown. Sternum and venter brown.

Structure: Very similar in structure to larva of *Tiphotrephes indicus*, but differing in the following characters. Rostrum longer extending beyond posterior margin of prosternum; pronotal dilations much broader. Fourth, fifth and sixth sternites and pleurites more or less fused together (in *Tiphotrephes* only the pleurites are fused). Median

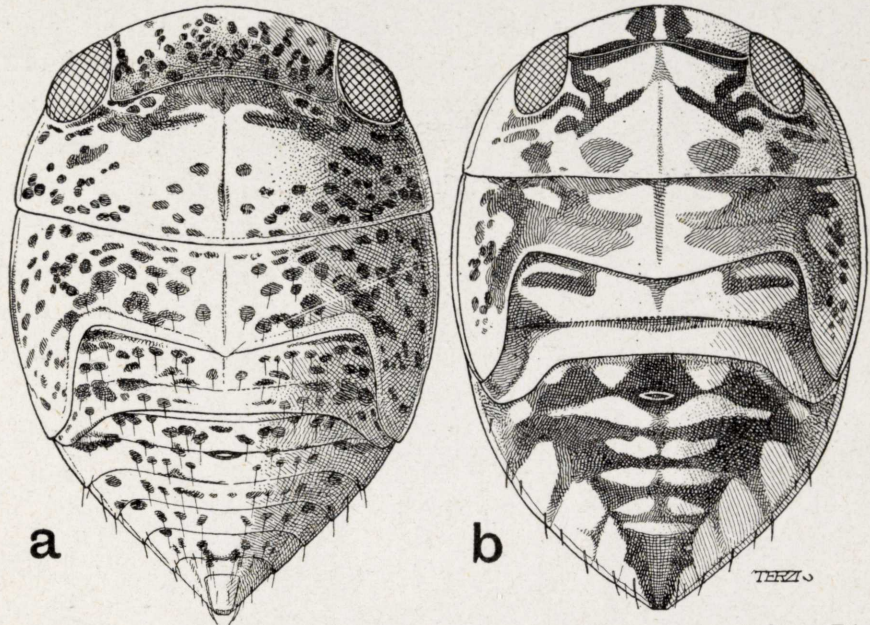


Fig. 12.—Larva of apparently the last instar of: a, *Tiphotrephes indicus*, Dist. b, *Limnotrephes campbelli*, E. & C.; A. J. E. Terzi, del.

abdominal processes the same as in imago in number and position, whereas in *T. indicus* the tubercle of the fifth sternite which is present in the imago is absent in the larva. Hind claws longer than in *T. indicus*.

Relative measurements of legs of larva:

	Coxa.	Trochanter.	Femur.	Tibia.	Tarsus.	Claws.
Front leg.....	18	11	28	20	12	6
Middle leg.....	20	15	28	18	12	6
Hind leg.....	21	17	30	30	30	11

Habitat: S. India, Mysore Prov., Nandidrug Hill, 4,500 feet; Type ♂ and numerous ♂ and ♀ paratypes. (T. V. Campbell). Dr. Campbell writes:

«This *Helotrephes*! I took in a large fresh water tank which I think was constructed in the hill by Tipoo Sultan. The tank is square 100 to 120 feet each side. Stone steps all round lead down to the water which is 10 to 12 feet below the ground level surface. The water is

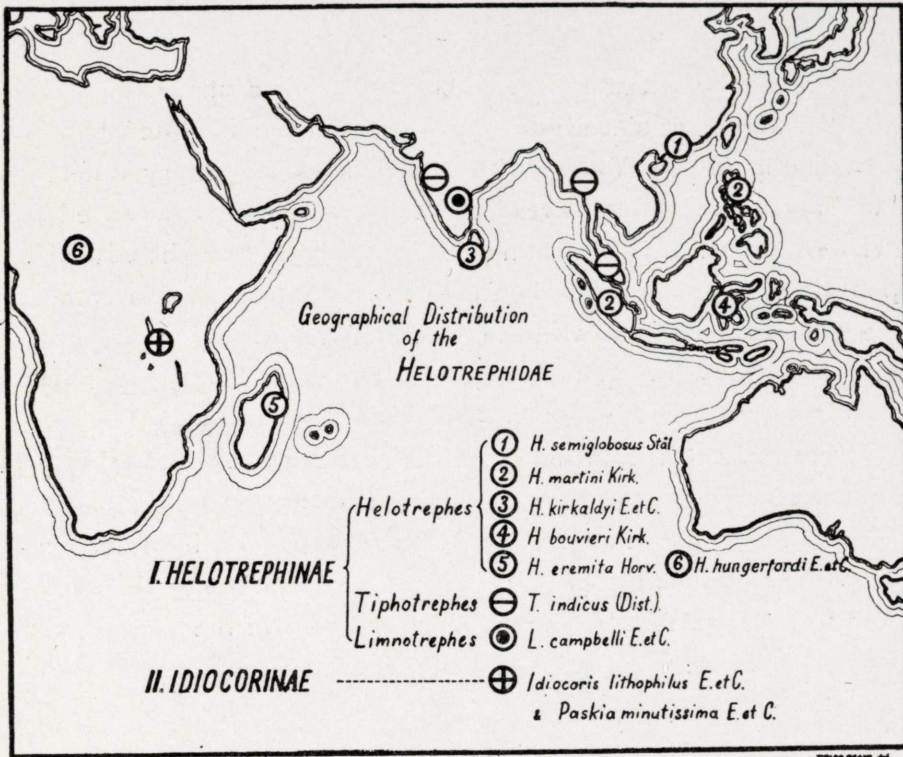


Fig. 13.—Map showing distribution of the *Helotrephidae*.

used for drinking purposes, and varies in depth with the season of the year 5-6 ft. in dry weather, and 10 to 12 feet in wet season. The little bugs I caught with a net as they came near the surface. There were some water weeds in the tank».

General conclusions.

In the introduction to our previous paper on the *Helotrephidae*, we stated: «*Helotrephes* can not remain in the same family with *Plea*, which it only superficially resembles». This was written with the belief common to most Hemipterists, that *Plea* belonged to the same

family as *Notonecta*. In spite of Wefelscheid's ¹ large paper on the biology and anatomy of *Plea minutissima* auct., the anatomy of this genus is still insufficiently known. During the present investigations, however, a careful study has been made of the morphology of *Plea*, and the conclusion has been reached that this genus can not remain in the same family with *Notonecta*. It is therefore proposed to revive the family *Pleidae*, which was first erected by Fieber under the name *Pleae*, and which has since been regarded by many Hemipterists only as a subfamily of the *Notonectidae*. *Plea* is not only very different from *Notonecta*, but in some respects it is more naturally related to the *Helotrephidae*. In this connection it has been thought advisable to publish here a redescription of the genus *Plea* based on a comparative study of that genus with the genera of *Helotrephidae*.

Re-description of genus *Plea* Auct. ².

Head and pronotum apparently distinctly separated by a deep suture, but the chitinous plates actually continuous and hardly separable, so that the head cannot be moved independently of the prothorax ³. Antennae three segmented. Rostrum four segmented, the apical

¹ H. Wefelscheid: Über die Biologie und Anatomie von *Plea minutissima* Leach, *Zool. Jahrb.* Abt. f. Syst., XXXII, pp. 387-474, 2 plates, 1912.

² The genus *Plea* may be divided as follows into three distinct subgenera according to the number of tarsal segments, and of abdominal carinae:

1. *Plea* Leach. Tarsal segments 3-3-3; abdominal carinae on 2nd-6th sternites. Distribution Palaearctic..... Type ***P. minutissima*** Auct.
2. *Paraplea* subgen. nov. Tarsal segments 2-2-3, abdominal carinae on 2nd-6th sternites. Distribution Oriental and Australasian..... Type ***Plea pallescens*** Dist.
The following species have been examined and agree with *P. pallescens* in the tarsal structure: *P. japonica* Horv., *P. letourneuxi* Sign., *P. pelopea* Dist., *P. metiadus* Dist., *P. brunni* Kirk., *P. rufonotata* Dist., *P. frontalis* Fieb. and a *Plea* sp. from Sudan.
3. *Neoplea* subgen. nov. Tarsal segments 3-2-3; abdominal carinae on 2nd-5th sternites. Distribution Nearctic and Neotropical..... Type ***Plea striola*** Fieber.

³ This character is also exhibited to a certain extent in *Notonecta*.

segment with a small labellum as in the *Helotrephidae*. Elytra thick, more or less symmetrical with an apical interlocking device; clavus generally distinctly separated from the corium, but sometimes (as in *Plea striola* Fieb.) fused with it, the claval suture absent, and the hind wings very small, and not functional; clavulus always distinctly separated.

All the thoracic sternites and the second to fifth (sometimes also the sixth, as in *Plea minutissima* Auct.) abdominal sternites each with a median laminate carina¹, as in the *Helotrephidae*.

Tarsal segments varying in number according to the species but either 3-3-3, 2-2-3 or 3-2-3. Apical structure of tarsi similar to that in *Helotrephidae*.

Male genital segments not twisted to the left and more or less symmetrical, but the pleurites of the seventh and eighth segments elongated and slightly asymmetrical as in the *Helotrephidae*. Pygofer (*P. minutissima*) with a short ventral spur. Parameres of slightly unequal length, one acute, the other truncate at apex; phallosoma mouth very wide; endosoma not differentiated into vesica and conjunctiva, the ejaculatory duct opening into middle of the membranous endosoma. In this respect, the aedeagus resembles that of *Limnotrephes campbelli*, but is without the large ejaculatory reservoir present in that genus. Female with a distinct ovipositor.

Larva of last instar. Head and pronotum more or less fused, but the suture between them distinct. Antenna represented by a stout conical process covered with long setae; and not segmented with the head capsule. Tarsal segments I-I-I (in *Plea minutissima* and presumably in all species). The 2nd tergite (3rd abdominal segment) with a single opening of the dorsal gland as in the *Helotrephidae*. Abdominal carinae present only on the 2nd to 4th sternites (in *Plea minutissima*).

Judging by the above mentioned characters, especially the larval characters, it is evident, as before mentioned, that the Pleidae show distinct relationships with the *Helotrephidae*, and we have no hesitation in placing these two families in the same superfamily which we propose to call **Pleoideae** nov. It consequently becomes necessary

¹ These carinae are diagrammatically shown by Wefelscheid in *Plea minutissima* Auct.

to suppress the series *Cephalonotera* since this group is evidently not so primitive as was at first suggested in our previous paper.

Diagnosis of the *Pleioideae* Superfam. nov.

Small water bugs with strongly convex body. Head and pronotum more or less fused, the head immovable independently of the prothorax. Rostrum four segmented, the apical segment with a distinct labellum, the two basal segments very short, and sometimes invisible. Thoracic sternites with median elevated carinae. Elytra very thick, covering the whole abdomen and united apically with an interlocking device, clavus present or absent, clavulus at base of costal area more or less distinct. Legs ambulatory, the hind pair modified for swimming, by the presence of two rows of hairs on tibiae and tarsi. All tarsi with two equal claws, a pair of bristle-like arolia, and a median tubular membranous pulvillus. Abdomen with the second and third, and sometimes the fourth, fifth and sixth sternites with median tubercles. Genital segments of male more or less asymmetrical. Female ovipositor present or absent¹. Larva with unsegmented antennae, and tarsi, and with a single opening of the dorsal gland on the second tergite (third abdominal segment).

Key to families.

- Antennae 3 segmented. First and second tarsi with two or three segments, third tarsus with three segments. Scutellum short and broad. Claval suture, if present, ending on commissure of elytra beyond the apex of scutellum. Male genital segments slightly asymmetrical. Female with distinct ovipositor **Pleidae** Fieber.
- Antennae 2 or 1 segmented. Tarsal segments 1-1-2, respectively. Scutellum long, claval suture when present ending on margin of scutellum. Male genital segments strongly asymmetrical, twisted to left. Female without ovipositor² **Helotrephidae** E. & C.

¹ Since this paper was written, we have discovered that the presence or absence of an ovipositor is not of family significance. In several genera of the *Anthocoridae*, for example, the ovipositor is absent.

² The female genitalia in *Helotrephes* are unknown since only unique type specimens of this sex have been available for study.

Phylogeny of the *Helotrephidae*.

As has already been pointed out, most of the characters exhibited by the *Helotrephidae* are extreme specialisations for an aquatic existence.

Assuming Reuter's¹ enumeration of the primitive characters in Heteroptera to be correct, we find in the *Helotrephidae* the following specialisations mainly due to reduction:

1. Absence of ocelli and reduction in size and number of facets of the eye.
2. Reduction of antennae from primitive 4 to 1 or 2 segments.
3. Fusion of corium and clavus in a special wingless form (the winged form probably rarely produced); reduction of membrane to an interlocking device.
4. Absence of metathoracic scent glands.
5. Modification of one pair of legs (hind) for swimming.
6. Reduction of tarsal segments from 3-3-3 to 1-1-2.
7. Asymmetry and twisting of the male genital segments.
8. Absence of ovipositor.
9. Reduction in number of dorsal glands in larva from 3 to 1.

We may therefore regard the *Helotrephidae* as more specialised than the *Pleidae*, and much more specialised than the *Notonectidae*. In the presence of an ovipositor in the female, and of a ventral spur on the male pygofer (genital capsule), the *Pleidae* show distinct affinities with the *Notonectidae*, but, on the other hand, they exhibit in our opinion still greater affinities with the *Helotrephidae*. The *Pleidae* may indeed be reasonably regarded as intermediate in the evolutionary scale between the *Notonectidae* and the *Helotrephidae*, in fact it is possible to trace the specialisation from the Notonectid to the Idiocorid type. In the following table the gradual reduction in the number of antennal and tarsal segments, the increase in the degree of fusion of the head and pronotum, and the decrease in size and number of facets of the eyes, is shown:

¹ *Acta Soc. Sci. Fennicae*, XXXVII, No. 3, p. 37, 1910.

	NOTONECTIDAE			PLEIDAE			HELOTREPHINAE			IDIOCORINAE	
	Notonecta	Plea	Neoplea	Paraplea	Tiphotrephes	Limnotrephes	Helotrephes	Idiocoris	Paskia		
Number of adult antennal segments.	4	3	3	3	2	2	2	1	1		
Number of larval antennal segments. *	3	1	—	—	1	1	—	1	1		
Number of adult tarsal segments.	3-3-2	3-3-3	3-2-3	2-2-3	1-1-2	1-1-2	1-1-2	1-1-2	1-1-2		
Number of larval tarsal segments. *	2-2-1	1-1-1	—	—	1-1-1	1-1-1	—	1-1-1	—		
Position of abdominal tubercles in adult.	None	II-VI	II-V	II-VI	II-V	II-IV	II-III	II-III	II-III		
Position of abdominal tubercles in larva. *	None	II-IV	—	—	II-IV	II-IV	—	II-III	—		
Degree of fusion of head and pronotum in adult.	Very slight. Suture straight	Partial. Suture straight	Partial. Suture straight	Partial. Suture straight	Almost complete. Suture sinuate.	Almost complete. Suture sinuate.	—	Complete. Suture absent.	—		
Degree of fusion of head and pronotum in larva. *	Very slight. Suture straight	Partial. Suture straight	Partial. Suture straight	Partial. Suture straight	Partial. Suture almost straight.	Partial. Suture almost straight.	—	Almost complete. Suture sinuate.	—		
Area of eyes.	Relative size of eye and the number of facets gradually reduced from <i>Notonecta</i> to <i>Paskia</i> . Area of each facet increasing from <i>Notonecta</i> to <i>Paskia</i> .										

* Larval characters based on larva of apparently the last instar.

The antennae in larval *Helotrophinae* are almost identical with those of the adults and larvae of the *Idiocorinae*, even to the presence of a small circular organ towards the apex. This apparently provides further proof that the *Idiocorinid* type is a reduction from the *Helotrephinid* type. The presence of a single opening of the dorsal gland in the larvae of *Pleidae* and *Helotrephidae*, and its absence in

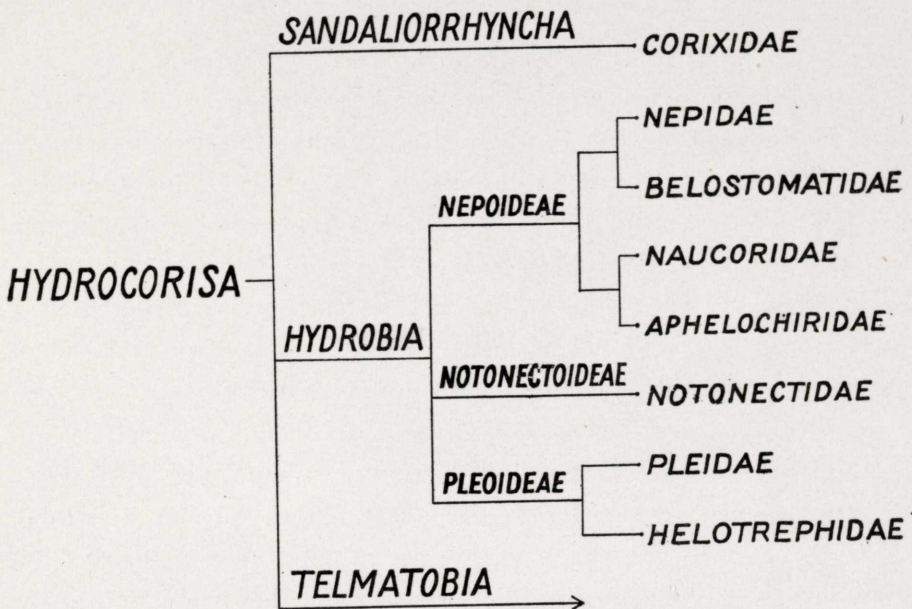


Fig. 14.—Phylogeny of the *Helotrephidae*.

the larva of *Notonecta*, would seem to indicate that the *Pleioideae* are more related to the *Nepoideae* than to the *Notonectoideae*. But, among the *Nepoideae*, too, we find the larval dorsal glands absence in the *Belostomatidae* and *Nepidae*. The presence of larval dorsal glands is very common throughout the terrestrial *Heteroptera*, and they are evidently of some vital importance to life on land. We might therefore expect some reduction in aquatic forms. This we find, for instead of the usual 3 pairs of openings normally found in the plant bugs, only one pair is found in the *Naucoridae* and *Aphelochiridae*, only a single opening in the *Pleidae* and *Helotrephidae*, and none at all in the *Nepidae*, *Belostomatidae* and *Notonectidae*. Strangely enough, in the highly specialised aquatic *Corixidae*, three pairs have survived, which would seem to indicate that the great develop-

ment of these glands in many *Heteroptera* may be due in some way to a vegetarian diet. In this connection it is interesting to note that the metathoracic scent glands, so common in the terrestrial *Heteroptera*, are also well developed in the *Corixidae*.

Appendix.

Since this paper was written, we have been able to examine, thanks to the kindness of Mr. W. L. McAtee of Washington, the only specimen of *Helotrephes* found in the Baker Collection. This specimen from Los Baños, Luzon, Philippine Is., has been labelled in the late Dr. Baker's handwriting, *Helotrephes balnearius* Bergr. It is not labelled type, however, and does not agree in detail with Bergroth's description. The actual type must therefore still remain at Helsingfors in Dr. Bergroth's collection. Assuming that the Baker specimen is correctly identified, it has been possible to check its presumed synonymy with *H. martini* Kirk. It agrees very well with Kirkaldy's Sumatran species, especially in the great length of the cephalonotum (AD.), and in the shape of the sternal and ventral carinae, but differs in having the scutellum distinctly longer than wide, and in the colour pattern of the head. The structural difference may be due to the fact that Baker's specimen is a male, while Kirkaldy's type is a female. If this is so, and *H. balnearius* is actually the male of *H. martini*, our key to the species of *Helotrephes* is valueless, since it is based primarily on scutellar structure. If, however, the two species are distinct, the key may be modified. The colour difference, if not specific, may be either varietal in significance, or the Philippine specimens may represent a distinct race of *H. martini*. In any case, the problem cannot be settled until more material is available.