

## Description of a new species of *Hesperinus* Walker, 1848 from the North Caucasus (Diptera: Hesperinidae)

### Описание нового вида рода *Hesperinus* Walker, 1848 с Северного Кавказа (Diptera: Hesperinidae)

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КЛЮЧЕВЫЕ СЛОВА: Hesperinidae, *Hesperinus*, новый вид, Северный Кавказ, Палеарктика

ABSTRACT. A third European species in the family Hesperinidae, *Hesperinus ninae* sp. n. from the North Caucasus (Krasnaya Polyana), Russia is described. The new species differs in shorter and broader first flagellomere and structure of male postabdomen and genitalia with projecting gonostylar lobe.

РЕЗЮМЕ. Третий европейский вид семейства Hesperinidae, *Hesperinus ninae* sp.n., описывается с территории Северного Кавказа (Красная Поляна). Новый вид отличается более коротким и широким первым флагелломером и строением постабдомена и гениталий с выступающей лопастью гоностилей.

#### Introduction

Krivosheina [1997] named Hesperinidae “a relict group of Diptera”, and indeed, its limited number of species has a special pattern of distribution (only a single genus with one Nearctic, one Neotropical and five Palaearctic species have formerly been known [Papp, 2010].

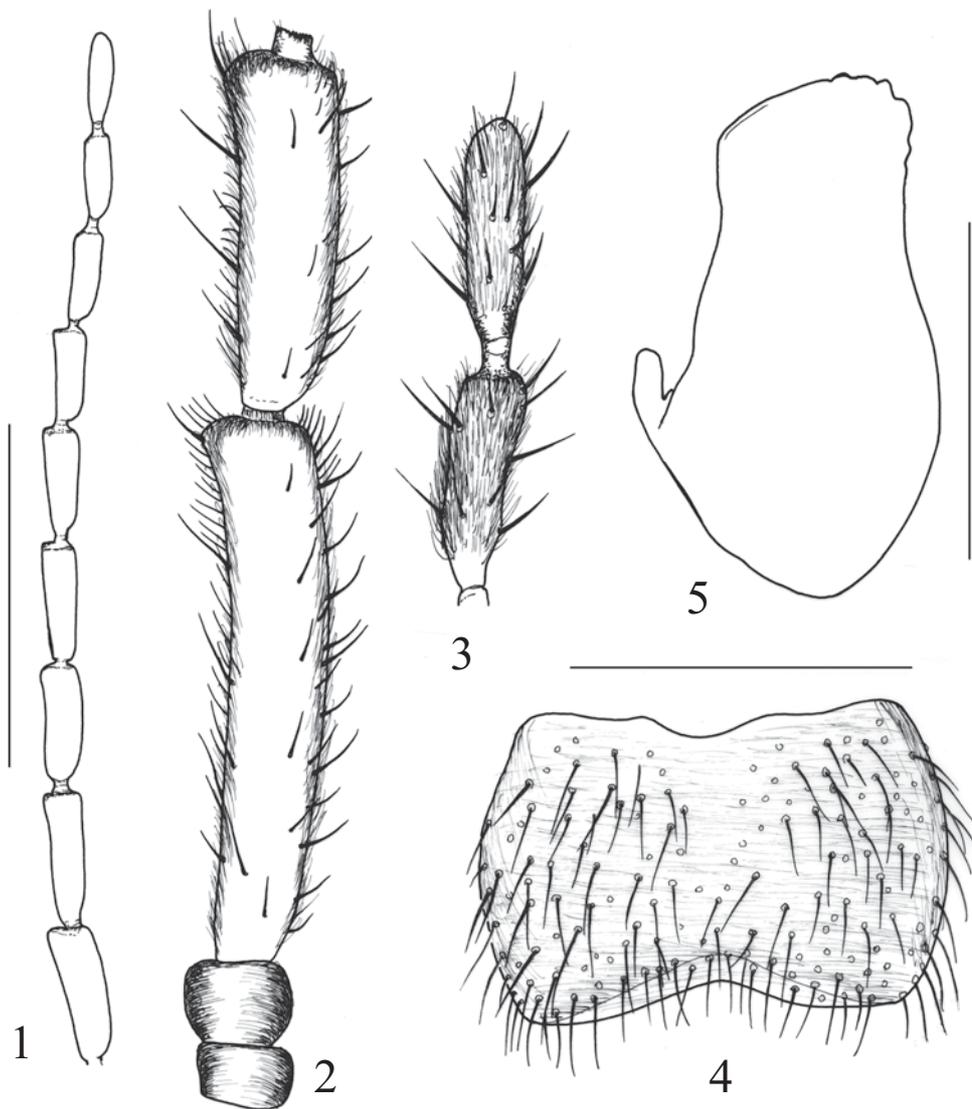
Even their relationship and position among the anisoneurine dipterous families are debatable. Krivosheina & Mamaev [1967] found synapomorphies for the larvae and pupae of Hesperinidae and Pachyneuridae against other families of Bibionomorpha but sporadic studies have been done on them hitherto. We discuss species level characters in this paper only.

Hesperinids are rare in collections, and as for the wider spread European species, *Hesperinus imbecillus*

(Loew, 1858), distributions data have formerly been unusually dubious. Papp [2010] studied several populations of *H. imbecillus* discussing their morphological distinctness, and he described the second European species, *H. graecus*. As Papp [2010] foresaw, the Krasnodarskiy Kray population must be most interesting, living so far from the other European populations. He managed to corroborate that it is a separate species. Formerly Mohrig, Mamaev & Matile [1975] studied males and females also from that locality. They managed to depict gonostylus, and male palpus of the “Nordkaukasus” population. Those have shown definite differences from those of the Austrian and Italian populations. In the Palaearctic Catalogue Krivosheina & Mamaev [1986] listed also “SET (Krasnodarskiy Kray)” under *Hesperinus imbecillus* (Loew, 1858). That must refer also to Krasnaya Polyana in the North Caucasus (Russia, not far from Sochi). Papp [2010] published three figures (his figs 58–60) in order to demonstrate its distinctness, but the formal description will be given in this paper.

#### Materials and methods

The material in this study was originally in the Diptera Collection of the A.N. Severtzov Institute of Ecology and Evolution, Russian Academy of Sciences. Originally four males and five females were captured. An unknown number of those specimens (probably two males, one female and one “intersex”) were sent to Germany to W. Mohrig by B. Mamaev in 1973/74 (see Mohrig et al., 1975). We did not manage to get information on the whereabouts of those specimens.



Figs 1–5. *Hesperinus ninae* sp.n., paratype male: 1 — outline of flagellomeres 2–10; 2 — 1<sup>st</sup> and 2<sup>nd</sup> flagellomeres; 3 — terminal (9<sup>th</sup> and 10<sup>th</sup>) flagellomeres; 4 — epandrium, dorsal view; 5 — contours of gonostylus, in widest view. Scales: 1.0 mm for Fig. 1, 0.4 mm for Figs 2–4, 0.2 mm for Fig. 5.

Рис. 1–5. Детали строения самца *Hesperinus ninae* sp.n. (паратип): 1 — членики 2–10 флагелломера; 2 — членики 1–2 флагелломера; 3 — терминальные (9–10) членики флагелломера; 4 — эпандрий, вид сверху; 5 — форма гоностилия, развернутого по максимальной ширине. Масштаб: 1.0 мм для рис.1; 0,4 мм для рис. 2–4; 0,2 мм для рис. 5.

The first author borrowed a male from the Severtzov Institute in the course of his former studies [Papp, 2010], which became later the paratype of the new species (abdomen and genitalia dissected). There only one additional male was found, which was not dissected and it became the holotype of the new species (see below).

The label data are quoted letter by letter; handwritten label data are given in quotation marks, whereas annotations of label data, incl. translation to English, are in square brackets; labels are separated by a “—” character.

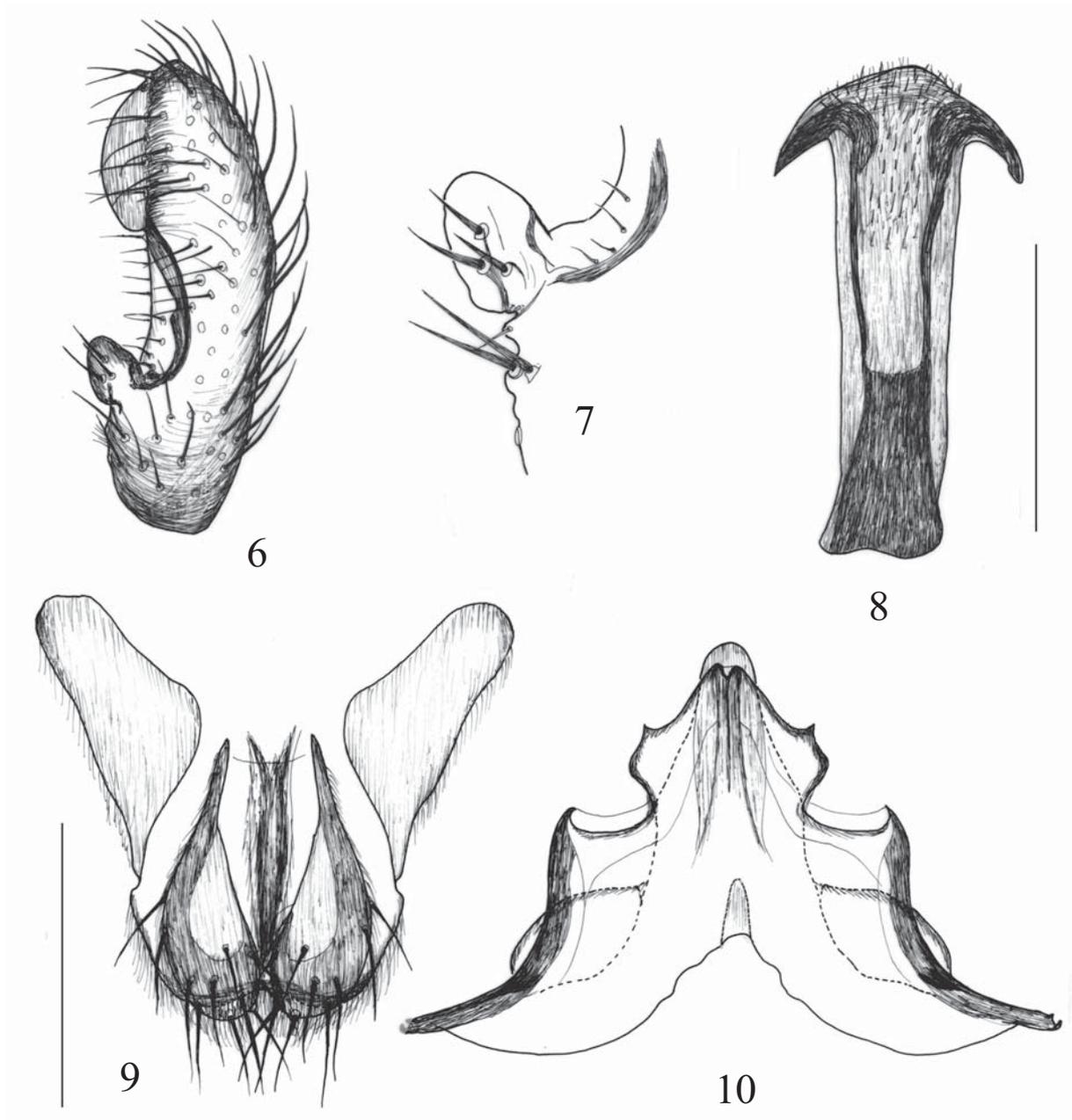
The terminology follows those in Sinclair [2000] and in Papp [2010]. Holotype of the new species is

kept in Zoological Museum Moscow University, paratype — in Hungarian Natural History Museum, Budapest.

*Hesperinus ninae* L. Papp & M. Krivosheina, **sp.n.**  
Figs 1–13.

Holotype male (ZMUM): “N227<sup>a</sup> 14. VI. 67, Кд. Їөүя, ìää. Áìðìòà [Krasnaya Polyana, Medvez’i Vorota (43.702204°N, 40.380738°E)]”. Paratype male (HNHM): same data — “*Hesperinus imbecillus*” N. Krivosheina det. 1990.

**DESCRIPTION** (based on paratype specimen). Holotype male. Body length 7.20, wing length 7.80, wing width 2.99. Intact, posterior legs: hind left leg without



Figs 6–10. *Hesperinus ninae* sp.n., paratype male: 6 — gonostylus, in the view perpendicular to the subapical process; 7 — subbasal process of gonostylus, in a view perpendicular to it; 8 — ejaculatory apodeme, dorsal view; 9 — proctiger, dorsal view; 10 — inner genitalia, dorsal view. Scales: 0.2 mm for Figs 6, 9–10, 0.1 mm for Figs 7–8.

Рис. 6–10. Детали строения самца *Hesperinus ninae* sp.n. (паратип): 6 — гоностиль, вид перпендикулярно субапикальному отростку; 7 — суббазальный отросток гоностыля сверху; 8 — эякуляторная аподема, вид сверху; 9 — проктигер, вид сверху; 10 — внутренние структуры гениталий, вид сверху. Масштаб: 0,2 мм для рис. 6 и 9–10, 0,1 мм для рис. 7–8.

2 apical tarsomeres and hind right leg without tibia and tarsi, fore and mid legs lost. Genitalia determinable well from dry specimen. Paratype male. Wings wrinkled, abdomen with male genitalia and left antenna are in a microvial with glycerol. Measurements in mm (paratype): length of head 0.44, length of thorax 1.29, head plus thorax 1.59, length of abdomen 4.63, total body length 6.21, wing length 5.98, wing width not

precisely measurable (wing wrinkled) but not less than 2.42.

Body grey, occiput almost black, humeri yellowish, mesonotum yellowish grey covered by whitish grey microtomentum.

Head comparatively small, frons broad also in male: head at broadest 0.74 mm, frons at that level 0.30 mm. Eyes oval, dichoptic, ocelli comparatively large, each



Figs 11–13. *Hesperinus ninae* sp.n., holotype male: 11 — general view; 12 — head and antennae, lateral view; 13 — wing.

Рис. 11–13. Детали строения самца *Hesperinus ninae* sp.n. (паратип): 11 — общий вид; 12 — голова и антенны, вид сбоку; 13 — крыло.

on small tubercles, ocelli form a triangle somewhat broader than an isosceles, occupying 1/3 of postfrons between eyes. Eye facets of equal size, eyes with scattered ommatiditrichia. Scape and pedicel sub-globular (only slightly longer than broad), antenna with 10 flagellomeres (Figs 1–3, 11) as in *H. imbecillus*. Antenna comparatively shorter than that of *H. graecus*, all flagellum 3.83 mm long. Length of left flagellomeres of the paratype (without distal necks): 0.56, 0.425, 0.375, 0.345, 0.36, 0.33, 0.285, 0.27, 0.26, 0.27, width of 5<sup>th</sup> flagellomere 0.08 mm (Figs 1–3). Distal dorsal corners of first flagellomere and that of the next ones distinct (Fig. 2), contrarily to those on *H. imbecillus* [Papp, 2010: fig. 1]. First flagellomere 0.15 mm thick at middle covered with fine microtrichia, and bears short stiff spiniform setae. Tenth (terminal) flagellomere (Fig. 3) not globular but cylindrical, 0.25 mm long, i.e. five times longer than broad, with long setae all around.

Pronotum well visible in dorsal view, humeri protruding. Mesoscutum with several not wholly arranged white setulae in acrostichal dorsocentral and intra-alar rows. Metanotum flat, insertion of abdomen is rather caudal and on a comparatively large surface of thorax. Membrane of wing light brown, veins darker brown, pterostigma indistinct. Costa continued to slightly more than halfway (one third in holotype) on section of apices of  $R_5$  and  $M_1$ . Vein  $R_4$  with dorsal setae on its apical 1/3. Costal sections (H to apex of Sc, to  $R_1$ ,  $R_1$ – $R_4$ ,  $R_4$ – $R_5$ ) of paratype male: 272–122–67–130 (1 unit = 0.011 mm), that is, vein  $R_4$  much longer than that of *H. graecus*. r–m cross-vein 0.28 mm. Setae present on

dorsal side of  $R_1$ ,  $R_5$ ,  $R_5$ , also on  $M_1$ ,  $M_2$ ,  $M_3$  and some also on apical part of  $Cu_1$ . Several setae on membrane of cells  $r_4$  and  $r_5$  apically-subapically. Halter dark, length (except for basal part) 1.15 mm, no long setula on stalk, the longest 0.07 mm. Femoral and tibial setulae fine and dense, and not ordered into rows. Tibial spurs ?1+2+2, more or less developed and hairy (fore tibia lost). Metatarsi long, almost as long as other tarsomeres combined. No anterior or posterior combs of small thornlets at apices of tibiae. Tarsal claws simple, short, pulvilli and empodium minute. Length of tarsomeres on mid leg: 106, 50, 38 units, 4<sup>th</sup> and 5<sup>th</sup> tarsomeres lost. Length of tarsomeres on hind leg: 120, 55, 40, 25, 22 units (1 unit = 0.011 mm).

Abdomen very long with 8 normal abdominal segments, we name the 8<sup>th</sup> as postabdominal. In each segment tergite and sternite almost meet laterally, i.e. intervening membranous area rather small. Spiracle pairs 1–7 are situated in membrane. Male postabdomen and genitalia are as given in Figs 4–10. Tergite 8 twice broader than long, in contrast to the mostly quadratic tergite 8 of *H. imbecillus*. Sternite 8 very short, proximal (cranial) middle part strongly and unevenly emarginated. Epandrium (Fig. 4) somewhat longer than its half width (strongly varying in *H. imbecillus*), cranial part bare, setae on central part scattered. Microtrichia on epandrium are uneven, in groups of 2–4 detectable in higher magnification, as in Papp [2010: fig. 49]. Gonocoxites much broader than long; medio-cranial gonocoxal apodemes strong and thick. Gonostylus (Figs 5–6) rather broad in widest view, we saw them as

slightly asymmetrical; subapical medial lobe long but not particularly broad, sub-basal process obviously double, but not much projecting. Cerci and hypoproct (Fig. 9) structurally as in *H. graecus*, cerci rather broad with long setae, hypoproct with shorter and distinctly thinner setae. Ejaculatory apodeme (Fig. 8) symmetrical, distal apex broad and cut. Inner genitalia (Fig. 10) largely triangular in dorsal and ventral view, phallus rather narrowly rounded at apex. As Papp [2010] mentioned, parameres, phallus and ejaculatory apodeme form the intricate inner genitalia, where phallus is minute (see also Sinclair, 2000: figs 2.8–11 for *H. brevifrons* Walker).

Female not studied and not seen now, but based on Mohrig et al.'s [1975] record, females must be flightless with very much reduced wings. They depicted a female (their Abb. 1) and they did not say that the females from the Caucasus would be different from females in Central Europe.

**DIAGNOSIS.** The new species differs from *H. graecus* L. Papp, 2010 in the following differentiating features. First flagellomere shorter and broader (Fig. 2), setose on dorsal and ventral surface but laterally and medially almost devoid of longer setae. Male postabdomen and genitalia (Figs 4–10) with projecting gonostylar lobe are different from those of the other two European species.

**ETYMOLOGY.** The specific epithet “ninae” was given to the honour to Dr Nina P. Krivosheina, to appreciate her outstanding achievements in various fields of dipterology.

## Discussion

As Papp [2010] mentioned, two extra-European species had been studied during his work, namely *Hesperinus nigratus* Okada, 1934 and *Hesperinus rohden-dorfi* Krivosheina & Mamaev, 1967. Since all the three East Palearctic species (*H. cuspidistylus* Hardy & Takahashi, 1960, *H. nigratus* Okada, 1934 and *H. rohden-dorfi* Krivosheina & Mamaev, 1967: Russian Far East (Primorskiy kray, Kuril Is., and Japan (Hokkaido, Honshu) (see more in Krivosheina & Mamaev, 1986), as well as *H. graecus* L. Papp, 2010 have elongate cylindrical 10<sup>th</sup> flagellomere, we have to assume that

the form must be of the plesiomorphic state. If so, populations of *H. imbecillus* with its globular 10<sup>th</sup> flagellomere have separated from *H. graecus* on one side, and from *H. ninae*, on the other, in a later phase of the glacial ages. Those populations of *H. imbecillus* inhabited a wide belt from South Alps through the Dinarian and Balkan Mountains to the South Carpathian. After the last glacial age those populations have become isolated in their cool and wet habitats and they are going to become (or have become) distinct species each [Papp, 2010]. In *H. imbecillus* an assumption of a strong isolation is deeply underlined by the main feature of this species, the flightless female sex. The situation must be quite the same in *H. ninae*, where the female also flightless [Mohrig et al., 1975].

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