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THE GENUS HOLOSTOMIS IN JAPAN AND ADJACENT TERRITORIES

(TRICHOPTERA : PHRYGANEIDAE)

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In his revised classification of the family Phryganeidae in 1924, Martynov revived the old genus *Holostomis* Mannerheim (1838), which had generally been considered as a synonym of the genus *Neuronia* s. l., and emended the limitation of its generic characteristics. According to him three spotted species—*phalaenoides* Linnaeus, *melaleuca* MacLachlan, *atrata* Gmelin—and one black species—*chinganica* Martynov—were included in this genus at that time. As far as I am aware, no more species of the genus has been added since then. However, having examined the specimens deposited at both the Hokkaido University and the Hokkaido National Agricultural Experiment Station, I have found two additional species apparently new to science. In this paper I intend to describe these two species, together with some notes on the relationship among the species of the genus.

Before going further I must express my cordial thanks to Professor C. Watanabe for his kind permission in examining the specimens of the Hokkaido University.

Holostomis coreana, sp. nov. [Pl. I, fig. 1; Pl. II, figs. 1, 2, 6]

Head and thorax deep shining black, with many black and brown long hairs on the face and warts of thorax; antennae black; palpi dull black, sparsely pubescent. Legs dull black, with the posterior tibiae generally paler, often passing into brownish. Abdomen dull black.

Fore wings rather elongate, the apex obliquely rounded; milky white and subopaque, marked densely with many large steel-black spots all over the wings; the greater part of the costal spots and of the spots on the inner margin larger than the others; the outer margin regularly spotted; veins pale, except where they traverse the black spots. Hind wings white, subopaque; on the costal area five or six black spots often united, of which one above the discoidal cell is the largest and somewhat wedge-shaped; the apex and the outer margin with very broad black border. In the male, a small black spot on the distal end of the median cell of hind wings.

In the male, the ninth segment narrow dorsad, the center of its apical dorsal margin produced caudad in a shallow triangle and sparsely fringed with long hairs; ventrally divided at the middle by a longitudinal line. Tenth segment, forming a penis-cover, long and directed downwards; from above wide at the base, tapering to an obtuse apex which is notched, and two keeled lines from the base, of which points are united at three-quarters of the length of the segments, leaving between them a flattened

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rugose space. The penis is concealed under the tenth segment, black at the basal part, but yellow at the membranous obtuse apical part, bearing a pair of long testaceous titillators which are directed outwards and curved downwards. Inferior appendages, or pedes genitales, rather short, two-jointed; the basal joint thick and curved inwards at right angle; posteroventral edge strongly produced as a prominent toothed ledge; the second joint slender, yellow, fringed with yellow hairs.

In the female, the tenth segment terminates with a pair of rounded lobes fringed with hairs, and with a truncate hairy process on each side beneath. Subgenital plate mesally terminates with a long spinous process which is deeply notched at the apex.

Measurement: Length of body 23-25 mm, of fore wing 33-37 mm, of hind wing 29-33 mm; width of fore wing 12-13 mm.

Specimens examined: [Korea] Kwangnung, Kyonggi-Do (1 ♂, holotype, May 26, 1921, leg. Inoue), Keumdong, Hamkyong Pukto (1 ♀, allotype, June 15, 1931, leg. K. Kishida), Nankok, Kangwon-Do (2 ♀♀, paratypes, June 3, 1932, leg. G. Takagi & W. S. Youn) in coll. HNAES¹⁾. Han River, Seoul (1 ♀, paratype, July, 1920) in coll. HU²⁾.

General Distribution: Korea; ? Honshū.

Remarks: At first glance this species resembles very much *H. phalaenoides*, and it has often been misidentified with the latter. It is, however, distinguishable from *H. phalaenoides* by its larger size, larger black spots scattered over the entire fore wings and very broad black border band along the outer margin of the hind wings. The genitalia of both sexes are quite different from those of *H. phalaenoides*, especially in their shapes of the tenth segment in the male and the truncate process of the last segment in the female. Recently Kuwada³⁾ illustrated *H. phalaenoides* based upon the specimen caught at Sandankyo of Hiroshima Prefecture, south-western part of Honshū. I am of the opinion that it is probably identical with *H. coreana*.

***Holostomis phalaenoides* (Linnaeus) [Pl. I, fig. 2; Pl. II, fig. 3]**

Phryganea phalaenoides Linnaeus, Faun. Suec., ed. II: 378 (1761).

Oligotricha phalaenoides: Rambur, Hist. Nat. Ins., Nev.: 472 (1842).

Neuronia sp. Matsumura, Jap. Ent., rev. ed. III: 80, Fig. 50 (1900).

Holostomis melaleuca Matsumura (nec MacLachlan), Thous. Ins. Jap., I: 166, Pl. XII, fig. 2 (1904); Matsumura, Syst. Ent., I: 187, Fig. 222 (1907).

Neuronia phalaenoides: MacLachlan, Mon. Rev. Syn. Trich. Eur. Fauna: 19, Pl. II (1874); Ulmer, Coll. Zool. Edm. Selys Longch., VI (1): 6 (1907); Ulmer, Gen. Ins., LX: 23, Pl. XXIX, fig. 1 (1907); Martynov, Ann. Mus. Zool. Acad. Imp. Sci. Petersbourg, XIV: 224 (1909); Matsumura, Jour. Coll. Agr., Tohoku Imp. Univ., IV: 15 (1911); Nakahara, Canad. Ent., XLV: 325 (1913); Martynov, Ann. Mus. Zool. Acad. Imp. Sci. Petrograd, XIX: 279 (1914); Navás, Rev. R. Acad. Cien. Exact. Fis. y Nat. Madrid, XVIII: 161 (1920); Kuwayama, Zool. Mag., XXXIV: 957 (1922); Kuwayama, Trans. Sapporo Nat. Hist. Soc., IX: 122 (1924); Kuwayama, Icon. Ins. Jap., ed. sec. reform.: 424, Fig. 1152 (1950).

Neuronia (Holostomis) phalaenoides: Tsuda, Mem. Coll. Sci., Kyoto Imp. Univ., ser. B, XVII: 307 (1942).

Holostomis phalaenoides: Hagen, Verh. Zool.-bot. Ges. Wien, XIV: 820 (1864); Wallengren, K. Sv. Vet. Akad. Handl., XXIV (10): 16 (1891); Matsumura, 6000 Illus. Ins. Jap.-Emp.: 1120, Fig.

1), 2) HNAES=Abbreviation of the Hokkaido National Agricultural Experiment Station. HU=Abbreviation of the Entomological Institute, Hokkaido University. The same applies to those that follow.

3) Kuwada, Icon. Ins. Jap. col. nat. ed., III: 165, Pl. LXXXIII, fig. 8 (1965).

(1931); Kuwayama, Icon. Ins. Jap., ed. prim.: 1502, Fig. 2971 (1932); Matsumura, Illus. Common Ins. Jap., V: 1 (1), Pl. I, fig. 1 (1933); Esaki, Hori, & Yasumatsu, Ins. Jap. Illus. Icon.: 141, Pl. LXIII, fig. 250-2 (1938).

Specimens examined: [Sachalin] Chipsani (1 ♂, 1 ♀, July 23, 1909, leg. K. Oguma), Solowiyofka (1 ♀, July 10, 1909, leg. K. Oguma), Konuma or Novo-alexandrovsk (1 ♀, June 13, 1924, leg. S. Takano & K. Tamaunki) in coll. HU. Toyohara or Vladimirofka (1 ♀, July, 1922, leg. M. Yano), Kushunnai-Todoroki pass (1 ♀, August 2, 1922, leg. T. Esaki) in coll. HNAES. [Hokkaidô] Abeshinai (2 ♀♀, July, 1917, leg. S. Sugawara), Teshio (1 ♀, July 5, 1916, leg. S. Issiki), Sapporo and its vicinity (3 ♂♂, 5 ♀♀, June 23, 1905, June 25, 1918, May, 1927, leg. S. Matsumura) in coll. HU. Nopporo (1 ♀, June 28, 1953, leg. S. Imabayashi), Sapporo (1 ♂, June 4, 1907, leg. K. Oguma) in coll. HNAES.

General Distribution: Sachalin; Hokkaidô; North-eastern Siberia (Ussuri-land, Irkutsk, and so on); Northern Europe; Caucasus.

Remarks: This species is distributed more widely than any other members of the genus *Holostomis*.

Holostomis melaleuca MacLachlan [Pl. I, fig. 3; Pl. II, fig. 4]

Holostomis melaleuca MacLachlan, Jour. Linn. Soc., Zool., XI: 106 (1871); Matsumura, 6000 Illus. Ins. Jap.-Emp.: 1120, Fig. (1931); Kuwayama, Icon. Ins. Jap., ed. prim.: 1501, Fig. 2970 (1932); Hirayama, 1000 Illus. Ins., Add.: 171, Pl. LXXV, fig. 6 (1937); Esaki, Hori & Yasumatsu, Ins. Jap. Illus. Icon.: 140, Pl. LXIII, fig. 250-1 (1938).

Neuronia (Holostomis) melaleuca: Tsuda, Mem. Coll. Sci., Kyoto Imp. Univ., ser. B, XVII: 307 (1942).

Neuronia melaleuca: Ulmer, Gen. Ins., LX: 24 (1907); Ulmer, Deutsch. Ent. Zeitschr., 1908: 339 (1908); Martynov, Mem. Zool. Acad. Imp. Sci. Petersburg, XIV: 225 (1909); Nakahara, Zool. Mag., XXV: 267, Pl. VII, fig. 3 (1913); Nakahara, Canad. Ent., XLV: 325 (1913); Kuwayama, Zool. Mag., XXXIV: 957 (1922); Marumo, Fig. Jap. Bestoj: 708, Fig. 1371 (1927); Kuwayama, Icon. Ins. Jap., ed. sec. reform.: 423, Fig. 1151 (1950); Takeuchi, Col. Illus. Ins. Jap.: 75, Pl. XXVIII, fig. 427 (1955); Kuwada, Icon. Ins. Jap. col. nat. ed., III: 164, Pl. LXXXII, fig. 17 (1965).

Specimens examined: [Honshû] Aomori (1 ♀), Karumai (1 ♀, leg. T. Ogasawara), Chûzenji, Nikko (1 ♀, June 6-13, 1911, leg. S. Matsumura), Kamikôchi (1 ♂, July 19, 1915, leg. S. Hirayama), Niigata Pref. (1 ♂, leg. M. Nakamura) in coll. HU. Kamikôchi (1 ♀, July 21, 1917, leg. T. Esaki; 1 ♀, July 30, 1922, leg. T. Kano) in coll. HNAES.

General Distribution: Hokkaidô, Honshû.

Remarks: MacLachlan originally described this species from Hakodate, Hokkaidô. Hirayama recorded this species from Asahikawa in the same island.

Holostomis atrata (Gmelin) [Pl. I, fig. 4; Pl. II, fig. 5]

Phryganca atrata Gmelin, Syst. Nat., ed. XIII: 2634 (1788).

Neuronia atrata: MacLachlan, Mon. Rev. Syn. Trich. Eur. Fauna: 20, Pl. II (1874); Ulmer, Gen. Ins., LX: 23 (1907); Ulmer, Coll. Zool. Edm. Selys Longch., VI (1): 7 (1907); Martynov, Ann. Mus. Zool. Acad. Imp. Sci. Petersburg, XIV: 225 (1909); Martynov, Ann. Mus. Zool. Acad. Imp. Sci. Petrograd, XIX: 279 (1914); Kuwayama, Zool. Mag., XXXIV: 957 (1922); Kuwayama, Trans. Sapporo Nat. Hist. Soc., IX: 122, Fig. 4 (1924).

Neuronia (Holostomis) atrata: Tsuda, Mem. Coll. Sci., Kyoto Imp. Univ., ser. B, XVII: 307 (1942).

Holostomis atrata: Hagen, Verh. Zool.-bot. Ges. Wien, XIV: 820 (1864); Wallengren, K. Sv. Vet. Akad. Handl., XXIV (10): 17 (1891); Esaki, Hori & Yasumatsu, Ins. Jap. Illus. Icon.: 140, Pl. LXIII, fig. 249-1 (1938).

Specimens examined: [Sachalin] Kashiho (1 ♂, 4 ♀♀, July 10, 1933, leg. T. Uchida, I. Okada & T. Sawamoto), Horo (1 ♂, July 24, 1933, leg. T. Uchida, I. Okada & T. Sawamoto) in coll. HU. Toyohara or Vladimirofka (1 ♂, July, 1922, leg. M. Yano), Konuma or Novo-alexandrovsk (1 ♀, July 21, 1922, leg. T. Esaki), Higashishiraura or Shiraraka-Odasamu (1 ♂, August 5, 1922, leg. T. Esaki) in coll. HNAES.

General Distribution: Sachalin, North-eastern Siberia (Ussuri-land, Amur, Maritime Prov., Yakutsk, Irkutsk, and so on); Northern Europe (Scandinavia, Finland, Lapland, and so on).

Remarks: Martynov described *H. chinganica* in 1907 from Putjata, South Chingang, Manchuria. As he stated this species resembles very much *H. atrata* but the fore wings are blackish, and it is probable that *H. chinganica* is a melanic form of *H. atrata* or a very near species.

Holostomis chishimana⁴⁾, sp. nov. [Pl. I, fig. 5; Pl. II, fig. 7]

Head and thorax deep shining black, with dense brownish long hairs on the face and grayish hairs on the warts of the thorax. Antennae black, being brownish toward the apical one-third; palpi dull black, sparsely pubescent. Legs dull black, except testaceous hind tibiae. Abdomen dull black.

Fore wings rather elongate, very obtuse, the apex obliquely rounded; stramineous and opaque, scattered with many rather small brownish black spots on the subcostal and inner marginal areas; the spots at the end of discoidal cell and at arculus are somewhat larger; the spots on the area of distal one-third obscurely confluent; the apical part somewhat darker. Veins pale, but brownish black under the spotted areas. Hind wings milky white and subopaque; on the costal margin at the base a brownish black spot; one or two small brown spots near the distal end of discoidal cell; the apical and outer margins up to the anal angle are bordered with brownish black, but in such a manner that there are usually pale areas along the apical sectors.

In the female, the end of the abdomen is obtuse, clothed with short yellow hairs, and divided ventrally into two angulated portions each possessing a conical process; subgenital plate terminates mesally in a short pointed process notched shallowly at the apex.

Measurement: Length of body 19–22 mm, of fore wing 26–30 mm, of hind wing 22–26 mm; width of fore wing 10–11.5 mm.

Specimens examined: [Kuriles] Shana-Rubetsu, Etorofu or Iturup (2♀♀, holotype and paratopotype, July 21, 1936, leg. Y. Sugihara) in coll. HU and HNAES.

General Distribution: Kuriles (Etorofu).

Remarks: This species is closely related to *H. atrata*, but easily distinguishable from the latter by its larger size, color of palpi and legs, markings of the fore wings, and especially by its confluence of spots in the distal area. The feature of the female genitalia is also markedly different from that of *H. atrata*. The male specimen has not yet been available for examination.

As I enumerated in the foregoing pages, the members of the genus *Holostomis* are all boreal species, that is, they are inhabitants in the north temperate area of the palaeartic region. Two species, *H. phalaenoides* and *H. atrata*, are distributed widely

4) "Chishima" is the Japanese name for the Kurile Islands.

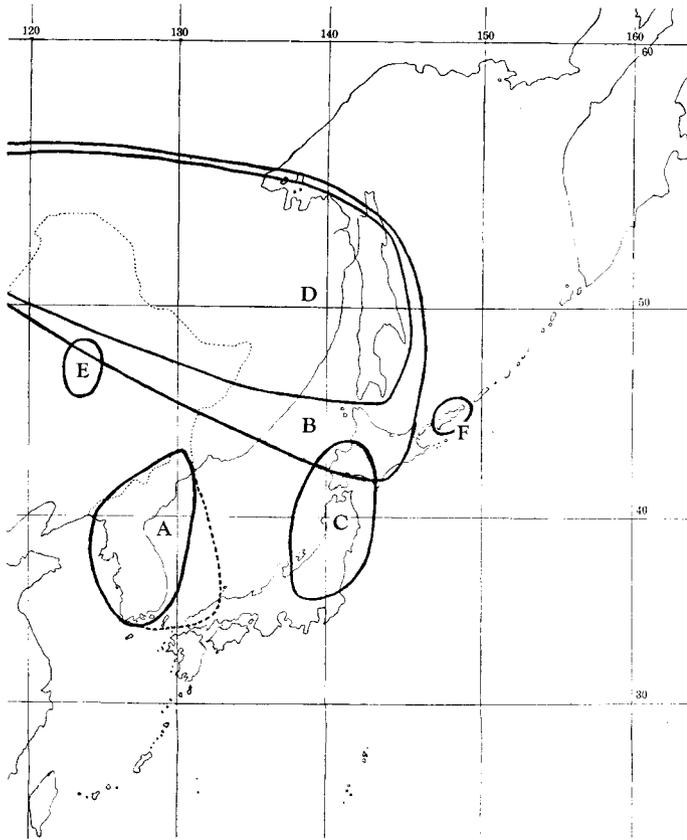
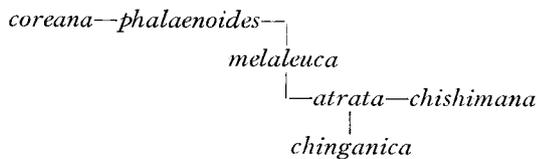


Fig. 1 Putative distribution of *Holostomis* species in Asia.

- A—*H. coreana*, B—*H. phalaenoides*,
 C—*H. melaleuca*, D—*H. atrata*,
 E—*H. chinganica*, F—*H. chishimana*.

throughout the greater parts of northern Europe and northern Asia, but the others, *H. coreana*, *H. melaleuca*, *H. chinganica*, and *H. chishimana*, are Asiatic, and they are apparently confined to the northern Far East in their distribution. My analysis of morphological features, especially of the genitalia, is suggestive of the interrelation among the hitherto known species, the phylogenical relationship of which may be illustrated as follows:



In *H. coreana* and *H. phalaenoides*, the fore wings are milky white in the ground color and scattered with black spots; the hind wings are bordered with black band. On the contrary, in *H. atrata* and *H. chishimana*, the fore wings are stramineous in

the ground color and with large and small fuscous spots, partly confluent, sometimes nearly disappearing in the distal area; the hind wings with a fuscous band along the margin, but discontinuous in the same manner. *H. melaleuca* may be a transitional and intermediate form between both groups above mentioned, as the ground color of the fore wings is creamy yellow and the black spots are variant in size and partly confluent in transverse fasciae. As for the genitalia, the titillators of the penis are the typical of the main difference. Titillators of *H. coreana* and *H. phalaenoides* are very long, while those of *H. atrata* are rather shorter. Titillators of *H. melaleuca* are comparatively long, but not longer than those of *H. coreana* and *H. phalaenoides*.

Thus, it may be concluded that the genus *Holostomis* should be classified into three groups: *phalaenoides* (+ *coreana*) — *melaleuca* — and *atrata* (+ *chishimana*) respectively.

EXPLANATION OF PLATES

Plate I. Five species of the genus *Holostomis* (natural size).

1. *H. coreana* (Korea, holotype, ♂).
2. *H. phalaenoides* (Hokkaidō, ♂).
3. *H. melaleuca* (Honshū, ♀).
4. *H. atrata* (Sachalin, ♀).
5. *H. chishimana* (Kuriles, paratopotype, ♀).

Plate II. Genitalia and terminal abdominal segments of *Holostomis* spp.

1. Terminal abdominal segments of male of *H. coreana* n. sp. (dorsal view).
2. Ditto (lateral view).
3. Tenth segment of *H. phalaenoides*, male.
4. Tenth segment of *H. melaleuca*, male.
5. Tenth segment of *H. atrata*, male.
 - a. Dorsal view.
 - b. Lateral view.
6. Terminal abdominal segments of female of *H. coreana* n. sp. (ventral view).
7. Terminal abdominal segments of female of *H. chishimana* n. sp. (ventral view).

