

Koleopterologische Rundschau	84	209–219	Wien, September 2014
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A review of the *Helophorus frater-praenanus* group of species, with description of a new species and additional faunal records of *Helophorus* FABRICIUS from China and Bhutan (Coleoptera: Helophoridae)

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Abstract

The six species of the East Palaearctic *Helophorus frater-praenanus* group (Coleoptera: Helophoridae) are reviewed and a new species, *H. aquila* sp.n. is described from China (Qinghai). Habitus, head and pronotum and aedeagophores are figured for all the species and a key for their identification is given. Four further species which could be confused with the *H. frater-praenanus* group are discussed and illustrated. These are *H. croaticus* KUWERT, 1886, *H. pumilio* ERICHSON, 1837, *H. pitcheri* ANGUS, 1970 and *H. shatrovskyi* ANGUS, 1985. Additional faunal records of *Helophorus* FABRICIUS species from the Tibetan Plateau and other areas of China are given. *Helophorus tuberculatus* GYLLENHAL, 1808 is recorded from Bhutan for the first time.

Key words: Coleoptera, Helophoridae, *Helophorus*, *Rhopalohelophorus*, East Palaearctic, China, Tibetan Plateau, Bhutan, new species, faunistics.

Introduction

The *Helophorus frater-praenanus* species group is here proposed as an informal grouping of six East Palaearctic species: *H. banghaasi* KNIŽ, 1919, *H. frater* ORCHYMONT, 1926, *H. kryzhanovskii* ANGUS, 1985, *H. parajacutus* ANGUS, 1970, *H. parasplendidus* ANGUS, 1970, and *H. praenanus* ŁOMNICKI, 1894. Full synonymy of these species is given by HANSEN (1999). The habitus of these species is illustrated in Figs. 1–10, heads and pronota in greater detail in Figs. 11–21 and aedeagophores in Figs. 30–39. This species group is characterised by the following suite of characters: antennae nine-segmented, with three small segments between the pedicel and the cupule; stem of Y-groove variable, often within species, shallow and often narrow-linear, but sometimes widened anteriorly; pronotum highly and evenly arched, lightly sculptured and with the grooves narrow and shallow; elytral flanks only narrowly visible from below; and apical segment of the maxillary palpi normally asymmetrical, but sometimes more or less symmetrical oval. *H. frater* and *H. banghaasi* were placed as “dubious *Atracthelophorus*” by ANGUS (1970). ANGUS (1985a) kept *H. banghaasi* in *Atracthelophorus* KUWERT but transferred *H. frater* to *Rhopalohelophorus* KUWERT. SMETANA (1985) synonymized *Atracthelophorus* with *Rhopalohelophorus* and Hansen (1999) followed this arrangement. However, here *Atracthelophorus* is used in the sense of ANGUS (1992) for species with symmetrical apical segments of the maxillary palpi and the elytral flanks broadly visible from below. Any decision about formal re-instatement of *Atracthelophorus* would require much more extensive data.

One of the surprises emerging from study and collection of *Helophorus* FABRICIUS in the Qinghai part of the Tibetan Plateau was the occurrence of large numbers of females, unaccompanied by males, apparently belonging to a very dark form of *H. frater*. The discovery of three males in a roadside pool near Gangca showed that an undescribed seventh species of the *H. frater-praenanus* species group was involved, which is described below under the name *H. aquila* sp.n.

Four further East Palaearctic species which could be confused with the *H. frater-praenanus* group are discussed and illustrated. These are: *H. croaticus* KUWERT, 1886 and *H. pumilio* ERICHSON, 1837, both species with the elytral flanks broadly visible from below, *H. pitcheri* ANGUS, 1970, excluded because the pronotum is strongly granulate and with deeper grooves, and *H. shatrovskyi* ANGUS, 1985, which is a true member of subgenus *Atractohelophorus* KUWERT, with the apical segments of the maxillary palpi clearly symmetrical oval and the elytral flanks broadly visible from below.

Additional faunal records of *Helophorus* FABRICIUS species from China and Bhutan are also presented below.

Material

The material studied is located in the following collections: The Museum of Biology, Sun Yat-sen University, Guangzhou (SYSU); The Natural History Museum, London (BMNH); National Natural History Museum, Prague (MNHP); Naturhistorisches Museum Wien (NMW); Naturkundemuseum, Erfurt (NME); Zoological Institute of the Russian Academy of Sciences, St. Petersburg (ZIN).

The Helophorus frater-praenanus group

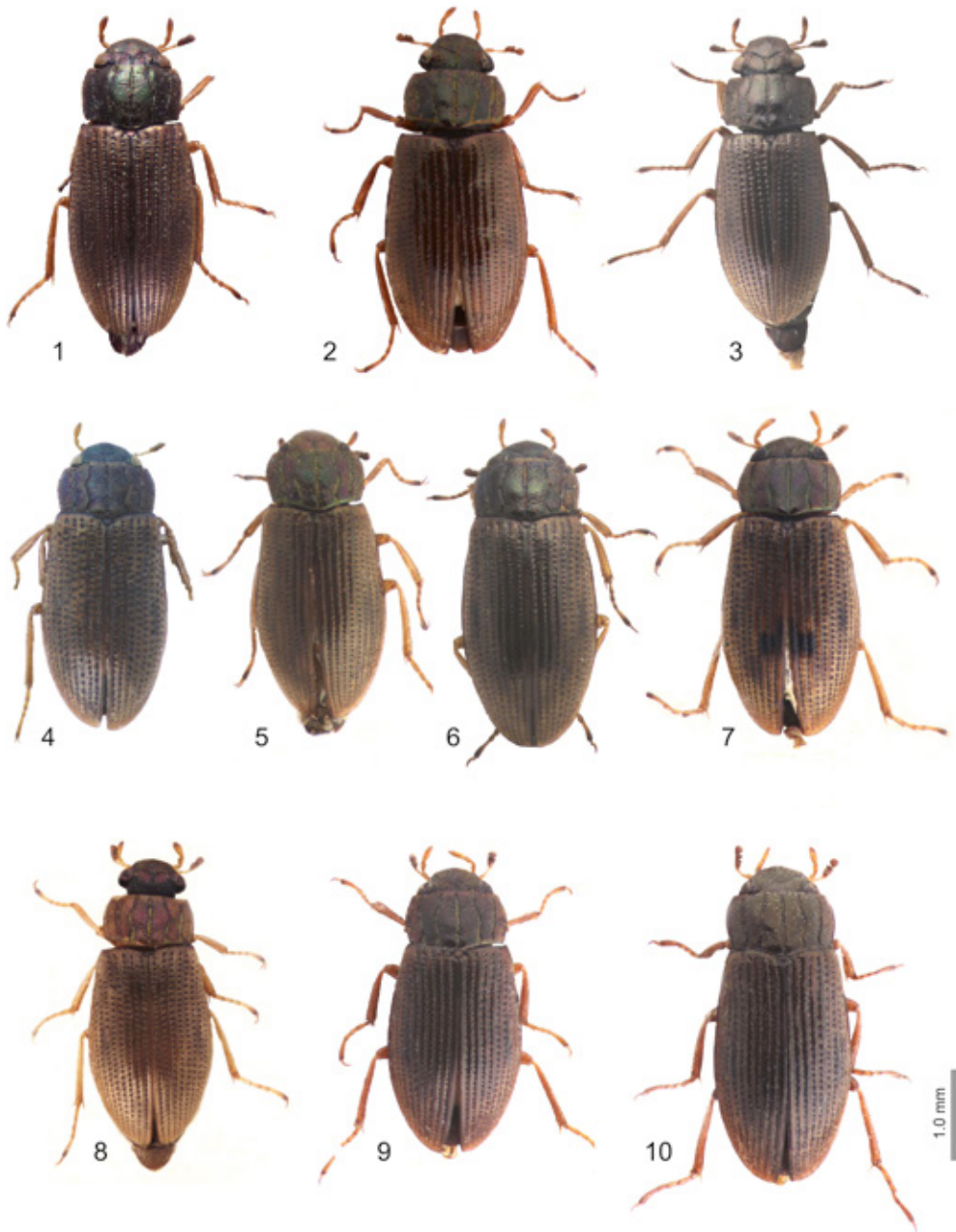
Helophorus frater ORCHYMONT, 1926

Habitus: Figs. 1–3; head and pronotum: Figs. 14–16; aedeagophore: Fig. 36. Length: 3.0–4.2 mm.

ANGUS (1970) discusses the type series of *H. frater*, described from Latpel and Sangcha in northern India, close to the Tibetan border. This species has a vast distribution, from the Tibetan Plateau and Tuva in the east to Iran and eastern Anatolia (Turkey) in the west (ANGUS 1992). Studied material from the Tibetan Plateau comprises the type series of *H. frater*, from Latpel and Sangcha (Kumaon) in northern India, adjacent to the Chinese (Tibetan) border, a female type of *H. hingstoni* ORCHYMONT from Pangle in southern Tibet (close to the Indian border) and material from the Upper Huang He region collected by the Kozlov-Roborovsky expedition and housed in the Zoological Institute in St. Petersburg (ANGUS 1970), and a series from Nepal with the data “Nepal. 2.8.85 Ghassa 3000 m s. Jarkot/Preuler” (NMW). The aedeagophore shows very little variation, and the incurved apices of the tapering parameres are characteristic. The elytra are generally dark to chestnut brown, without distinct darker markings. However, material from Nepal has the elytra blackish. Throughout its range *H. frater* is bisexual, with males and females present in approximately equal numbers.

Helophorus aquila sp.n.

TYPES: Holotype ♂: CHINA, QINGHAI, N Qinghai Hu, Gangca, roadside pool, 37°18'N 100°11'E, 5.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang. In the Museum of Biology, Sun Yat-sen University. **Paratypes:** 2 ♂♂: Data as holotype. In the Natural History Museum, London and the Museum of Biology, Sun Yat-sen University. 48 ♀♀, data as holotype, 46 SYSU, 2 BMNH; 40 exs., CHINA, QINGHAI, N Qinghai Hu, Gangca, 1 km SE of Gangca Dasi, stream, 37°31'00.25"N 100°05'68"E, 3464 m, 5.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang, 34 BMNH, 4 MNHP, 2 NMW; 2 exs., CHINA, QINGHAI, SW Qinghai Hu, roadside pools, 36°42'N 99°45'E, 3380 m, 4.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang, BMNH; 1 ex., CHINA, QINGHAI, Golo, Maduo, roadside pools on river flats 20 km E Maduo, 34°51'17"N 98°15'18"E, 4290 m, 8.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang, BMNH; 2 exs., CHINA, QINGHAI, Golo, Maduo, roadside pools near Yematan, 34°40'47"N 99°03'57"E, 4240 m, 8.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang, BMNH; 2 exs., CHINA, QINGHAI, Huzhu County, Baimuxia, 37°00'03"N 102°06'57"E, 3055 m, 3.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang, BMNH.



Figs. 1–10: Habitus of 1) *Helophorus frater*, holotype ♂; 2) *H. frater*, ♀, Upper Huang He, Kozlov-Roborovsky leg.; 3) *H. frater*, dark ♂ from Nepal; 4) *H. banghaasi*, ♂ paralectotype; 5) *H. aquila*, holotype ♂; 6) *H. aquila*, ♀ paratype, Gangca Dasi; 7) *H. praenanus*, ♂, Tibelti, E Siberia; 8) *H. parajacutus* ♂ paratype, Mongolia, Central Aimak; 9) *H. kryzhanovskii*, ♂ paratype, Tibelti; 10) *H. parasplendidus*, ♂, Yakutia, Vilyuysky Trakt.

Although the females appear virtually indistinguishable from dark *H. frater* (for example the Nepal material mentioned above), they are regarded as paratypes of *H. aquila* because no male *H. frater* is known from these localities. It seems likely that the distributions of *H. frater* and *H. aquila* either overlap or at least approach each other very closely. Thus the Kozlov-Roborovsky material is from the “valley of the lakes” (Eling Hu and Jaling Hu), close to the Yematan and Maduo *H. aquila* localities. This *H. frater* material has the chestnut brown elytra usual in this species.

The habitus of a Gangca Dasi female paratype is shown in Fig. 6, and the head and pronotum in Fig. 13.

DESCRIPTION: Habitus: Figs. 5–6. Length: 3.1 mm (holotype), 2.8–3.3 mm (♂ paratypes), 3.2–3.7 mm (♀ paratypes); breadth 1.4 mm (holotype), 1.25–1.4 mm (♂ paratypes), 1.4–1.6 mm (♀ paratypes). Head and pronotum: Figs. 11–13, black with green-bronze reflections. Head granulate, the granulation reduced medially in some of the paratypes. Stem of Y-groove narrow linear. Maxillary palpi dull yellow, apical segment asymmetrical, darker, especially towards apex. Antennae nine-segmented, dull yellow, the clubs darker, brownish. Pronotum highly arched, slightly flattened medially in holotype. Grooves narrow, shallow, submedians angled outwards medially. Intervals granulate, the granulation somewhat reduced medially, stronger externally. Marginal grooves of holotype narrow, distinct throughout their length, of some of the paratypes wider but completely obliterated in anterior quarter. Pronotum widest at base of anterior third, lateral margins straighter in posterior third.

Elytra dark blackish brown, strongly striate, interstices with transverse wrinkles, especially mediobasally. Flanks narrowly visible from below. Lateral margins evenly curved, elytra widest slightly behind the middle, apex fairly tapered.

Legs dull yellow, distal half of apical tarsal segments darker. Claws yellow, about half as long as the apical tarsal segment.

Aedeagophore: Figs. 30–31. Length about 0.6 mm, tube and struts about the same length, parameres bluntly pointed, outer margins weakly curved, without subapical sinuation.

DIAGNOSIS: Resembling blackish specimens of *H. frater* but distinguished by the aedeagophore (Figs. 30–31): length about 0.6 mm, outer margins of parameres weakly curved, not sinuate subapically, parameres bluntly pointed apically, the apices not deflected inwards as in *H. frater* (Fig. 36).

HABITAT: The specimens were collected in pools and quiet backwaters of streams.

ETYMOLOGY: Latin, aquila, eagle, named for Ying Zhang of Qinghai Normal University. The Chinese word for an eagle (ying) is a homophone of her name.

Helophorus banghaasi KNIŽ, 1919

Habitus: Fig. 4; head and pronotum: Fig. 19; aedeagophore: Figs. 33–35. Length: 2.7–3.7 mm.

This species is recognisable by the distinctly elongate rather parallel-sided elytra, and the aedeagophore which has the parameres normally with their outer margins weakly sinuate subapically and the tips pointed but not deflexed inwards as in *H. frater*. ANGUS (1970, 1985a) placed *H. banghaasi* in the subgenus *Atractohelophorus* on the grounds of its symmetrical oval apical segment of the maxillary palpi. However, the shape of this segment varies, and in one of the palpi shown in Fig. 19 is clearly not symmetrical. Further, the elytral flanks of *Atractohelophorus* are normally broadly visible from below, while in *H. banghaasi* they are very narrow. It therefore seems better to place *H. banghaasi* in subgenus *Rhopalohelophorus* KUWERT, in the *H. frater-praenanus* group of species.

Helophorus banghaasi is widely distributed in the mountains of Middle Asia, with records from Kazakhstan (Tian Shan), Kyrgistan (Karakol/Przhevalsk) and Tajikistan (Pamir).

***Helophorus praenanus* ŁOMNICKI, 1894**

MATERIAL EXAMINED: CHINA, QINGHAI, N Qinghai Hu, Gangca, roadside pool, 37°18'N 100°11'E, 5.vi.2013, leg. R.B. Angus, F.-L. Jia & Y. Zhang, SYSU, BMNH.

Habitus: Fig. 7; head and pronotum: Fig. 17; aedeagophore: Fig. 37. Length: 3.3–3.8 mm.

ANGUS (1970) gives an account of this species (as *H. jacutus* POPPIUS), and ANGUS (1973) establishes that *H. praenanus*, described as a Pleistocene fossil from Borislav in the Western Ukraine, is the correct name for this species. *Helophorus praenanus* may be recognised by the clearly visible dark Λ -mark and spots on the elytra, and the rather small aedeagophore (about 0.6 mm long) with blunt-ended parameres. It is widely distributed in East Siberia and the northern half of Mongolia, and is a frequent component of English fossil assemblages dating from colder phases of the last glaciation. It is here recorded for the first time from China.

Records of this species from North America (as *H. jacutus*) refer to *H. sempervarians* ANGUS, 1970 (ANGUS 1970).

***Helophorus parajacutus* ANGUS, 1970**

Habitus: Fig. 8; head and pronotum: Fig. 18; aedeagophore: Fig. 32. Length: 2.8–3.6 mm.

This species may be recognised by the normally orange undertone to its colour, and the aedeagophore, which is most similar to that of *H. aquila*, though slightly larger. In paler specimens the dark markings of the elytra are indistinct. It is known only from Mongolia.

***Helophorus kryzhanovskii* ANGUS, 1985**

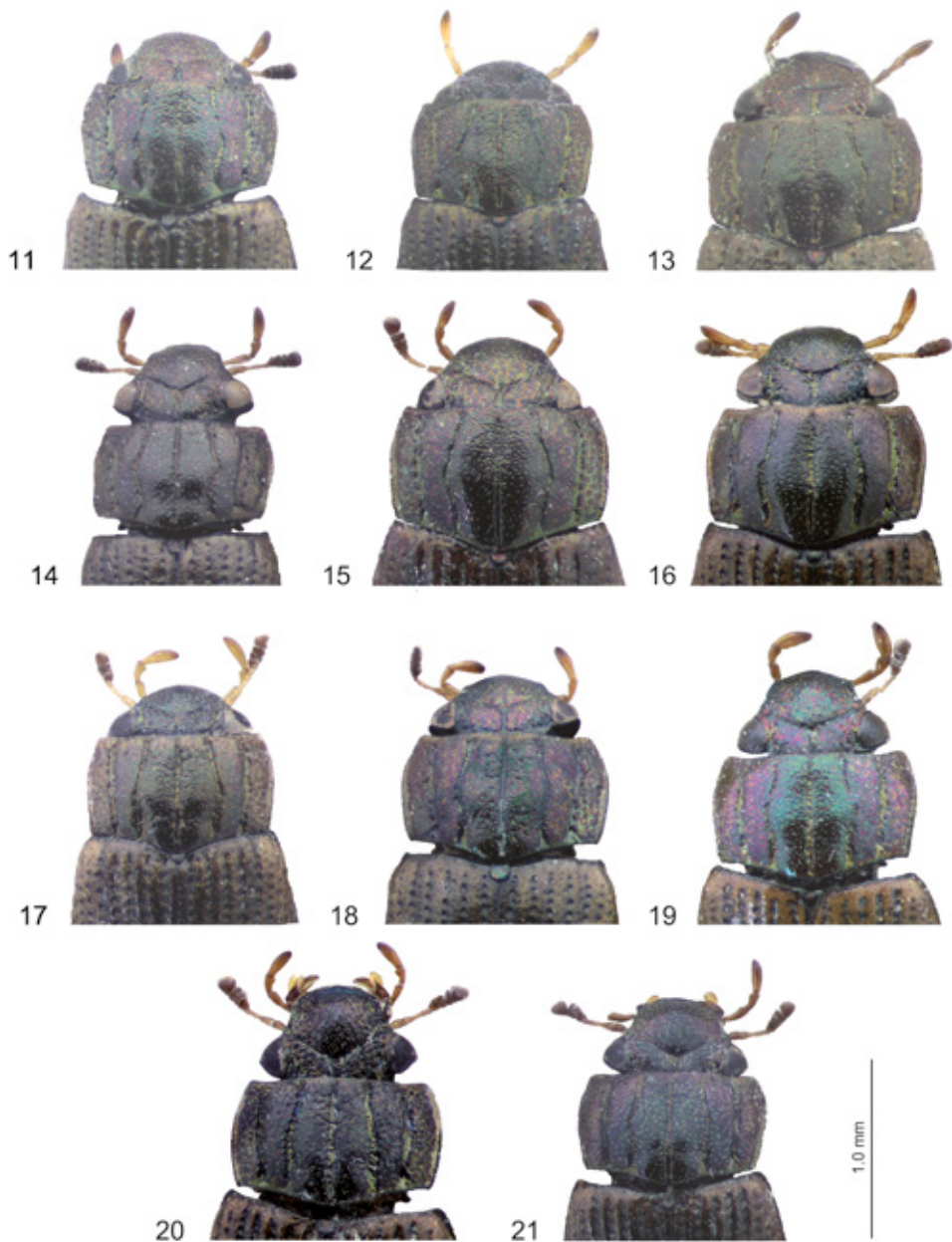
Habitus: Fig. 9; head and pronotum: Fig. 20; aedeagophore: Fig. 38. Length: 2.7–3.7 mm.

A very dark (almost black) species, distinguished from *H. frater* and *H. aquila* by the sides of the pronotum being rather strongly rounded and evenly curved to the hind angles. In the other species the pronotal sides are somewhat straighter in the basal third. *H. parasplendidus*, also a blackish species, has the pronotum more highly polished and often with the sides slightly straighter basally. The aedeagophores of all these species are distinctive. *H. kryzhanovskii* is characteristic of the Baikal region of East Siberia – the Irkutsk Oblast and Buryatia (ANGUS 1985a).

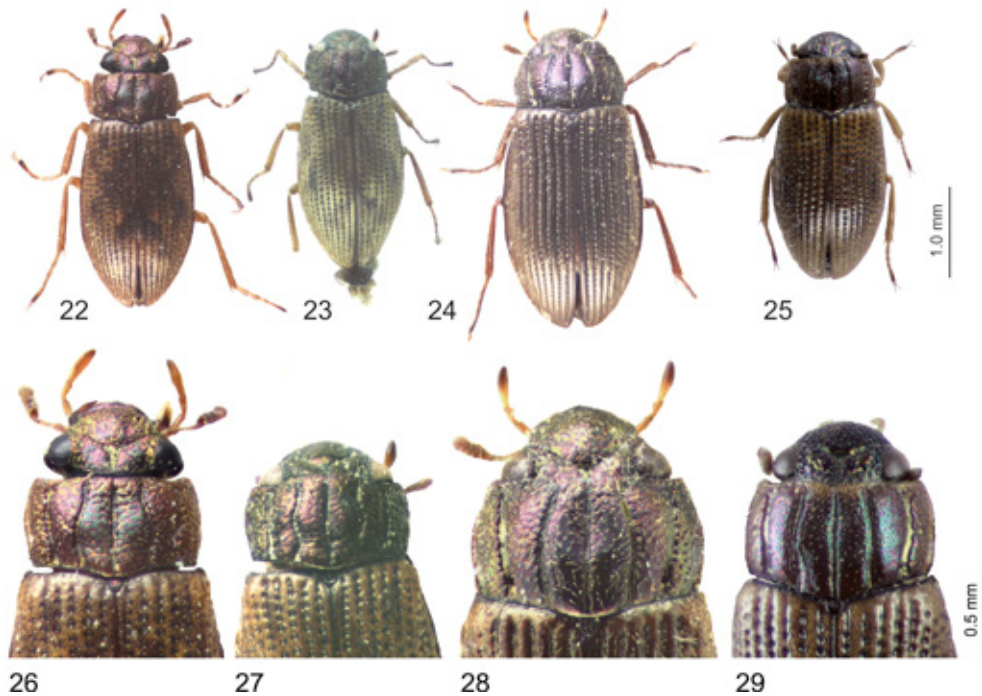
***Helophorus parasplendidus* ANGUS, 1970**

Habitus: Fig. 10; head and pronotum: Fig. 21; aedeagophore: Fig. 39. Length: 3.2–3.7 mm.

A blackish species recognised by its normally highly polished pronotum with distinct white short hairs emerging from the flattened pronotal granules. The aedeagophore, with its sharply pointed parameres with weakly and evenly curved lateral margins, is very distinctive. This species was described from the Canadian High Arctic (ANGUS 1970), but is widely distributed in Yakutia and the Russian Far East (ANGUS 1995).



Figs. 11–21: Heads and pronota of 11) *Helophorus aquila*, holotype ♂; 12) *H. aquila*, paratype ♂; 13) *H. aquila*, ♀ paratype, Gangca Dasi; 14) *H. frater*, ♂, Nepal; 15) *H. frater*, ♀, Upper Huang He; 16) *H. frater*, ♀, Turkey; 17) *H. praenanus*, ♂, Tibelti; 18) *H. parajacutus*, ♂, paratype, Mongolia, Bajan-Ölgij Aimak; 19) *H. banghaasi*, ♂, Kazakhstan, Central Tian Shan, Naryn River; 20) *H. kryzhanovskii*, ♂, paratype, Tibelti; 21) *H. parasplendidus*, ♂, Vilyuysky Trakt.



Figs. 22–29: Habitus (22–25) and heads and pronota (26–29) of 22, 26) *Helophorus croaticus*, ♂, by River Lena near Yakutsk; 23, 27) *H. pitcheri*, ♂, China, Jilin; 24, 28) *H. pumilio*, ♂, Russia, St. Petersburg; 25, 29) *H. shatrovskiyi*, ♂, paratype, Mongolia, Bajanchongor Aimak.

**Species superficially resembling the *Helophorus frater-praenanus* group,
but excluded from it**

***Helophorus croaticus* KUWERT, 1886**

Habitus: Fig. 22; head and pronotum: Fig. 26; aedeagophore: Fig. 40.

Excluded from the *H. frater-praenanus* group because of its very wide elytral flanks. The habitus, with its orange-reddish colour and highly arched pronotum, is very distinctive, as is the aedeagophore. It ranges from western Central Europe (eastern France) to Yakutia in East Siberia.

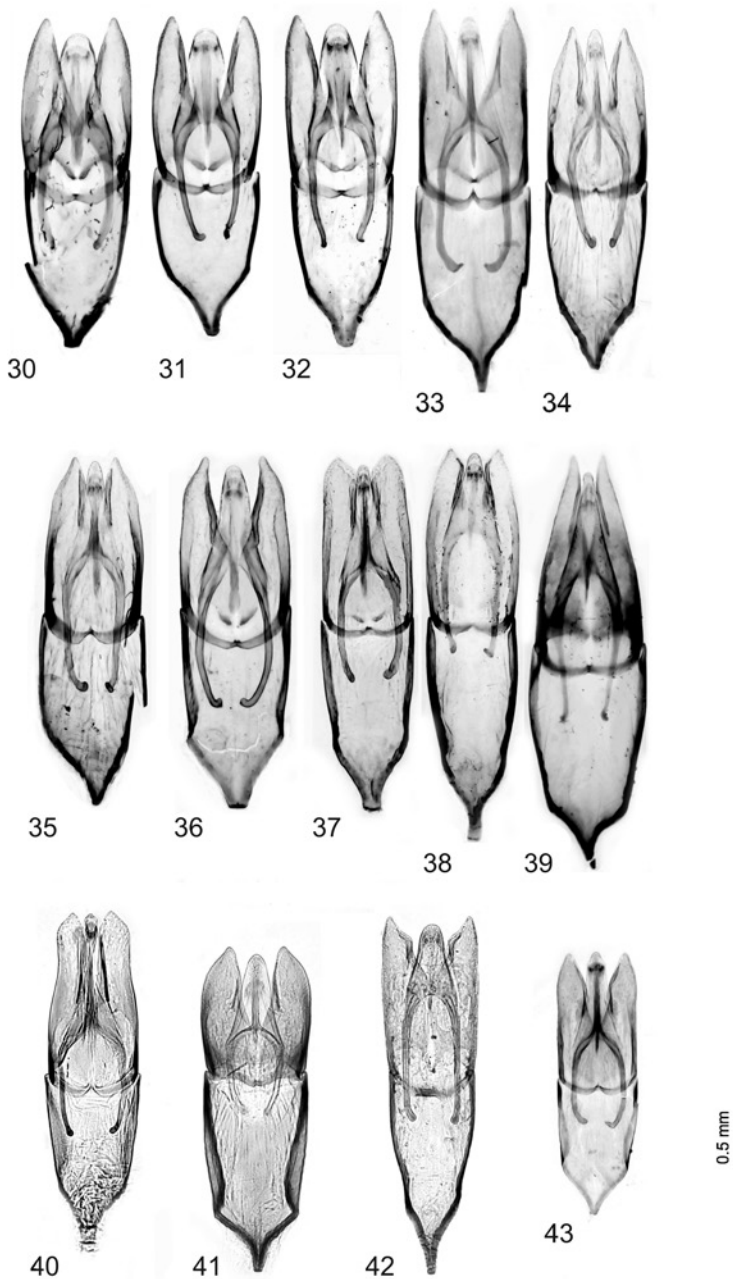
***Helophorus pumilio* ERICHSON, 1837**

Habitus: Fig. 24; head and pronotum: Fig. 28; aedeagophore: Fig. 42.

Excluded from the *H. frater-praenanus* group because of the wide elytral flanks. The habitus is very distinctive, as is the aedeagophore. *Helophorus pumilio* is distributed from Central Europe east to the Irkutsk Oblast in East Siberia (ANGUS 1992).

***Helophorus pitcheri* ANGUS, 1970**

Habitus: Fig. 23; head and pronotum: Fig. 27; aedeagophore: Fig. 41. Length: 2.9–3.0 mm.



Figs. 30–43: Aedeagophores of: 30) *Helophorus aquila*, holotype; 31) *H. aquila*, paratype; 32) *H. parajacutus*, paratype, Central Aimak; 33) *H. banghaasi*, Naryn River; 34, 35) *H. banghaasi*, paratypes; 36) *H. frater*, Upper Huang He; 37) *H. praenanus*, China, Qinghai, Ganga; 38) *H. kryzhanovskii*, paratype, Tibelti; 39) *H. parasplendidus*, Vilyuysky Trakt; 40) *H. croaticus*, by River Lena; 41) *H. pitcheri*, Jilin; 42) *H. pumilio*, E Siberia, Irkutsk; 43) *H. shatrovskyi*, Bajanchongor Aimak.

A little-known species, described from two males and one female from the Baikal area of East Siberia (ANGUS 1970) and known also from one male from China (Jilin) (ANGUS 1995). Excluded from the *H. frater-praenanus* group because of its strongly granulate and rather deeply grooved pronotum. The elytra may be darker than in the Chinese specimen figured, and their flanks are narrowly visible from below. The aedeagophore, with its short wide parameres, is very distinctive.

***Helophorus shatrovskyi* ANGUS, 1985**

Habitus: Fig. 25; head and pronotum: Fig. 29; aedeagophore: Fig. 43. Length: 2.5–2.7 mm.

A little-known species, described from two males from the Bajanchongor Aimak in central Mongolia (ANGUS 1985b). Excluded from the *H. frater-praenanus* group as it is a true *Atractohelophorus* with clearly symmetrical apical segments of the maxillary palpi (see ANGUS 1985b: Fig. 1) and very broad elytral flanks. The habitus and aedeagophore are very distinctive.

Key to the species of the *Helophorus frater-praenanus* group

- 1 Noticeably elongate, elytra rather parallel-sided (Fig. 4), brown or reddish with indistinct darker mottling. Aedeagophore (Figs. 33–35) with the parameres pointed, their lateral margins normally weakly sinuate subapically *banghaasi*
- Less elongate, sides of elytra more rounded 2
- 2 Dark Λ -mark and spots on elytra distinct (Fig. 7), especially in paler specimens. Aedeagophore (Fig. 37) with paramere apices blunt. Anterior margin of pronotum normally with a paler band *praenanus*
- Darker mottling on elytra indistinct, even in paler specimens. 3
- 3 Ground colour orange-red, or if darker, pronotum generally with some maroon-bronze reflections and pale anterior margin (Fig. 18). Sides of pronotum strongly and evenly rounded. Aedeagophore (Fig. 32) with the parameres clearly pointed *parajacutus*
- Ground colour darker, at least pronotum blackish, sometimes with green- or maroon-bronze reflections. No pale band along anterior margin 4
- 4 Surface of pronotum highly polished, shining black or black-bronze, scarcely granulate, except for weak granulation on external intervals. At least some of the granules or punctures with short white setae (Figs. 10, 21). Aedeagophore (Fig. 39) very distinctive, with tapering, sharply pointed parameres *parasplendidus*
- Surface of pronotum less highly polished, without white setae 5
- 5 Sides of pronotum strongly and evenly rounded to the hind angles (Fig. 20). Aedeagophore (Fig. 38) characteristic, elongate and with the outer margins of the parameres weakly but evenly curved *kryzhanovskii*
- Sides of pronotum less strongly and evenly rounded, frequently straighter in basal third 6
- 6 Clearly bisexual species with males and females present in approximately equal numbers. Aedeagophore (Fig. 36) with outer margins of parameres distinctly incurved and frequently weakly sinuate subapically, paramere tips directed mediad. Pronotum (Figs. 14–16) blackish but often with distinct green or maroon bronze reflections. Elytra often dark chestnut brown (Figs. 1–2), but may be darker, blackish (Fig. 3) *frater*
- Populations parthenogenetic to some extent, males absent or very rare. Aedeagophore (Figs. 30–31) with outer margins of parameres incurved, but not sinuate subapically, paramere tips directed apicad. Ground colour of pronotum black with bronze reflections (Figs. 11–13), elytra blackish brown (Figs. 5–6) *aquila*

Additional faunal records for China and Bhutan

Helophorus aspericollis ANGUS: CHINA, Qinghai, Huzhu County, Baimuxia, leg. R.B. Angus, F.-L. Jia & Y. Zhang (BMNH); Inner Mongolia, Yitulihe, leg. F.-L. Jia (SYSU).

Helophorus crinitus GANGLBAUER: CHINA, Shanxi, Qinshui, Lishan, 2 exs., at light, 23.vii.2013 leg. F.-L. Jia, W.C. Xie & R.C. Lin (SYSU).

Helophorus jaechi ANGUS: CHINA, Qinghai, Xunhua County, Yimacun village, wetland by Yellow River Crossing. 1 ♂, 2 ♀♀, leg. R.B. Angus & F.-L. Jia (BMNH).

Helophorus kerimi GANGLBAUER: CHINA, Qinghai, SW Qinghai Hu, roadside pools, leg. R.B. Angus, F.-L. Jia & Y. Zhang (BMNH); Xinjiang, Wulumuqi, leg. Z.H. Huang (SYSU); Xinjiang, Chabuchar, leg. Z.H. Huang (SYSU); Inner Mongolia, Jining, leg. Z.-N. Chen (SYSU); Xizang, Rikaze, 3626 m, leg. G.Q. Liang (SYSU).

Helophorus mongoliensis ANGUS: CHINA, Qinghai, Huzhu County, Baimuxia, leg. R.B. Angus, F.-L. Jia & Y. Zhang (BMNH).

Helophorus nanus STURM: CHINA, Inner Mongolia, Hailar, leg. F.-L. Jia (SYSU).

Helophorus nigricans POPPIUS: CHINA, Heilongjiang, Harbin, leg. Z.-L. Pu (SYSU); Inner Mongolia, Hailar, leg. F.-L. Jia (SYSU).

Helophorus timidus MOTSCHULSKY: CHINA, Heilongjiang, Liangshui, leg. Z.-L. Pu (SYSU); Inner Mongolia, Yitulihe, leg. F.-L. Jia (SYSU).

Helophorus tuberculatus GYLLENHAL: BHUTAN, Paro, Chiley-La, 10.–13.VII.1990, 3000–3500 m, leg. C. Holzs Schuh, 1 ex. (NME).

Acknowledgements

We thank the Natural History Museum, London, The Museum of Biology, Sun Yat-sen University, Guangzhou and the Biology and Geography School, Qinghai Normal University, Xining for the facilities to carry out this research and Ying Zhang for valuable help both in the field and in Xining.

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Book Review

MARUYAMA, M., KOMATSU, T., KUDO, S., SHIMADA, T. & KINOMURA, K. 2013: The Guests of Japanese Ants. – Tokyo: Tokyo University Press, XII + 208 pp.

There are various kinds of scientific books. Some are good, some are bad, some simply average. Others, although good and essential, may be boring and are consulted only to gain some information and then disappear in the library for an indefinite period of time. However, every now and then, certain books hit the public that are not only good and informative but also have this level of addictiveness that makes one browse it regularly just for pleasure. “The Guests of Japanese Ants” is such an exceptional book.

Crammed into 208 pages, a plethora of information on this group of (mainly) arthropods is presented in a most captivating manner. In a separate chapter, also the few termitophiles of Japan are mentioned. What makes this book so attractive is the overly complete make-up of top notch close-up images of virtually all ant and termite guests as well as their host species. Some of these images allude to a high degree of patience and technical skill of the photographers.

Except for a few short (mostly autobiographic and technical) chapters, the book is written in Japanese and English, something that is not obligatory with books published in Japan. There is usually a short introductory chapter to each class and order, the remaining text goes with the images and contains mostly distribution data and notes on biology.

The book closes with a short “Introduction of Myrmecophile Biology” and a list of all Japanese myrmecophilous insects including new records.

Even for one not actively working on myrmecophiles, this book is worthwhile reading. For one interested in photomacrography it is an incentive. But for one working on myrmecophiles, it is probably the ultimate form of motivation.

H. SCHILLHAMMER

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Zeitschrift/Journal: [Koleopterologische Rundschau](#)

Jahr/Year: 2014

Band/Volume: [84_2014](#)

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