

Mayflies of the Crimean Peninsula. III. The description of *Baetis milani* sp. n. with notes on taxonomy of the subgenus *Rhodobaetis* JACOB, 2003 (Ephemeroptera: Baetidae)

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Abstract. *Baetis* (*Rhodobaetis*) *milani* sp. n. (larva, as well as reared male and female subimago and imago) is described from numerous localities in foothills and mountains of the Peninsula. Critical distinguishing characters are illustrated and available data on biology and distribution of the new species are summarized. Taxonomic characters of West Palaearctic species of the subgenus *Rhodobaetis* JACOB, 2003 are discussed in detail.

Key words: Ephemeroptera, Baetidae, *Baetis*, *Rhodobaetis*, new species, Crimean Peninsula.

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I. INTRODUCTION

This paper is the third part of a series of works which deal with mayflies of the Crimean Peninsula, namely with species of the genus *Baetis* LEACH, 1815 (the subgenus *Rhodobaetis* JACOB, 2003). The first species of *Rhodobaetis* from the Crimea, *B. braaschi* ZIMMERMANN, 1980 was described from the Southern Coast of the Peninsula (ZIMMERMANN, 1980a) and attributed by the author to *rhodani* species-group s. MÜLLER-LIEBENAU (1969). Later on, KISELEVA & VASYUTA (1984) and TEMIROVA, PARTOLAKHA & TUROBOV (1984) recorded "*B. rhodani*" in rivers discharging into Simferopol' Reservoir and in to the Biyuk-Karasu River. In following works this taxon was cited from northern slopes of the Crimean Mountains (see KISELEVA, 1993, 1997). Information on availability of *B. stipposus* KLUGE, 1982 in the Crimea, which had been previously described from Central Asia by KLUGE (1982), was published by NOVIKOVA (1987). This species was repeatedly cited by KISELEVA (1987, 1992, 1997) from foothill sections of the Crimean rivers. GODUNKO &

PROKOPOV (2003) have described *B. rhodani tauricus* GODUNKO & PROKOPOV, 2003 both on the basis of their own material and G. A. KISELEVA's collection. The nominal subspecies *B. rhodani rhodani* PICTET, 1843 has not been found in the Crimea during many-year investigations. Finally, GODUNKO et al. (2004) have published the redescription of little known species *B. braaschi* with the depiction of larva and imago male in detail, and confirmed its synonymy with *B. stipposus*.

The present paper deals with a description of adults and larvae of a new species found in the Crimean Peninsula. The bionomics and distribution of this species are briefly stated, range of subgenus *Rhodobaetis* is discussed. Main morphological characters of male imagines and larvae of West Palearctic species of *Rhodobaetis* have been presented and compared.

A c k n o w l e d g m e n t s. We are sincerely indebted to Milan PUTZ for the material kindly placed at our disposal and to Iryna B. KONOVALOVA for help in English version of the paper. This study has been carried out owing to the cooperation between the Academy of Sciences of Czech Republic and the National Academy of Sciences of Ukraine.

II. SYSTEMATICS

Baetis milani sp. n.

(Figs 1-28)

Baetis [sic!] *rhodani* RICTET [sic!]: KISELEVA & VASYUTA, 1984: 143 (partim)

Baetis rhodani: TEMIROVA, PARTOLAKHA & TUROBOV, 1984: 137; KISELEVA, 1993: 163 (partim)

Baetis [sic!] *rhodani* MULL [sic!]: KISELEVA & EZERNITSKII, 1985: 112 (partim)

Baetis [sic!] *rhodani*: KISELEVA & VASYUTA, 1986: 57 (partim)

Baetis [sic!] gr. *rhodani*: KISELEVA, 1997: 39 (partim)

M a t e r i a l e x a m i n e d. Holotype: male imago, Ukraine, Autonomous Republic of the Crimea, small right tributary of Guva River, Uch-Kosh gap, 21.VI.2002, leg. G. A. PROKOPOV. Paratypes: 7 male imagines, 11 male subimagines, 4 female imagines, 1 female subimago, from the same locality and date as holotype, leg. G. A. PROKOPOV; 2 female imagines, Ukraine, Autonomous Republic of the Crimea, middle part of Uchan-Su River, 13.IV.2002, leg. G. A. PROKOPOV; 2 male imagines, 2 male subimagines, 6 female imagines, Ukraine, Autonomous Republic of the Crimea, Kyzyl-Kobinka River (150 m downstream of "Hidropost"), 14.VI.2002, leg. G. A. PROKOPOV.

Other specimens (not type). Ukraine, Autonomous Republic of the Crimea: 8 larvae, upper part of Al'ma River, 12.IV.1984, leg. G. A. KISELEVA; 9 larvae, 1 larval skin, Eastern Ulu-Uzen' River, 16.VII.1989, leg. KUZNETSOVA & LYSINKINA; 13 larvae, Chorna River, 16.VII.1989, leg. KUZNETSOVA & LYSINKINA; 32 larvae, upper part of Guva River, 16.VI.1998, leg. G. A. PROKOPOV; 20 larvae, down part of Voron River, 16.VII.1998, leg. G. A. PROKOPOV; 3 larvae, middle part of Shelen River, 20.VII.1998, leg. G. A. PROKOPOV; 26 larvae, Khasta-Bash River, 31.V.1999, leg. R. J. GODUNKO; 64 larvae, upper part of Kyzyl Koba River near Pereval'ne village, 2.VI.1999, leg. R. J. GODUNKO; 37 larvae, upper part of Burul'cha River, W slope of Yuki-Tepe Mt., 3.VI.1999, leg. R. J. GODUNKO; 9 larvae, Uchan-Su River (near Uchan-Su waterfall), 17.IX.1999, leg. G. A. PROKOPOV; 53 larvae, Guva River (Uch-Kosh gorge), 20.IX.1999, leg. G. A. PROKOPOV; 14 larvae, upper part of Guva River, 24.V.2000, leg. G. A. PROKOPOV; 21 larvae, Voron River, 4.VI.2000, leg. G. A. PROKOPOV; 34 larvae, down part of Shelen River, 7.VI.2000, leg. G. A. PROKOPOV; 65 larvae, down part of Eastern Ulu-Uzen' River, 11.VI.2000, leg. G. A. PROKOPOV; 73 larvae, stream near Pryvitne village, 18.VI.2000, leg. R. J. GODUNKO & M. PUTZ; 24 larvae, Khasta-Bash River, 20.VI.2000, leg. R. J. GODUNKO & M. PUTZ; 2 male subimagoes, 2 female imagoes, 2 females subimagoes, 64 larvae, middle part of Eastern Ulu-Uzen' River, 28.VII.2000, leg. G. A. PROKOPOV; 1 female imago, 1 female subimago, 25 larvae, Eastern Ulu-Uzen' River near Solnechnogorskoe village, 28.VII.2000, leg. G. A. PROKOPOV; 13 larvae, upper part of Eastern Ulu-Uzen' River (near water-

falls), 15.X.2000, leg. G. A. PROKOPOV; 9 larvae, Eastern Ulu-Uzen' River near General's'ke village, 15.X.2000, leg. G. A. PROKOPOV; 28 larvae, Eastern Ulu-Uzen' River near General's'ke village, 2.V.2001, leg. G. A. PROKOPOV; 46 larvae, 2 female imago, middle part of Eastern Ulu-Uzen' River, 2.V.2001, leg. G. A. PROKOPOV; 1 male imago, 12 larvae, Al'ma River (higher than a trout facilities), 28.VI.2001, leg. G. A. PROKOPOV; 2 larvae, Al'ma River (near trout facilities), 28.VI.2001, leg. G. A. PROKOPOV; 38 larvae, 1 larval skin, Al'ma River near Asport Boundary, 29.VI.2001, leg. G. A. PROKOPOV; 18 larvae, Al'ma River near Sosnovyi Boundary, 1.VII.2001, leg. G. A. PROKOPOV; 11 larvae, Chorna River (source of the river near Rodnikovskoe village), 9.VII.2001, leg. G. A. PROKOPOV; 2 larvae, Alaka River near Dzhurla waterfall, 18.VII.2001, leg. G. A. PROKOPOV; 54 larvae, Uzundzha River (upper then Kolhoznoe village), 2.V.2002, leg. G. A. PROKOPOV; 7 larvae, Uzundzha River (upper then Rodnikovskoe village), 3.V.2002, leg. G. A. PROKOPOV.

All adults of type series were reared from larvae. The specimens were preserved in 80% alcohol. All larval skins of type specimens are mounted on microscopic slide. The holotype and some paratypes are housed in the collection of the State Museum of Natural History, National Academy of Sciences of Ukraine (L'viv). Some other paratypes can be found in the Institute of Entomology, Academy of Sciences of the Czech Republic and in the collection of G. A. PROKOPOV.

Description. *Male imago.* Length: body 7.0-7.6 mm; fore wings 5.9-6.7; cerci 13.0-14.0 mm; length of fore legs: femora + tibiae = 2.9-3.0 mm; tarsal segments: T1 = 0.67-0.75 mm; T2 = 0.65-0.67 mm; T3 = 0.35-0.37 mm; T4 = 0.20-0.25 mm; general ratio of tarsal segments length: 1>=2>3>4 (Fig. 3). General color of body light, yellow to light brown. Head yellow to light brown. Antennae light brown. Flagellum slightly darker proximally. Ocelli black at the base and yellowish apically. Eyes surrounded by a yellowish ring. Turbinate eyes oval in dorsal view with convex external margin (Fig. 2). Facetted surface of turbinate eyes orange, sometimes surrounded by a brownish ring. The shaft lighter than facetted surface, yellow or yellowish-brown. Basal part of turbinate eyes shaft with apparently narrow orange or light brown ring (Fig. 1).

Thorax light, yellow to light-brown, with some brownish maculation dorsally and laterally. Pronotum with dark smudges centrally. Dorsal part of thorax with longitudinal light brown strip. Metanotum darker than pro- and mesonotum, brownish color. Fore wings hyaline, transparent. Pterostigma only slightly opaque, with 5-9 simple cross veins, some of them with pronounced bifurcation. Venation yellowish to light brown. Hind wings hyaline, transparent, with three simple longitudinal veins and distinct costal process typical of subgenus *Rhodobaetis* (Fig. 4). Legs light, yellow to yellowish-brown. Femora and tibia of fore legs light, yellow. Femora with hardly visible smudges distally. Tibiae slightly darker distally. Tarsal segments yellowish-brown, segment 4 darker apically. Middle and hind legs the lightest, uniformly yellow.

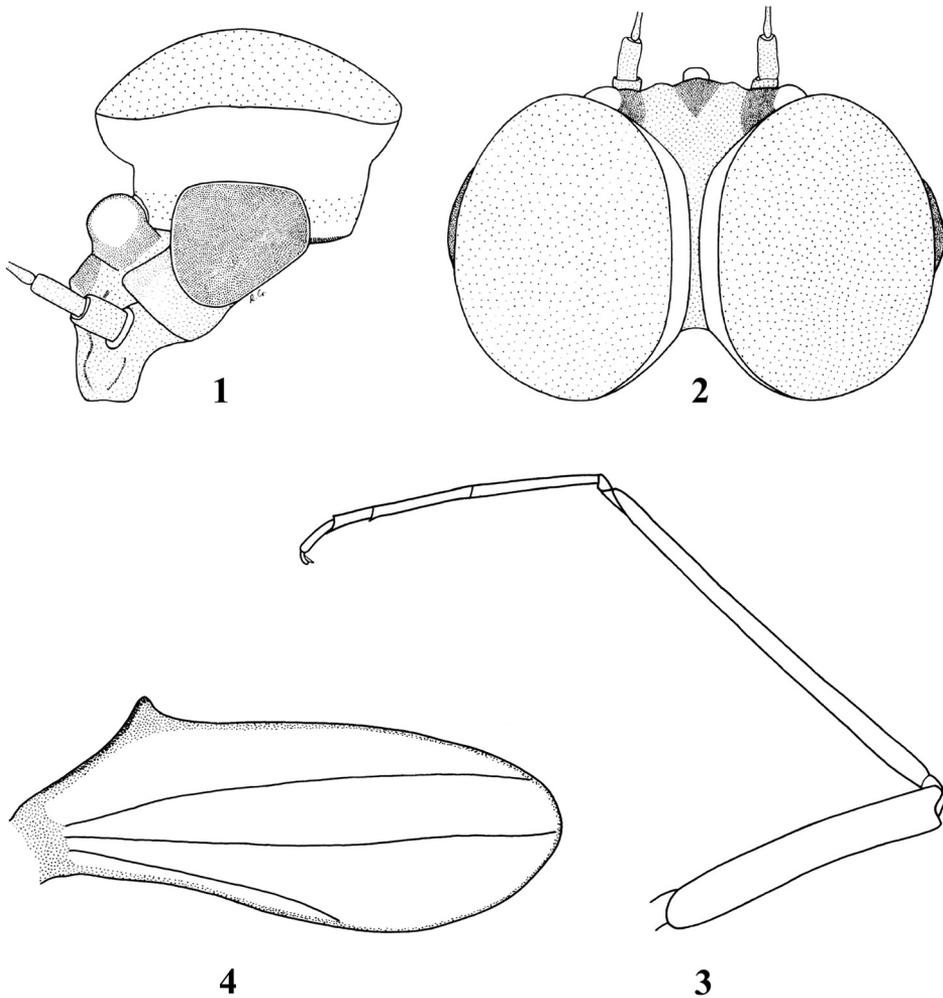
Abdominal tergum I darker than others. Terga II-X uniformly yellowish-brown to light brown. Occasionally terga VII-X slightly darker. Posterior margin of terga sometimes with narrow reddish-brown band. Lateral part of terga with brownish smudges. Sterna the same color that terga, with small unclear spots. Cerci yellowish-white to yellowish-brown, slightly darker at the base. Joints of caudal segments dark.

Genitalia yellow to light brown. Basal segment of forceps nearly as long as wide (Figs 5, 6). Segment 1 relatively wide at the base with subparallel margins. Segment 2 elongated and narrow, widening towards segment 3, the widened distal part being as long as 1/2 the segment length. Inner margin of segment 2 slightly concave. Segment 3 of various structure, oval or slightly elongated, with more or less truncate inner margin (Figs 5, 6).

Female imago. Length: body 8.0-8.5 mm; fore wings 7.8-8.3; cerci 10.0-11.0 mm. General color of body yellow to yellowish-brown, sometimes distinctly brown, darker than in male imago.

Head uniformly yellow or light brown. Antennae with brownish flagellum, darker than head. Eyes and base of ocelli black; apical part of ocelli whitish.

Thorax with brownish bands dorsally and laterally. Wings hyaline, transparent. Pterostigma slightly milky color. Venation light brown to brown. Legs uniformly yellow to yellowish-brown. Fore legs slightly darker than middle and hind ones. All femora distally with diffuse smudges. Distal part of tibiae and tarsi darker than femora. Abdominal terga yellow to yellowish-brown, with



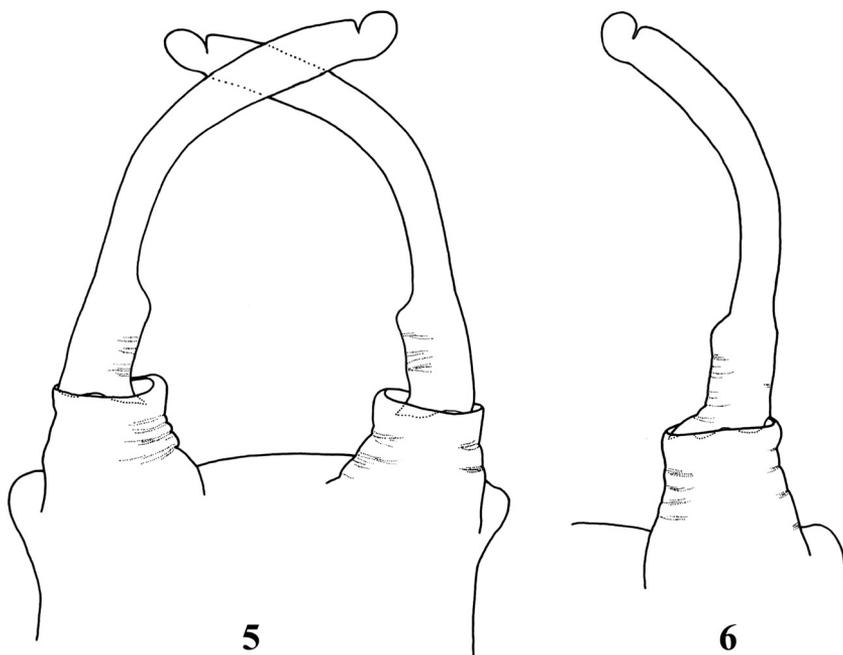
Figs 1-4. *Baetis milani* sp. n., male imago: 1 – head (lateral view); 2 – head (dorsal view); 3 – fore leg; 4 – hind wing.

brownish band near posterior margin. Sterna lighter than terga, with small spots centrally. Cerci yellow to yellowish-brown.

Male subimago. Length: body 6.4-7.2 mm; fore wings 5.6-6.0; cerci 9.1-11.2 mm. General color of body yellowish-brown to light brown with light greyish ting.

Head yellow to yellowish-brown. Antennae generally the same color that head, flagellum slightly darker apically. Eyes and basal part of ocelli black. Ocelli whitish apically. Facetted surface of turbinate eyes light orange, sometimes with narrow marginal ring. The shaft lighter, yellow, with well visible narrow brownish ring basally.

Thorax yellowish-brown to light brown with brown or black bands. Wings uniformly yellowish-grey. Venation yellowish. Legs yellowish-brown. Fore legs the same color that middle and hind legs. All femora with clear dark spots distally. Joints of leg segments dark.



Figs 5-6. *Baetis milani* sp. n., male imago: 5-6 – genitalia (ventral view).

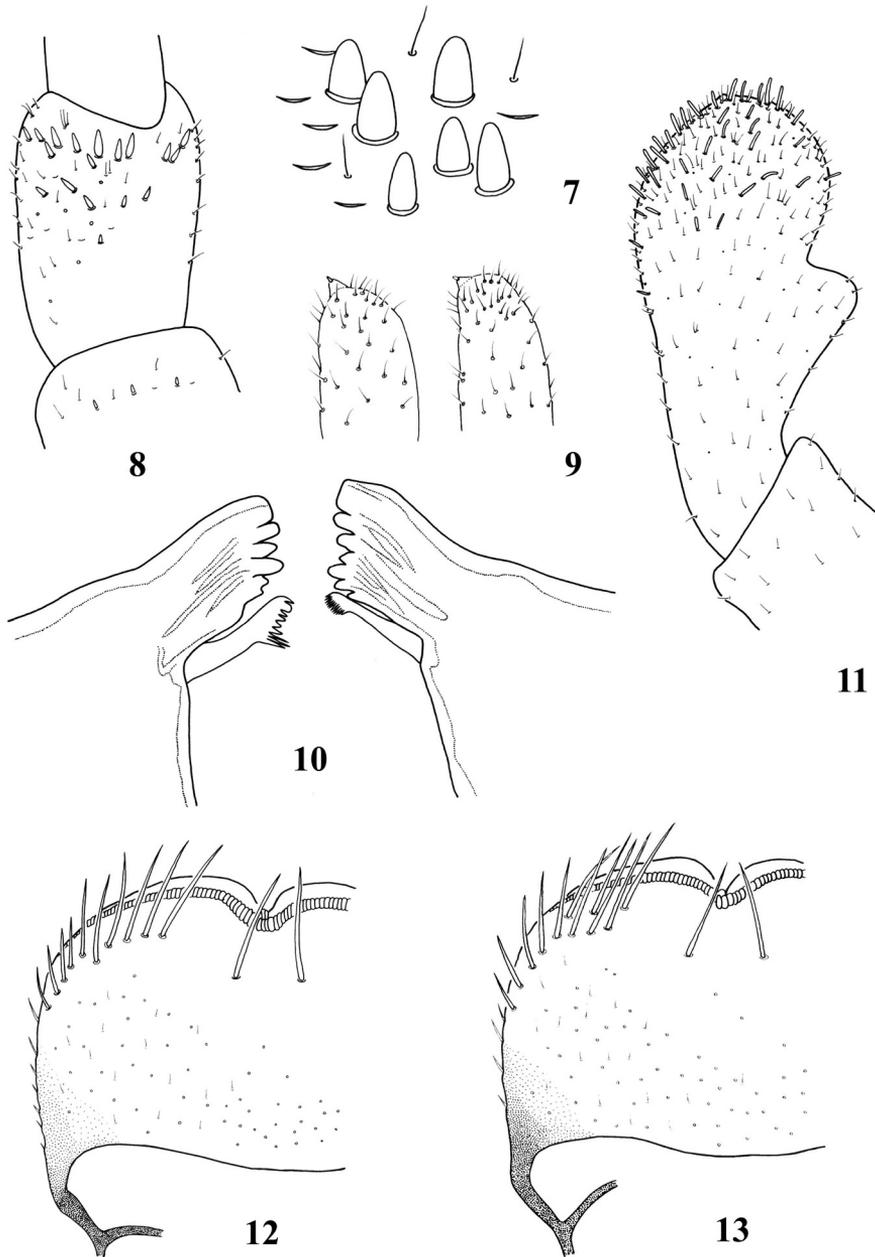
Abdominal terga yellowish-brown, with some small central spots and *L*-shaped light spots laterally. Sterna the same color that terga, with light spots near anterior part of segments. Cerci uniformly yellowish-brown.

Female subimago. Length: body 6.8-8.4 mm; fore wings 7.4-7.6; cerci 8.2-8.7 mm. General color of body similar to male subimago, somewhat lighter.

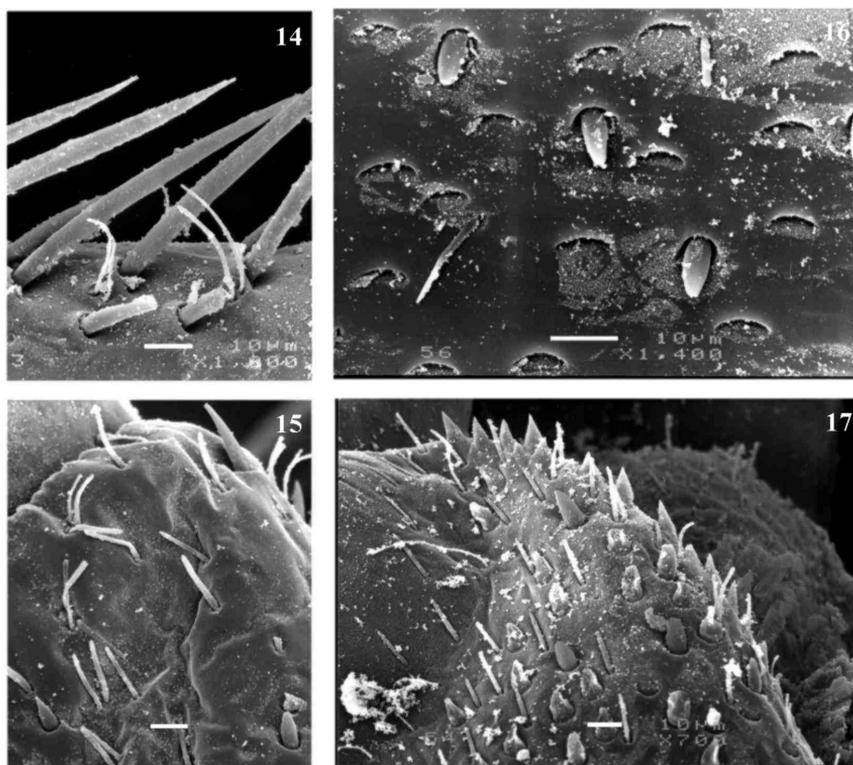
Mature larva. Length of body: 7.5-8.5 mm (male larva), 7.7-9.4 mm (female larva); length of cerci: 4.6-6.0 mm; length of terminal filament: 2.9-4.3 mm. General color of body yellowish-brown to brown.

Head yellowish-brown, antennae slightly darker. Numerous spatulas on the frons surface with margins convergent apically (Fig. 7). Surface of larval turbinate eyes dark orange, with yellowish ring around the margin. Pedicel with elongated, sharply pointed or bluntly pointed scales arranged in one irregular row or scattered over the segment surface (Figs 8, 15). Scape with small scales and fine hairs. Labrum distinctly wide (the width/length ratio = 1.42), with 1 + 6-10 (mainly 7-9) long submarginal bristles arranged in one regular or irregular row (Fig. 12), occasionally in two rows (Fig. 13). Labrum laterally with few fine bristles. Apical part of segment 2 of maxillary palps with well visible scales on rounded projection and fine hairs (Fig. 9). First tooth of mandibular incisor approximately quadrate, other teeth relatively rounded (Fig. 10). Segment 3 of labial palp rounded, relatively wide, only slightly asymmetric. The length/width ratio of segments 2+3 of labial palps = 2.0 (in *B. rhodani rhodani* mainly 2.0 (THOMAS & SOLDÁN, 1987); in *B. rhodani tauricus* is 2.0-2.2 (GODUNKO & PROKOPOV, 2003)) (Fig. 11). Glossae and paraglossae relatively narrow (Figs 18, 19). Paraglossae with three regular rows of bristles at the apex.

Thorax yellowish-brown to brown. Pronotum with a pair of central oval diffuse spots and pair of smudges laterally. Medial longitudinal strip generally present. Mesonotum with yellowish-brown longitudinal bands and light spots near larval wing base. Legs yellowish-brown to brown. Femora with central diffuse large dark spot or with small spot distally. External margin of femora with dense row of fine long setae sharply pointed at the apex and arranged in 2-3 rows proximally (in central



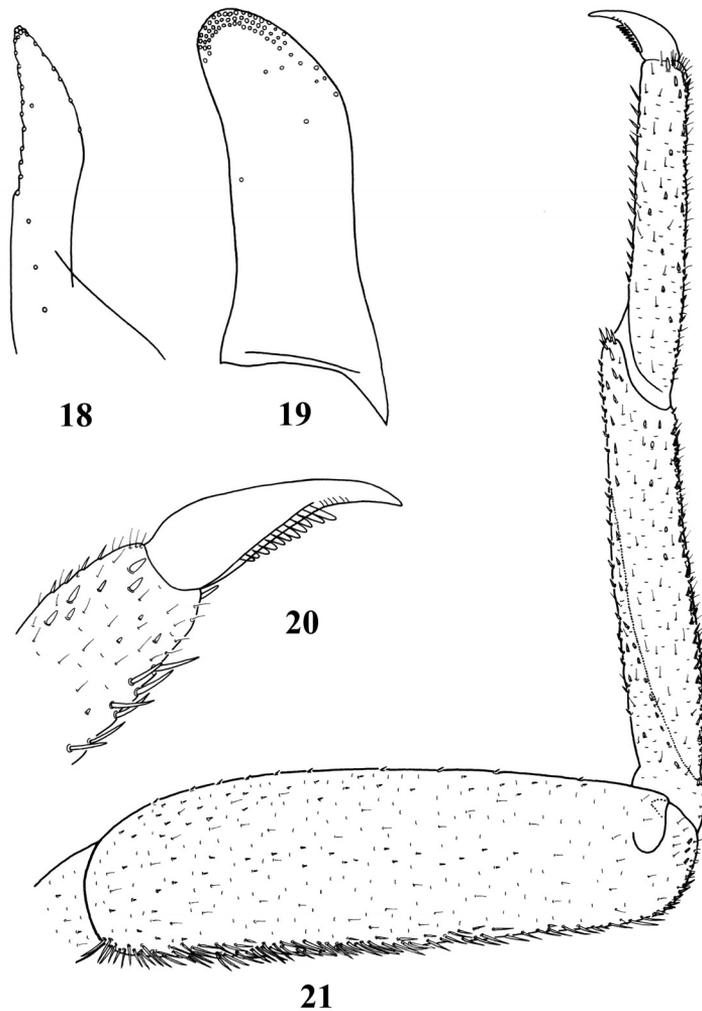
Figs 7-13. *Baetis milani* sp. n., larva: 7 – surface of frons; 8 – base of antenna; 9 – apex of maxillary palps; 10 – mandibular incisors; 11 – labial palp; 12-13 – labrum.



Figs 14-17. *Baetis milani* sp. n., larva: 14 – posterior margin of femur; 15 – surface of pedicel; 16 – surface of tergite 4; 17 – surface of paraproct plate. Scale bar = 10 μ m.

part of femora in 1-2 rows) (Fig. 21). These setae distinctly thinner and longer than in *B. rhodani rhodani* and similar to those of *B. rhodani tauricus* (Fig. 14). Inner margin of femora with small spines. Surface of femora with spines and spatulas, spine bases, hardly visible triangular scales and fine hairs. Tibiae the same color that femora or slightly darker. Tarsi brown, distinctly darker distally. External and inner margin of tibiae and tarsi with spines and fine hairs. Occasionally tarsi with two rows of spines distally (Fig. 20). Tarsal claw brown, relatively elongated, with 9-12 teeth and without hairs apically.

Abdominal terga yellowish-brown to light brown, occasionally dark brown: tergum I generally light, with diffuse central spot; terga II and III generally uniformly color, with two central oval spots and some small spots; tergum IV light, with large central spot and two small spots; tergum V the lightest, only with one central light spot and longitudinal darker spots laterally; color of terga VI-VIII generally similar to terga II and III; terga IX and X light, generally uniformly color, without distinct spots. Medial longitudinal strip well visible on all terga. Lateral part of all terga with broad light spots. Posterior margin of abdominal terga with narrow dark brown strip. Sterna lighter than terga. Posterior margin of abdominal terga of different structure: posterior margin of terga I-V (occasionally terga I-VI) generally with irregular row of sparse spatulas with margins distinctly convergent apically and with bluntly pointed spatulas alternating with fine hairs only; terga VII and VIII (occasionally tergum IX) with more or less regular row of triangular spines alternating with scales and fine hairs; terga IX and X generally with prevalence of triangular spines (Fig. 22). Surface of terga with sharply pointed or bluntly pointed scales, numerous broad triangular scales and fine hairs (Fig. 16). Gill 1 slightly asymmetric, with hardly visible tracheization (Fig. 24). Its external margin mainly without spines. Gills 2-6 distinctly asymmetric with row of spines on external margin (Fig. 23). Gill 7 apparently symmetrical with spines on external margin (Fig. 25). Paraproct

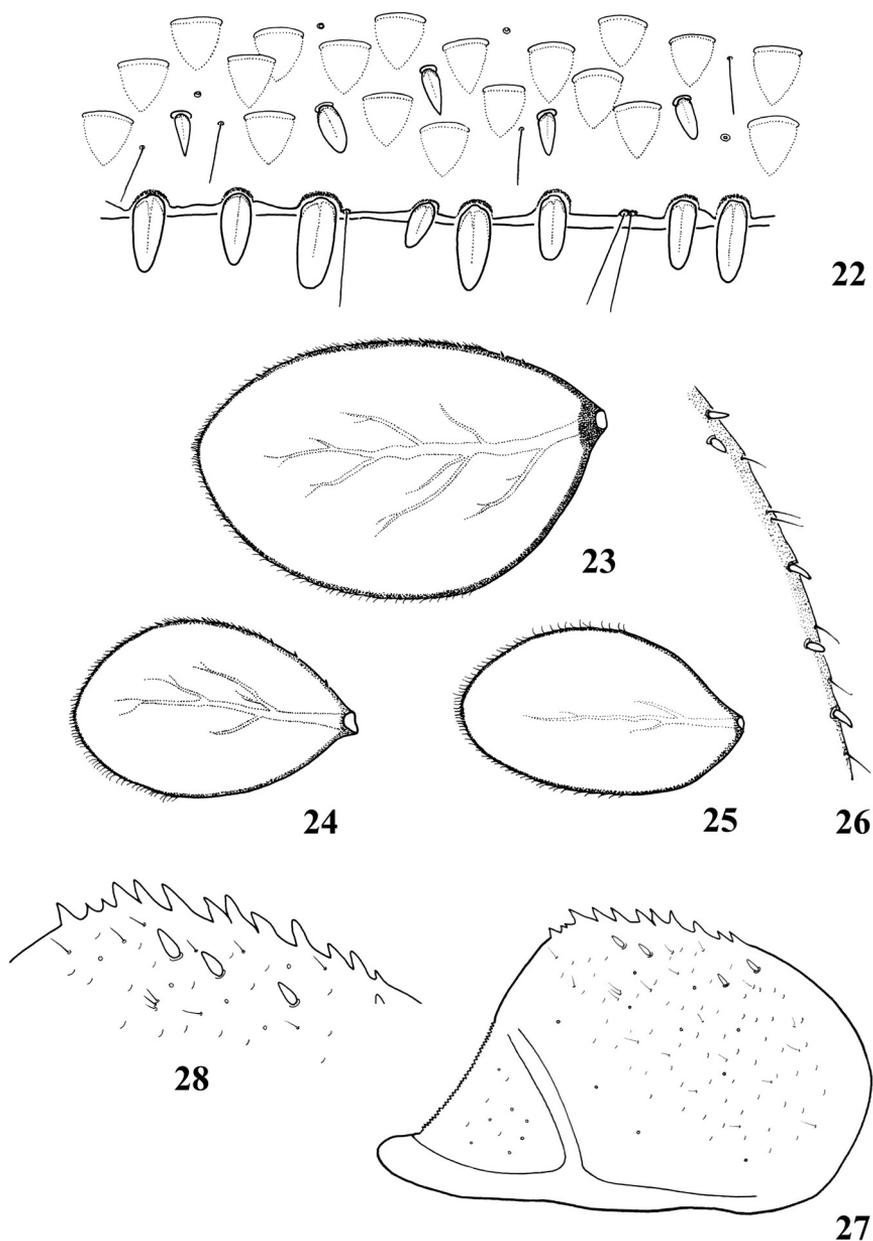


Figs 18-21. *Baetis milani* sp. n., larva: 18 – glossa; 19 – paraglossa; 20 – tarsal claw; 21 – hind leg.

plate with 9-14 teeth on the margin (Figs 27, 28). Surface of paraproct with a few sharply pointed scales, bases of scales and fine hairs (Figs 17, 27). Cerci yellowish-brown to brown, distinctly darker apically. Terminal filament $3/4$ the cerci length.

A f f i n i t i e s. *B. milani* sp. n. clearly belongs to *Rhodobaetis* and occupies a relatively isolated position among other species of the subgenus. This species can be distinguished by the following combination of characters: in imago male: (I) light color of body; (II) faceted surface of turbinate eyes orange; (III) shaft yellow or yellowish-brown; (IV) segment 2 of forceps elongated and narrow, widening towards segment 3, the widened distal part being as long as $1/2$ the segment length; in larva: (V) frons surface with numerous spatulas with margins convergent apically; (VI) pedicel with sharply pointed or bluntly pointed scales; (VII) scape with small scales; (VIII) labrum distinctly wide with 1 + 6-10 long bristles arranged in one row (rarely in two rows); (IX) apical part of segment 2 of maxillary palps with well visible scales; (X) segment 3 of labial palp rounded, rela-

tively wide, only slightly asymmetric; (XI) paraglossae with three regular rows of bristles at the apex; (XII) external margin of femora with dense row of fine long setae sharply pointed at the apex and arranged in 2-3 rows proximally; (XIII) tarsal claw with 9-12 teeth and without hairs apically; (XIV) decoration of posterior margins and surface of abdominal terga; (XV) gills 2-6 distinctly asymmetric with row of spines on external margin; (XVI) paraproct plate with 9-14 teeth on the margin and sharply pointed scales on the surface; (XVII) terminal filament $\frac{3}{4}$ the cerci length. By



Figs 22-28. *Baetis milani* sp. n., larva: 22 – posterior margin of abdominal tergite 4; 23 – fourth gill; 24 – first gill; 25 – seventh gill; 26 – external margin of fourth gill; 27 – paraproct plate; 28 – inner margin of paraproct plate.

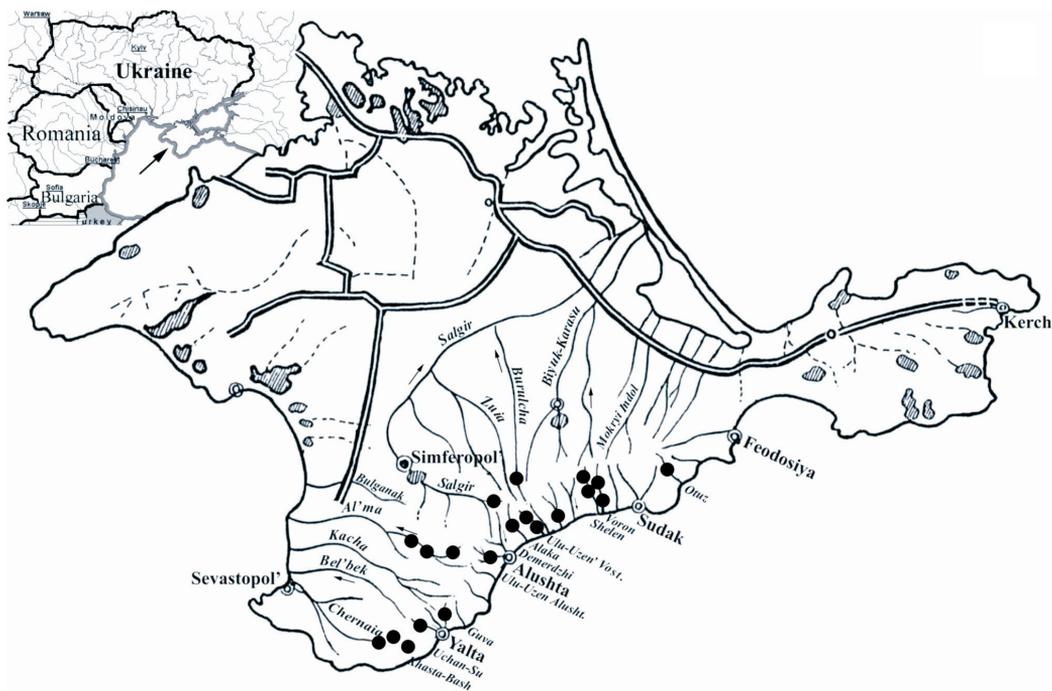


Fig. 29 – Distribution of *B. milani* sp. n. in the Crimean Peninsula.

combination of larval characters (VI-VIII, XII, XIV-XVI) *B. milani* sp. n. clearly differs from other species of the subgenus *Rhodobaetis*. Male imago of a new species markedly differs from other species of the subgenus by the color of turbinate eyes and body. *B. milani* sp. n. can be easily distinguished from other species of *Rhodobaetis* from the Crimean Peninsula, viz., *B. braaschi* and *B. rhodani tauricus*: from the first one by a number of characters in male imago (II-III) and in larva (VI-X, XII, XIV-XVI); from the latter one by a number of characters in male imago (I-III) and in larva (VI, VII, XIV, XVI).

E t y m o l o g y. The new species is named in honor of our friend Milan PUTZ, who collected some specimens of this species in the Crimean Peninsula.

D i s t r i b u t i o n a n d b i o n o m i c s. *B. milani* sp. n. inhabits the upper reaches of mountain rivers of the Crimea (Fig. 29). It is especially abundant in the rivers of the Southern Coast, frequently being there the only species of the genus *Baetis*. In those rivers the species larvae can be found everywhere down the stream nearly to their mouths. Some river sections, where *B. milani* sp. n. larvae occur, dry up in summer. Water habitats in generally are characterized by fast current, rocky bed with admixture of detritus at 0.2-0.5 m depth at the altitudes between 900 m to 200 m (Figs 30, 31). Water temperature in those localities fluctuates from 6°C to 20°C and mineralization of water between 340 mg/l and 700 mg/l. In chemical composition of these waters, the ions HCO_3^- (177-300 mg/l) and Ca^{2+} (44-110 mg/l) predominate.

B. milani sp. n. forms a part of a community of epi- and metarhithral of the Crimean rivers, where occurs together with following representatives of aquatic fauna: *Electrogena braaschi* (SOWA, 1984), *Siphonoperla taurica* (PICTET, 1841), *Agapetus ajpetriensis* MARTYNOV, 1917, *Plectrocnemia intermedia* MARTYNOV, 1917, *Silo alupkensis* MARTYNOV, 1917, *Cnetha* spp., *Dugesia gonocephala taurocaucasica* PORFIRIEVA, 1958 and others. The new species is probably an endemic of the Crimea.



Figs 30-31. Typical habitat of *B. milani* sp. n.: 30 – Eastern Ulu-Uzen' River; 31 – Al'ma River.

III. DISCUSSION

The name *Rhodobaetis* was suggested for the first time by KAZLAUSKAS (1972: 337) for species united by MÜLLER-LIEBENAU (1969: 91) in *rhodani* species-group. Subgeneric names given by R. S. KAZLAUSKAS, *Rhodobaetis* in particular, were invalid, since type species were not determined (HUBBARD, 1979).

Subsequently, NOVIKOVA & KLUGE (1987) designated type species of some subgenera, previously distinguished by R. S. KAZLAUSKAS, having made their names suitable for application. How-

ever, species which at present belong to *Rhodobaetis*, were considered by NOVIKOVA & KLUGE (1987: 8) as those belonging to *rhodani* species-group of the genus *Baetis* s. str. and this point of view was generally accepted. JACOB (2003: 122) made use of the old name given by R. S. KAZLAUSKAS and made it appropriate having designated the type species of the subgenus *Rhodobaetis*, viz. *B. rhodani rhodani*.

The diagnosis suggested by JACOB (2003) for the subgenus *Rhodobaetis*, is based on the characters of larvae and male imagines. The distinguishing character of larvae, according to the author, is the availability of movable spatulas on terga surface. The distinguishing characters of male imagines are as follows (JACOB, 2003): basal segment of forceps with weakly distinct protuberances on inner margin; segment 1 of forceps cylindrical or slightly conical, rather sharply narrowing apically; segment 2 of forceps narrow at the base; segment 3 of forceps almost spherical, separated from segment 2 by incision on outer margin; hind wing with three simple longitudinal veins. Larval scales described by JACOB (2003) are really present on terga surface of most species *Rhodobaetis*, however their shape is quite different, from spatulas widening apically, as in *B. braaschi* (see GODUNKO et al. 2004), to pointed apically scales, as in *B. milani* sp. n. (Figs 8, 15). And what is more, wide spatulas are also present on terga and paraproct surfaces in the species *B. pseudothermicus* KLUGE, 1983 (KLUGE, 1983: Figs 11, 12), which has been attributed by NOVIKOVA (1987: 80) to separate *pseudothermicus* species-group. There are no special differences in structure of genitalia between species of *Rhodobaetis* and *pseudothermicus* species-group. The same way as in some species of *Rhodobaetis* (e. g. in *B. rhodani tauricus*), *B. pseudothermicus* is lacking protuberance on inner margin of basal segment of forceps (KLUGE, 1983: Fig. 15, GODUNKO & PROKOPOV, 2003: Fig. 3). Three simple longitudinal veins on hind wings are typical of all discussed groups, just as of *Rhodobaetis*. SOLDÁN (1977a) has mentioned the availability of only two longitudinal veins in *B. baksan* SOLDÁN 1977. NOVIKOVA (1987) has noted, that in fact there is the third vein, which is very close to posterior margin of hind wings. Only in one case (undescribed imaginal material of *Rhodobaetis* from Algeria) a fork second vein is present on hind wing (possible individual variability of specimen).

All the facts stated above afford ground to consider the species attributed to *pseudothermicus* species-group as close to the species of the subgenus *Rhodobaetis* s. JACOB (2003). Since no significant differences in structure of larvae and male imagines have been revealed, it is advisable to attribute these groups to the subgenus *Rhodobaetis*. In this connection we suggest to define more precisely and to amplify the earlier diagnoses of *rhodani* species-group (MÜLLER-LIEBENAU, 1969: 91; MORIHARA & MCCAFFERTY, 1979: 146; NOVIKOVA, 1987: 66-67), and of the subgenus *Rhodobaetis* (JACOB, 2003: 122). The following combination of cited characters makes possible to distinguish species of *Rhodobaetis* (incl. *B. pseudothermicus*) from other species of *Baetis* s. l.: (I) surface of terga with scales of different structure (a – wide, widened apically spatulas, rounded at the tip; b – relatively narrow spatulas with margins slightly divergent apically, rounded at the tip; c – relatively narrow scales with margins slightly convergent apically, rounded or bluntly pointed at the tip; d – scales with wide base and margins distinctly convergent apically, pointed at the tip); (II) antennal segments (mainly pedicel), surface of femora and paraproct plate with every kind of scales mentioned above; (III) basal segment of forceps approximately square or slightly elongated; (IV) inner margin of basal segment of forceps sometimes with small subapical protuberance; (V) segment 1 of forceps with subparallel margins basally and medially, distinctly or slightly convergent apically; (VI) inner margin of segment 1 of forceps with subapical protuberance; (VII) segment 2 of forceps narrow at base, mainly widened towards the apex; (VIII) segment 3 of forceps of various structure (a – oval and slightly asymmetric; b – almost square with truncate inner margin; c – almost spherical; d – elongated with length/width ratio = 1.5-3.0).

Up to date 22 species of the subgenus *Rhodobaetis* are known from Palaearctic region (incl. Palaearctic parts of China). The species *B. bicaudatus* DODDS, 1923 has Holarctic distribution, besides Nearctic occurring from Japan and the Far East to the Arctic Urals. One species, namely *B. thermicus* UENO, 1931 is known from Japan (FUJITANI, HIROWATARI, TANIDA, 2003). *B. pseudothermicus* and *B. silvaticus* KLUGE, 1983 (KLUGE, 1983) have been described from the Primorye Territory.

The fauna of Central Asia includes the most number of species of *Rhodobaetis*. The first Central Asian species of the subgenus, those are *B. issykuvensis* BRODSKY, 1930, *B. mycetopis* BRODSKY,

1930 and *B. heptapotamicus* BRODSKY, 1930 were described from Kyrgyzstan and Kazakhstan (BRODSKY, 1930). Later on, some of those species were also found and redescribed by KLUGE (1982) also from Tajikistan and Uzbekistan. *B. oreophilus* KLUGE, 1982 was described by larvae and associated imago from Kyrgyzstan (KLUGE, 1982). *B. rhodani rhodani* has Euro-Asian range.

The subgenus *Rhodobaetis* is presented in the Crimea by three species: *B. braaschi*, *B. milani* sp. n. and *B. rhodani tauricus*. *B. braaschi*, which was regarded earlier the endemic of the Crimean Mountains (ZIMMERMANN, 1980a), belongs to the group of Euro-Asian species and has been recorded also in the Caucasus and all over Central Asia as well (KLUGE, 1982, GODUNKO et al. 2004). Besides the latter, two more, probably endemic species have been found in the Crimea, those are *B. rhodani tauricus* (GODUNKO & PROKOPOV, 2003) and above described *B. milani* sp. n.

Two species of *Rhodobaetis* were described from the Southern and Central Caucasus: *B. baksan* by adults and larvae found in the Central Caucasus and *B. illex* JACOB & ZIMMERMANN, 1978 only by larvae from Georgia and Armenia (SOLDÁN, 1977a, JACOB & ZIMMERMANN, 1978). The information of ZIMMERMANN (1980b: 102, fig. 6) on finding of *B. gemellus* EATON, 1885 in the Caucasus and the Transcaucasus probably regards to a new species of the subgenus *Rhodobaetis*.

The larvae of *B. pseudogemellus* SOLDÁN, 1977, *B. rhodani sinespinosus* SOLDÁN & THOMAS, 1883 and *B. bisri* THOMAS & DIA, 1983 were described from Middle East and Northern Africa (SOLDÁN, 1977b; SOLDÁN & THOMAS, 1983; THOMAS & DIA, 1983). MÜLLER-LIEBENAU (1971) has described two species, those are *B. canariensis* MÜLLER-LIEBENAU, 1971 and *B. pseudorhodani* MÜLLER-LIEBENAU, 1971 from the Canary Islands. Larvae of one more species of the subgenus *Rhodobaetis*, namely *B. ingridea* THOMAS & SOLDÁN, 1987 were described from the Corsica (THOMAS & SOLDÁN, 1987).

THOMAS (1999) having analyzed the material from the Pyrenees, as well as the literature data and the results of many-year research in species of *Rhodobaetis* in France, Switzerland and Italy has suggested the species name *B. gadeai* THOMAS, 1999 for *B. gemellus* s. MÜLLER-LIEBENAU (1969). In THOMAS's opinion that species is the Pyrenees endemic. ENGBLOM (1996) has assumed that designation "rhodani" embraces the complex of several forms which taxonomic status is unknown. The description of the subspecies *B. rhodani tauricus* from the Crimea confirms this assumption. The comparative analysis of main morphological characters of larvae and male imagines of West Palaearctic species of the subgenus *Rhodobaetis* are given in Tables 1-3. Since the validity of the species name of *B. gemellus* s. EATON, 1885 is called in question, it is absent from the tables given.

Tables 1-3

Main morphological characters for distinguishing of West Palaearctic species of the subgenus *Rhodobaetis*. CH – characters; larva: 1 – pedicel (shape of scales); 2 – scape (shape of scales); 3 – labrum (the mean width/length ratio); 4 – labrum (number of long submarginal bristles); 5 – maxillary palps (apical part of distal segment); 6 – paraglossae (number of regular rows of bristles); 7 – labial palps; 8 – external margin of femora (shape of bristles); 9 – tarsal claw (number of strong teeth); 10 – tarsal claw (presence of apical setae); 11 – surface of terga (shape of scales); 12 – posterior margin of terga 3-6 (presence of triangular spines); 13 – shape of 3-5 gills; 14 – spines of external margin of gills; 15 – paraproct plate (number of marginal teeth); 16 – paraproct plate (shape of scales); 17 – terminal filament length (relative cerci length); male imago: 18 – turbinate eyes (facetted surface); 19 – shaft of turbinate eyes; 20 – coloration of thorax; 21 – hind wings (number of veins); 22 – basal segment of forceps; 23 – segment 1 of forceps; 24 – segment 2 of forceps (widened part); 25 – segment 2 of forceps (inner margin); 26 – segment 3 of forceps. BBA – *B. baksan*; BBI – *B. bisri*; BBR – *B. braaschi*; BC – *B. canariensis*; BG – *B. gadeai*; BIL – *B. illex*; BIN – *B. ingridae*; BM – *B. milani* sp. n.; BRR – *B. rhodani rhodani*; BRS – *B. rhodani sinespinosus*; BRT – *B. rhodani tauricus*; BPG – *B. pseudogemellus*; BPR – *B. pseudorhodani*.

Table 1

CH	BBA	BBR	BIL	BM	BRT
1	elongated and pointed apically	elongated and widened apically	elongated and bluntly pointed apically	elongated, pointed or bluntly pointed apically	not elongated and widened apically
2	small and pointed	small and wide	mainly absent	small and pointed	small and wide
3	1.45	1.40	1.16	1.42	1.28
4	1 + 11-14	1 + 5-7	1 + 6-10	1 + 6-10	1 + 6-9
5	with 3-9 short spines	with one pointed scale	with one rudimentary scale	with one pointed scale	with one pointed scale
6	2-3	3	4-5	3	3
7	slightly asymmetric	strongly asymmetric and wide	slightly asymmetric and relatively narrow	slightly asymmetric and relatively wide	slightly asymmetric and relatively wide
8	long and pointed apically	short and rounded apically	long and pointed apically	long and pointed apically	long and pointed apically
9	8-12	8-13	11-18	9-12	7-10
10	absent	absent	absent	absent	absent
11	wide and rounded apically	wide and rounded apically	relatively wide and rounded apically	pointed or bluntly pointed apically	wide and rounded apically
12	absent	present	absent	absent	present
13	asymmetric	strongly asymmetric	asymmetric	strongly asymmetric	slightly asymmetric
14	mainly absent or with 1-3 solitary spines	absent	present	present	present
15	2-4	5-10	10-13	9-14	8-14
16	pointed apically	widened apically	pointed apically	pointed apically	widened apically
17	2/3	2/3-3/4	3/4	3/4	3/4
18	ferruginous or dark orange	light yellow	–	orange	orange
19	light with ferruginous ring	light yellow, sometimes with dirty yellow ring	–	yellow to yellowish-brown with mainly orange ring	light, with orange-violet ring
20	pith-brown	yellow to yellowish-brown	–	yellow to light-yellow	brown to dark brow
21	3 (2 well visible only)	3	–	3	3
22	approximately square	almost square, slightly convergent apically	–	approximately square	approximately square
23	slightly convergent apically	with subparallel margins	–	with subparallel margins	with subparallel margins
24	about 1/2 of segment length	1/2-2/3 of segment length	–	1/2 of segment length	2/3 of segment length
25	slightly concave	clearly concave	–	slightly concave	straight or slightly concave
26	oval or slightly elongated	oval or asymmetric	–	oval or slightly elongated	oval or slightly quadrangular

Table 2

CH	BBI	BG	BRR	BRS	BPG
1	elongated and pointed apically	elongated and bluntly pointed apically	elongated, widened or bluntly pointed apically	elongated and pointed apically	elongated, pointed and bluntly pointed apically
2	elongated and pointed	small and wide	small and wide	mainly absent	small and pointed
3	1.24	1.30	1.32	1.38	1.45
4	1 + 5-9	1 + 7-10	1 + 7-12	1 + 9-12	1 + 10-12
5	with one rudimentary scale	with one pointed scale	with one pointed scale	absent	with one pointed scale
6	5-6	3	3	4	3
7	relatively symmetrical and wide	slightly asymmetric and relatively wide	slightly asymmetric and relatively wide	slightly asymmetric and relatively narrow	slightly asymmetric and relatively wide
8	short and pointed apically	long and pointed apically	long and bluntly pointed apically	short and pointed apically	short and pointed apically
9	11-16	8-12	8-14	9-12	8-10
10	absent	absent	absent	absent	absent
11	rounded apically	wide and rounded apically	wide and rounded apically	very rare, rounded apically	solitary, rounded or bluntly pointed apically
12	present	mainly absent	absent	present	present
13	strongly asymmetric	asymmetric	slightly asymmetric	slightly asymmetric	asymmetric
14	absent	absent	present	present	present
15	5-9	at least 10	at least 15	9-12	6-9
16	pointed apically	rounded apically	rounded apically	pointed apically	rounded and bluntly pointed apically
17	3/4	2/3-3/4	2/3-3/4	3/4	2/3-3/4
18	–	orange to brownish-red	brown to dark brown	–	–
19	–	orange to brownish-red, without ring	yellowish brown with brown rings	–	–
20	–	castaneous-brown	dark brown	–	–
21	–	3	3	–	–
22	–	approximately square	slightly elongated	–	–
23	–	with subparallel margins	with subparallel margins	–	–
24	–	almost not widening apically	2/3 segment length	–	–
25	–	slightly concave	concave	–	–
26	–	slightly elongated	mainly quadrangular or oval	–	–

Table 3

CH	BIN	BC	BPR
1	elongated, widened apically	elongated, rounded or bluntly pointed apically	elongated, rounded apically
2	elongated and wide	rounded or pointed	small and wide
3	1.45	1.50	1.65
4	1 + 5-10	1 + 5-7	1 + 8-10
5	with one pointed scale	with one rudimentary scale	with one rudimentary scale
6	3	3	3
7	slightly asymmetric and relatively narrow	relatively symmetrical	slightly elongated, relatively symmetrical and narrow
8	long and rounded apically	long and rounded apically	long and pointed apically
9	8-11	9-12	7-9
10	absent	present	present
11	wide and rounded apically	bluntly pointed apically	bluntly pointed apically
12	present	present	present
13	asymmetric	slightly asymmetric	slightly asymmetric
14	present	absent	present
15	9-11	at least 15	at least 8
16	rounded apically	pointed	pointed
17	1/2-2/3	1/2-1/3	1/8-1/9
18	–	light yellow to brownish	yellowish-orange to brownish-orange
19	–	yellowish, without ring	light orange, without ring
20	–	brown	brown
21	–	3	3
22	–	approximately square	not square, slightly elongated
23	–	with mainly subparallel margins and strong inner projection apically	not elongated, with subparallel margins
24	–	1/2-2/3 segment length	1/2-2/3 segment length
25	–	clearly concave	clearly concave
26	–	oval	oval

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