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Hesperinidae (Diptera: Bibionomorpha) a new family from the Korean Peninsula

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Research on Korean nematocerous flies (Diptera: Nematocera) was started by the National Institute of Biological Resources in 2012. This publication is a continuation of our previous work. During the season of 2019 insects were collected in Odaesan National Park by the researchers from Korea University. Among these samples, two specimens belonging to the family Hesperinidae, which was previously unrecorded from Korea, were noticed. This family is known from countries bordering Korea (East Siberia and Far East of Russia, Hokkaido Island of Japan), thus occurrence of hesperinid flies was expected on the Korean Peninsula. Only one genus *Hesperinus* Walker, 1848 with eight species belong to this family. They are developing in decaying wood of deciduous trees. *Hesperinus rohdendorfi* Krivosheina & Mamaev, 1967, which was known from East Siberia and Far East of Russia is recorded from South Korea. Redescription and photographs of the most important taxonomical details are presented.

Keywords: larva, new record, pupa, South Korea, taxonomy

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Introduction

Research on Korean nematocerous flies (Diptera: Nematocera) was started by the National Institute of Biological Resources in 2012. Most attention was devoted to the infraorder Tipulomorpha, because it is one of the less investigated, less understood, but important groups of Diptera in Korea. Since then, specimens have been collected annually in different localities, at different times and using different methods. The aim of the study is to document, re-describe, illustrate, and prepare keys for Korean species identified to date. This publication is a continuation of our previous work on nematocerous insects of Korea.

In 2019, insects were collected in Odaesan National Park by the researchers from Korea University. Among these samples two specimens belonging to the family Hesperinidae (Diptera: Nematocera), which was previously unrecorded from Korea, were noticed. This family is known from countries bordering Korea (East Siberia and Far East of Russia, Hokkaido Island of Japan) (Hardy & Takahashi, 1960; Krivosheina & Mamaev, 1967; Paramonov, 2005; Krivosheina & Krivosheina, 2015), thus occurrence of hesperinid flies was expected on the Korean Peninsula.

Materials and Methods

Specimens of *Hesperinus* flies, that were available for this study, are deposited in the collections of the Korea University (KU), Seoul, South Korea.

Two specimens were collected with Malaise trap in Odaesan National Park by the researchers of the Korea University. Specimens were preserved in 96% ethanol. Later some structures, like antenna, wing and male terminalia were slide mounted in Euparal. Male terminalia of one specimen were cleared overnight in approximately 10% KOH, and then preserved in microvial filled with glycerol. Specimens were studied with Olympus SZX10 dissecting microscope. Photographs of insects were taken with digital camera (Canon EOS 80D) through a macro lens (Canon MP-E 65 mm) and Mitutoyo M Plan Apo 10x lens mounted on same camera.

Terminology of adult morphological features generally follows that of Cumming & Wood (2017).

Taxonomy

Family Hesperinidae

Hesperinidae is a small relict family, probably the sister-group of Bibionidae (Skartveit, 2017) and closely related to the families Cramptonomyiidae, Pachyneuridae and Pleciidae. Some authors treat it as a subfamily of Bibionidae (Hardy & Takashi, 1960; Hardy, 1981). Hesperinidae includes single genus *Hesperinus* Walker, 1848 with only eight extant species. Six of these species are recorded from the Palearctic Region; of the two remaining species, one species is known from Canada and one from Brazil. In addition to extant species, three species are described from Eocene Baltic amber (Skartveit, 2008), representatives of Hesperinidae are also known from Oligocene deposits in France (Nel & Skartveit, 2012).

Adults fly near small streams surrounded by trees and shrubs (Papp, 2010; Kurina, 2013). Larvae develop in decaying wood of deciduous trees (Krivosheina & Mamaev, 1967).

***Hesperinus* Walker, 1848**

Hesperinus Walker, 1848: 81; Hardy & Takahashi, 1960: 386, 387; Papp, 2010: 348–350.
Spodius Loew, 1858: 101–108.
Type species *Hesperinus brevifrons* Walker, 1848 (original designation).

Adult. *General*: Small to medium-sized flies with body length between 4–12 mm. Body slender, coloration varies from dark brown to black. *Head*: Antenna long, inserted near the lower margin of the face. Flagellum with 10 flagellomeres, basal flagellomere elongate. Ocelli conspicuous. Eyes widely separated in both sexes. Palpus four-segmented, longer than head. *Thorax*: Prescutum separated from mesoscutum by transverse suture. Scutellum small, subscutellum indistinct (Papp, 2010). Wing darkened, well developed in males, but females of some species, like *H. imbecillus* (Loew, 1858) and *H. ninae* Papp & Krivosheina, 2010, have distinctly shortened wings that reach halfway down the second abdominal segment. Halter elongate. Legs long and slender, tibiae with apical bristles or spurs (Oosterbroek, 2006). Claw simple, without additional spines. *Abdomen*: long and slender, eight-segmented.
Larva. *General*: Grayish-white, up to 12 mm long. Body consists of three thoracic and nine abdominal segments. Tracheal system holopneustic (Krivosheina & Mamaev, 1967; Krivosheina & Krivosheina, 2015). *Head*: Eucephalic, oval and heavily sclerotized, capsule almost closed ventrally. Frontal plate separated from lateral plates by sutures. Clypeus and labrum fused. Mandible heavily sclerotized, maxilla consists of well-developed lacinia, stypes and cardo. Hypostomal bridge sclerotized, plate-shaped. Antenna short, one-segmented. *Abdomen*: Segments evenly covered with small conical microspinules. Terminal segment without spiracles.
Pupa. *General*: Grayish-white. *Head*: Basal segments of both antennal sheaths enlarged and touching each other (Krivosheina & Mamaev, 1967). *Thorax*: Pronotal horn short, located on small outgrove. *Abdomen*: With several dark spots, consists of nine segments covered with short conical microspinules and longitudinal row of paired spines both dorsally and ventrally, with row of separate spines laterally. Segments I–VI similar in length, segments VII–VIII considerably shorter, segments I–VIII similar in width, terminal segment shortest and narrowest of all abdominal segments.

Hesperinus rohdendorfi
Krivosheina & Mamaev, 1967

Hesperinus rohdendorfi Krivosheina & Mamaev, 1967: 236–242; Paramonov, 2005: 232; Krivosheina & Krivosheina, 2015: 315–316.

General: Body coloration black. Body length of male 8.5 mm, wing length 7.0–8.0 mm.
Head: Black with scarce short erect setae dorsally and posteriorly. Eyes rounded, widely separated, vertex with three distinct ocelli. Male antenna 5.2 mm long, reaching to about middle of abdomen if bent backward. Both basal antennomeres dark brown to black. Scape slightly wider than longer, pedicel nearly as long as scape. Flagellum brown, 10-segmented. Basal flagellomere narrowly pale at base, elongate, 1.6 times as long as succeeding flagellomere, remaining flagellomeres decreasing in length towards apex. Five basal flagellomeres slightly swollen subapically. Length of apical segment slightly exceeds that of penultimate. Flagellomeres covered by erect pubescence. Longest verticils up to 0.3 times as long as respective segments. Rostrum dark brown. Palpus four-segmented, if extended, reaches slightly beyond apex of basal flagellomere. Three basal flagellomeres and base of fourth segment brown, remainder of fourth segment pale. Labellum brownish, setose. *Thorax*: Cervical sclerites pale. Pronotum brownish. Mesonotal prescutum generally dark brown to black, brownish along lateral margin and posteriorly. Scutellum brown. Pleuron brown, anepisternum and anepimeron dark brown to black dorsally, katepisternum ventrally blackened. Wing brownish, more intensely infuscate along frontal margin. Stigma indistinct, elongate. Veins brown. Venation: *Sc* long, reaching distinctly beyond cross-vein *r-m*, R_1 long and nearly straight, radial sector with two branches R_{2+3} and R_{4+5} which are strongly diverging at wing margin. Cell m_1 large with short stem, cross-vein *bm-m* indistinct. *CuA* strongly arched distally, *CuP* indistinct, slightly arched. Wing cells without macrotrichi-

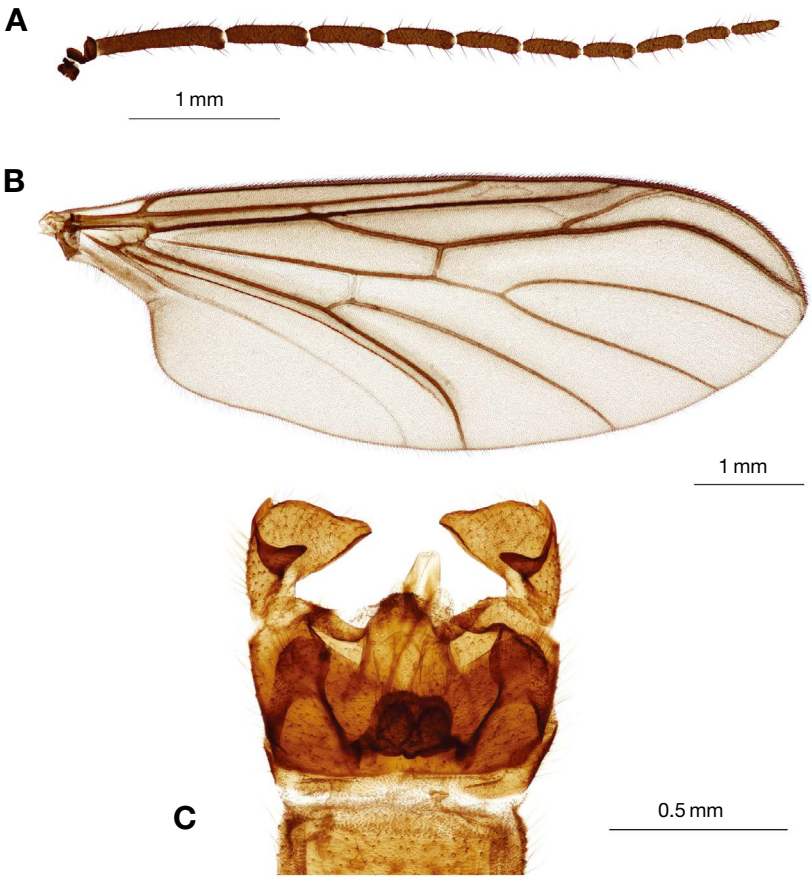

Fig. 1. *Hesperinus rohdendorfi* Krivosheina & Mamaev, 1967, male, Korea. A. antenna. B. wing. C. male terminalia, dorsal view.

ae. Anal lobe large, nearly right-angled. Halter elongate, covered with macrotrichiae. Halter pale at base, stem brownish, knob pale, rounded. Length of male halter 1.1–1.3 mm. Leg long and slender. Fore coxa brown with darker along dorsal margin, middle and posterior coxae pale-brownish with indistinct darker spots. Trochanters pale-yellow. Femur dark brown, pale at base, longer than tibia. Tibia dark brown with apical spurs. Fore tibia with single spur. Tarsus five-segmented, nearly as long as tibia. Tarsal claw simple without additional teeth, pulvilla short. Male femur I: 3.7 mm, tibia I: 3.1 mm long. *Abdomen*: Dark brown to black. Tergites brown with narrow line along lateral margin and slightly darkened posteriorly. Sternites grayish-brown, two basal sternites slightly darker. Male terminalia slightly enlarged, wider than the remainder of abdomen, black. Tergite with very wide emargination of posterior margin. Gonocoxite large. Both gonocoxites reaching each other ventrally. Gonostylus large, plate-shaped, setose, with elongate postero-mesal angle, distinct darkened sclerotized lobe subbasally and small lobe at posterior margin, both lobes connected with narrow ridge. Edeagus straight, slightly widened subapically.

Elevation range in Korea. Captured slightly above 900 m.
Period of activity. End of May or beginning of June.
Habitat. Unknown in Korea. Larvae develop in rotten wood of deciduous trees (*Maackia amurensis*, *Ulmus propinqua*, *Chosenia arbutifolia* and different species of birch trees *Betula*) (Krivosheina & Krivosheina, 2015).
General distribution. Eastern Siberia and Far East of Russia.
Examined material. 2 males (in ethanol), S. Korea, Gangwon-do, Pyeongchang-gun, Jinbu-myeon, Mt. Odae-san, 37°47′34.58″N, 128°33′37.97″E, alt. 929 m, 2019. V.27–VI.01, coll. HDS, PSH, Malaise trap.

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