

FIRST RECORD OF *HESPERINUS CUSPIDISTYLUS* HARDY ET TAKAHASHI, 1960 (DIPTERA: HESPERINIDAE) FROM RUSSIA

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Summary. The species *Hesperinus cuspidistylus* Hardy et Takahashi, 1960 is recorded from Russia for the first time. Diagnostic characters of three similar species, *H. cuspidistylus*, *H. rohdendorfi* Krivosheina et Mamaev, 1967 and *H. nigratus* Okada, 1934, are discussed. These species differ in the structure of male terite 9 and form of gonostyli. A key to the species from the Russian Far East and Japan is given.

Key words: Hesperinidae, *Hesperinus*, taxonomy, key, fauna, new record, Russian Far East, Japan.

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Резюме. Вид *Hesperinus cuspidistylus* Hardy et Takahashi, 1960 впервые приводится из России. Обсуждаются диагностические признаки трех близких видов: *H. cuspidistylus*, *H. rohdendorfi* Krivosheina et Mamaev, 1967 и *H. nigratus* Okada, 1934. Эти виды хорошо различаются по форме 9 тергита самца и форме гоностилей. Составлена определительная таблица для видов, известных из Японии и российского Дальнего Востока.

INTRODUCTION

Hesperinidae is a unique small family of relict nematocerous dipterans, most similar to the families Cramptonomyiidae and Pachyneuridae (Krivosheina & Mamaev, 1967; Krivosheina, 1972). The status of the family Hesperinidae is still controversial. The results of molecular genetic studies (Ševčík *et al.*, 2016) suggested that either *Hesperinus* should not be classified in the separate family Hesperinidae because it would render the rest of Bibionidae paraphyletic or, Bibioninae, *Plecia* Wiedemann, 1828, *Penthetria* Meigen, 1803, and *Hesperinus* Walker, 1848 each need to be treated as distinct families. However, no changes have been made to the family Hesperinidae in modern databases (Evenhuis & Pape, 2024).

The currently known materials on *Hesperinus* species are represented predominantly by adult forms. The biology of the immature stages has been established for *H. rohdendorfi* and *H. ninae* which larvae developing in decaying wood of deciduous trees. A detailed morphological study of the larvae of the these species was carried out by Krivosheina & Mamaev (1967) and Krivosheina & Krivosheina (2015).

The species of the family Hesperinidae are rare in collections. One male of previously unknown in Russia species is found in the Zoological Museum of the Moscow Lomonosov State University (ZMUM).

RESULTS

Genus *Hesperinus* Walker, 1848

Type species: *Hesperinus brevifrons* Walker, 1848.

DIAGNOSIS. Species of the genus have a fragile, narrow body with elongated, thin legs. The male's body is black, with round dichoptic eyes. The wing is wide, transparent, with a slight smoky tint, the subcostal vein is long, flows into the costal vein behind the middle of the wing, the costal vein reaches the apex of the wing, slightly protrudes beyond the point of connection of the costa with the radial vein, the radial veins are branched, R 4+5 is strongly arcuate in apical half. The species are characterized by a peculiar form of antennae, different from those of all nematoceros dipterans. The antennae are elongated, in the male they are longer than the head and thorax combined. The antennal flagella are narrow, almost cylindrical, but rounded at the apex, and consist of 10 segments. The first segment is long, it is at least 2 times as long as the head, the 2nd–5th segments are almost equal in length and slightly exceed half the length of the first, the 1st–5th segments have a characteristic angular apical protrusion of different sizes. The abdomen is long and narrow, with massive broad genitalia.

Males of *Hesperinus* are characterized by massive, voluminous genitalia, much larger in comparison with the narrow long segments of the abdomen, genitalia are of various shapes and in general bear little resemblance to similar structures in representatives of other families of nematoceros dipterans. The shape of individual structures appears differently depending on the viewing angle. Genitalia with well-developed lamellar tergite 9 and sternite 9, somewhat elongated gonocoxites and large gonostyli of a peculiar shape (massive, elongated oval or lamellar). The most similar in structure are the internal structures (parameres, gonocoxites and apodemes of the aedeagus).

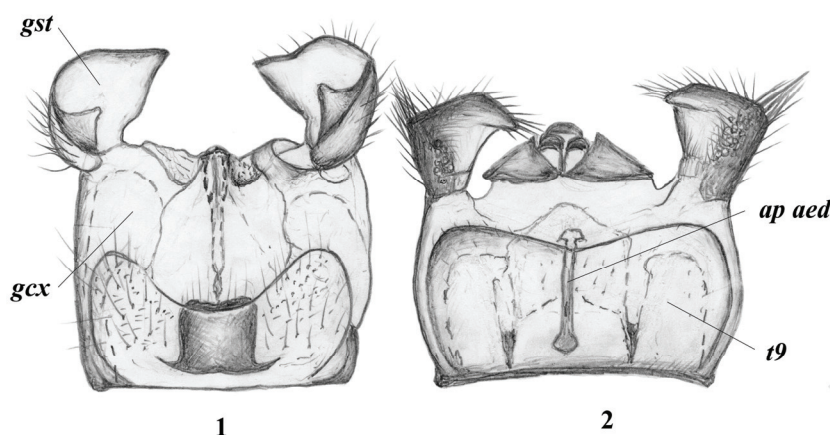
COMPOSITION. The six species have been recorded in the Palearctic: *H. cuspidistylus* Hardy et Takahashi, 1960, *H. graecus* Papp, 2010, *H. imbecillus* (Loew, 1858), *H. nigratus* Okada, 1934, *H. ninae* Papp et Krivosheina, 2009, and *H. rohdendorfi* Krivosheina et Mamaev, 1967. Two species are known from the Western Hemisphere: *H. brevifrons* Walker, 1848 from North America and *H. conjungens* Schiner, 1868 from Brazil. The first species, *H. brevifrons*, was described and recorded based on materials from Alaska and the USA (Colorado, Utah, British Columbia, Ontario), as well as from Canada (Hardy & Takahashi, 1960; Krivosheina & Mamaev, 1986; Hardy, 1966; Papp & Krivosheina, 2009; Papp, 2010).

REMARKS. Larvae of *H. rohdendorfi* develop in the thickness of dead rotting wood of various deciduous species: elm, maakia, chosenia, alder, aspen, and birch. The larvae are most common in elm, chozenia and alder stumps, in fallen alder branches lying on the soil surface, in damp birch trunks lying on the ground (Primorsky Krai: Ussuriysky and Kedrovaya Pad Nature reserves). Larvae are usually not found under the bark. The larvae develop in relatively dense wood of different types of decay, affected by light and blackened rot, but are absent in brown rot. In large logs and stumps, the larvae are concentrated in peripheral areas, and small trunks colonize along the entire diameter, making longitudinal passages, usually forming colonies of up to several dozen specimens. In some biotopes, larvae reach such high numbers that they become an important factor in the process of natural destruction of wood. Adult larvae overwinter and move to the surface layers of the substrate before pupation (Krivosheina & Mamaev, 1967).

Larvae of *H. ninae* inhabit brown fragile wood of fallen *Fagus orientalis* where they were discovered at the periphery of the trunk together with the larvae of *Symmerus annulatus* (Meigen, 1830) (Ditomyiidae) (Krivosheina & Krivosheina, 2015).

Key to *Hesperinus* species from the Russian Far East and Japan

1. Gonostylus like broad apically pointed lobe with internal sclerotized conical protuberance in basal half (Fig. 1, 1). Tergite 9 with broad lateral lobes and medial deep emargination (Fig. 1) *H. rohdendorfi* Krivosheina et Mamaev
- Gonostylus without internal sclerotized conical protuberance in basal half (Fig. 2) 2
2. Gonostylus with curved at right angle apex forming flat broad plate (Fig. 2). Tergite 9 with shallow small medial emargination (Fig. 2) *H. cuspidistylus* Hardy & Takahashi
- Gonostylus oval, broadly rounded, with a small subapical tooth. Tergite 9 evenly narrowed medially with semicircular deep emargination (Hardy & Takahashi, 1960: 387, fig. 1e) *H. nigratus* Okada



Figs 1–2. Male genitalia of *Hesperinus* spp., dorsal view. 1 – *H. rohdendorfi*; 2 – *H. cuspidistylus*. Abbreviations: *ap aed* - aedeagal apodeme; *gcx* - gonocoxite; *gst* - gonostylus; *t9* - tergite 9.

Hesperinus cuspidistylus Hardy et Takahashi, 1960

MATERIAL. Russia: Khabarovsk Krai, region of Amur River estuary, “Ozerpakh fishery”, 24.VI 1915, 1♂, coll. V.V. Chernavin (ZMUM).

DESCRIPTION. Male. Predominantly dark colored species. Face, frons and occiput with rather dense gray pollination and sparse setose hairs. Base of flagellar segment 1 yellow. Scape and pedicel brownish. The antennae are generally densely pollinated with short yellowish-gray pubescens. Flagellar segment 1 is 4 times as long as scape and pedicel combined and about 2 times as long as flagellar segment 2 (4: 2.5). Palpi yellow-brown. Thorax brownish to black, the depressed area in front of the scutellum is grayish. Scutum with 3 light longitudinal stripes. The halteres are gray-yellow, the legs are yellow. The wing is light with a faint yellow-brown tint and transparent along the costal vein. The abdomen is dark brown to black, with dense gray-brown pollination, with short yellow hairs. The abdomen is almost 2 times longer than the head and thorax combined.

Genitalia with massive gonostyles curved almost at right angles, flattened at the apex after bending. Strong, long setae form a dense longitudinal row along the basal part and a longer and dense tuft at the bend (Fig. 2). Gonocoxites longitudinally elongated. The apodeme of the aedeagus is well sclerotized and has a diamond-shaped, smooth base and an expanded posterior end in the form of a cap, covered with numerous denticles. It differs from the closely related species *H. rohdendorfi* and *H. nigratus* primarily in the structure of the gonostyles.

Female is unknown (Hardy & Takahashi, 1960).

DISTRIBUTION. The species was described from the territory of the National Park in the center of Hokkaido (Japan). Here *H. cuspidistylus* is recorded from Russia for the first time.

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