

Mayflies of the Crimean Peninsula. I. *Baetis rhodani tauricus* ssp. n. (Ephemeroptera: Baetidae)

Roman J. GODUNKO and Grigorii A. PROKOPOV

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Abstract. *Baetis rhodani tauricus* ssp. n. from Crimean Peninsula is described and illustrated. Some data concerning its distribution and biology are given.

Key words: Ephemeroptera, Baetidae, *Baetis rhodani* species-group, new subspecies, Ukraine, Crimean Peninsula.

Roman J. GODUNKO, State Museum of Natural History, National Academy of Sciences of Ukraine, Teatral'na St. 18, UA-79008 L'viv, Ukraine.

E-mail: museum@lviv.net

Grigorii A. PROKOPOV, Tavrychnyi National University V. I. Vernads'kogo, Faculty of Geography, Department of Geoeology, Yaltyn's'ka St. 4, UA-33007 Simferopol', Ukraine.

E-mail: prokopov@crimea.com

Three species of the *Baetis rhodani* species-group are known from the Crimean Peninsula, viz., *B. rhodani* (PICTET, 1843), *B. braaschi* ZIMMERMANN, 1980 and *B. stipposus* KLUGE, 1982. *B. rhodani* is a transpalaeartic species, distributed from Kamchatka to the British Isles, all over the Europe and in northern Africa (Algeria and Morocco). SOLDÁN & THOMAS (1983) described the female imago and larva of *B. rhodani sinespinosus* SOLDÁN & THOMAS, 1983 from Algeria, and ZIMMERMANN (1980) described *B. braaschi* from a small stream in Yalta town. The latter species is hitherto known only from three specimens of the type series and was never recorded outside the limits of the type locality. Its holotype was redescribed by NOVIKOVA (1987) who ascertained diagnostic characters for that species. The last species, *B. stipposus* was recorded by KLUGE (1982) from Central Asia (Uzbekistan, Kazakhstan, Turkmenistan, Tajikistan). NOVIKOVA (1987) cited *B. stipposus* from the Crimea on the basis of one larva. As it turned out, this information concerns a new species of *B. rhodani* species-group, a description of which will be published in our next paper.

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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, and was supported by the Jadwiga Queen Fund of Jagiellonian University (Kraków, Poland).

Baetis rhodani tauricus ssp. n.

(Figs 1-17)

Baëthis [sic!] *rhodani* Rictet [sic!]: KISELEVA & VASYUTA, 1984: 143 partim

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

Baethis [sic!] *rhodani* Mull [sic!]: KISELEVA & EZERNITSKII, 1985: 112 partim

Baethis [sic!] *rhodani*: KISELEVA & VASYUTA, 1986: 57 partim

Baethis [sic!] gr. *rhodani*: KISELEVA, 1997: 39 partim

Material examined. Holotype: male imago, Ukraine, Autonomous Republic of the Crimea, Angara River near Pereval'ne village, 23-25.V.2002, leg. G. A. PROKOPOV. Paratypes: 20 larvae, from same locality as holotype, 24.VI.1999, leg. G. A. PROKOPOV; 36 larvae, Ukraine, Autonomous Republic of the Crimea, Al'ma River downstream of Asport Boundary, 29.VI.2001, leg. G. A. PROKOPOV; 14 larvae, Ukraine, Autonomous Republic of the Crimea, Al'ma River downstream of Tarver Boundary, 30.VI.2001, leg. G. A. PROKOPOV; 2 larvae, Ukraine, Autonomous Republic of the Crimea, Al'ma River near Partyzans'ke Reservoir, 1.VII.2001, G. A. PROKOPOV; 1 male imago (genitalia on microscopic slide), 1 female imago (hind wing on microscopic slide), 1 male subimago, 1 female subimago, from same locality and data as holotype, leg. G. A. PROKOPOV.

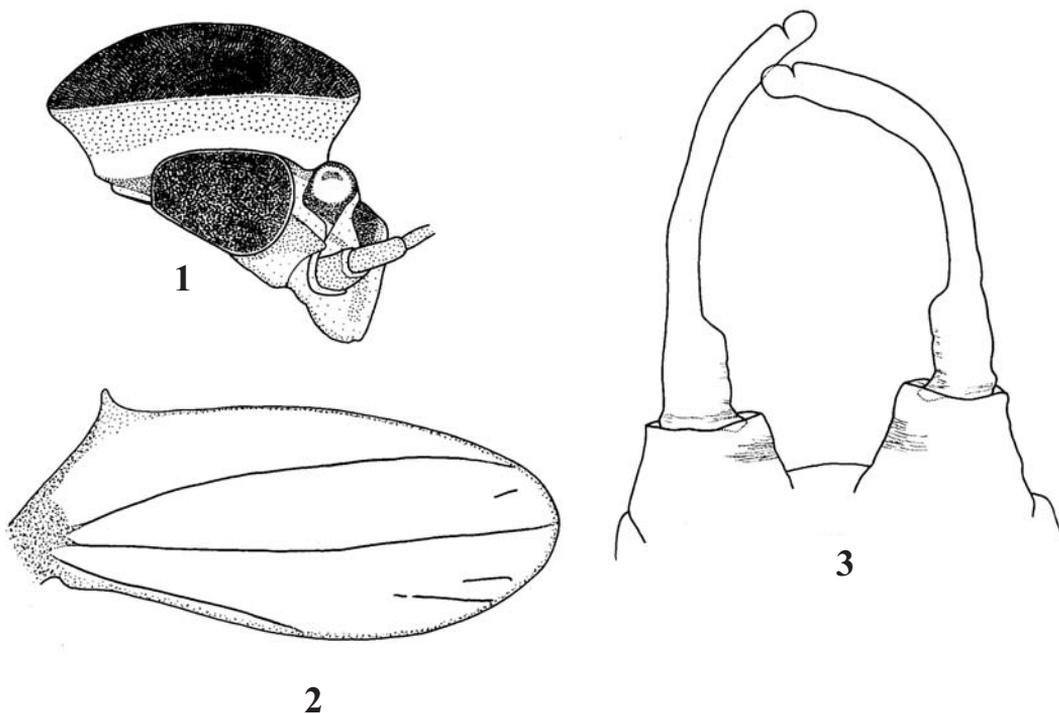
Other specimens: 3 larvae, from same locality as holotype, 24.VI.1999, leg. G. A. PROKOPOV; 1 larva, 1 larval skin, Ukraine, Autonomous Republic of the Crimea, Al'ma River downstream of Asport Boundary, 29.VI.2001, leg. G. A. PROKOPOV; 14 larvae, Ukraine, Autonomous Republic of the Crimea, Al'ma River downstream of Tarver Boundary, 30.VI.2001, leg. G. A. PROKOPOV; 75 larvae, Ukraine, Autonomous Republic of the Crimea, Burul'cha River near Tsvetochnoe village, 14.VI.2000, leg. R. J. GODUNKO. All adults were reared from larvae. The specimens were preserved in 80% alcohol. The holotype and part of the paratypes are housed in the collection of the State Museum of Natural History, National Academy of Sciences of Ukraine (L'viv). The other material can be found in the second author's collection.

D e s c r i p t i o n. *Male imago.* Length: body 8.3-9.1 mm; fore wings 8.4-8.6 mm; cerci 15.5-16.7 mm. General color of body dark, yellowish-brown to dark-brown.

Head light brown. Antennae unicolorous brown. Eyes and basal part of ocelli greyish-black. Apical part of ocelli whitish. Eyes surrounded by a yellowish ring. Turbinate eyes oval in dorsal view with slightly convex external margin. Facetted surface of turbinate eyes orange, unicolorous, with narrow light ring around the margin. Shaft of eyes paler, with broad well apparent orange-violet strip. Base of turbinate eyes with narrow brown strip (Fig. 1).

Dorsal part of thorax brown to dark-brown, lateral part yellowish-brown. Metanotum with a pair of pale spots. Fore wings hyaline, transparent, except the distal part and pterostigmatic area which are whitish. Pterostigma with 7-10 cross veins. Venation yellowish-brown. Hind wings hyaline, transparent, with a costal process and three simple longitudinal veins (Fig. 2). Legs in general light, fore legs being distinctly darker, light brown. Dorsal surface of femora distally with clear brown spot. Tarsi brown, two last segments lighter. Mid and hind legs lighter than fore legs, yellowish-white. Femora distally with small spot only. Tarsi dark brown, first and last segments being always lighter than others.

Abdominal tergite I dark-brown, the same color as thorax. Terga III-VIII lighter, yellowish-brown to brown with two clear central small spots and two oblique strokes near anterior margin of segments. These spots are smaller and hardly visible on terga IX and X. Terga IX and X slightly darker than II-VIII. Sterna lighter than terga with uniformly brownish drawing near anterior margin



Figs 1-3. *Baetis rhodani tauricus* ssp. n., male imago: 1 – head (lateral view); 2 – hind wing; 3 – genitalia (ventral view).

of segments, including two small spots laterally. Cerci generally brown to yellowish-brown, slightly darker at the base. Apical part of cerci yellowish-white. Joints of segments darker.

Basal segments of forceps nearly as long as wide (Fig. 3). Segment 1 relatively wide with sub-parallel margins. Segment 2 narrow at base, about $\frac{2}{3}$ the width of the apical part of segment 1. Segment 2 slightly widening towards segment 3, the widened part being not more than $\frac{1}{2}$ its length. Inner margin of segment 2 almost straight or slightly concave. Segment 3 oval or slightly quadrangular, nearly as long as wide (Fig. 3).

Female imago. Length: body 10.2 mm; fore wings 8.5 mm; cerci 11.9 mm. General color of body similar to male imago, but somewhat lighter, yellowish-brown to brown.

Head and thorax yellowish-brown to brown, eyes and bases of ocelli black, ocelli yellowish at the apex. Antennae unicolorous, light brown. Wings hyaline, unicolorous, fore wings with whitish pterostigmatic area. Venation yellowish-brown. Legs yellowish-brown, fore legs somewhat darker. Tarsi brownish-grey. All femora with distinct dark spot distally.

Abdominal terga brown with drawing similar to male imago. Terga VIII and IX lighter, yellowish-brown. Sterna yellowish with drawing similar to male imago. Cerci light, yellowish, yellowish-white at the apex with darker joints. Only some basal segments brownish.

Male subimago. Length: body 7.5 mm; fore wings 8.6 mm; cerci 15.8 mm. General color of body yellowish-brown to brown.

Head yellow to yellowish-brown. Antennae with whitish flagellum and brown basal segments. Eyes and basal part of ocelli greyish-black. Apical part of ocelli whitish. Facetted surface of

turbinate eyes orange without ring around the margin, shaft with hardly visible dark strip, basal part with brownish strip.

Thorax yellowish-brown. Wings uniformly greyish, slightly yellowish in basal part, without any maculation. Legs generally light, yellowish-white to brown. Fore legs slightly darker than mid and hind legs, with brownish femora and intensively brown tibiae and tarsi. Mid and hind legs yellowish-white with brownish tarsi. All femora with clear dark spot distally.

Abdominal segments light brown, terga darker than sterna. Terga and sterna with drawing similar to male imago. Cerci uniformly brown.

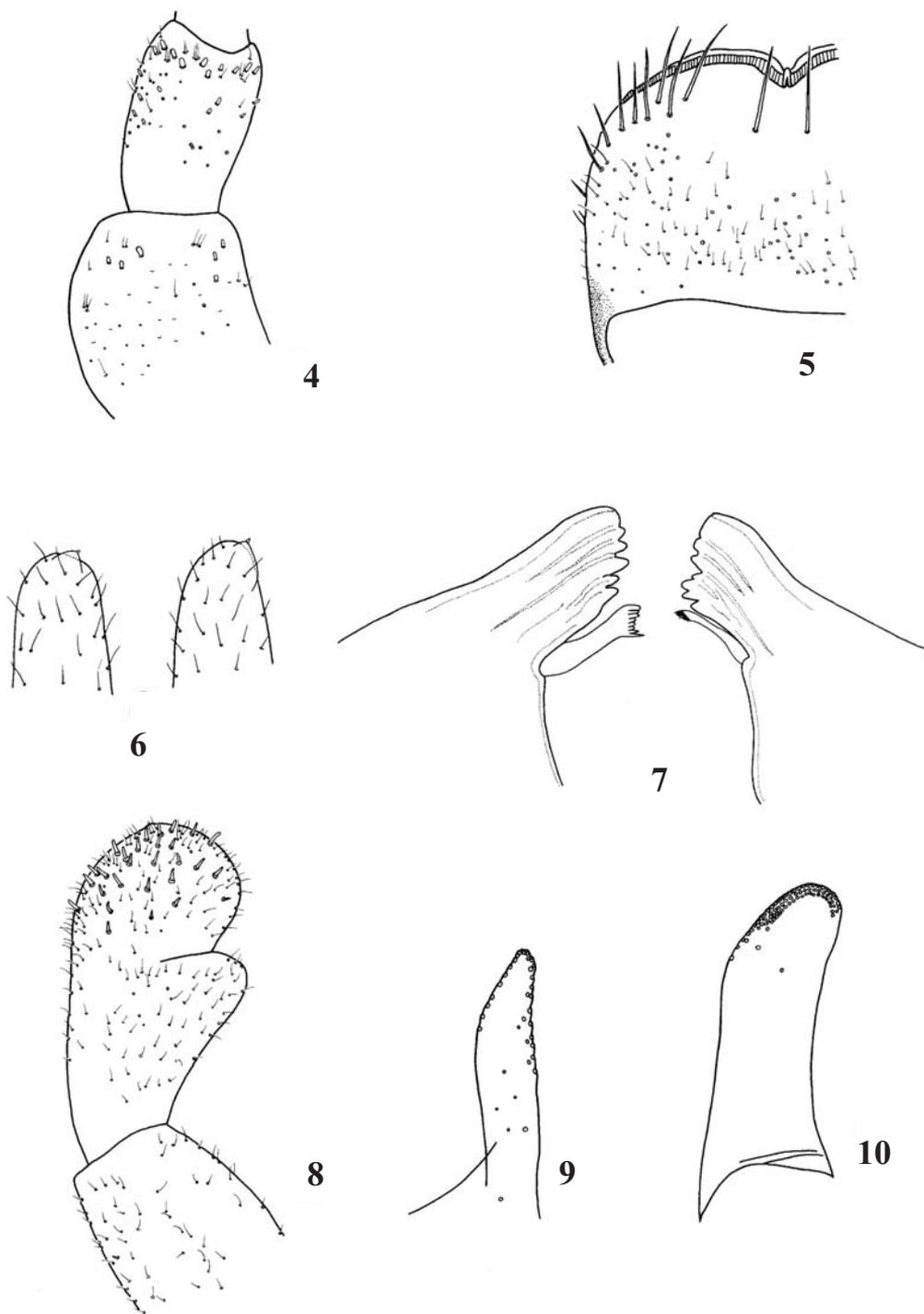
Female subimago. Length: body 9.5 mm; fore wings 9.9 mm; cerci 10.3 mm. General color of body similar to imago female but slightly darker. Wings greyish, slightly yellowish in basal part.

Mature larva. Length: body 7.6-9.4 mm; cerci 7.0-8.2 mm. General color of body yellowish-brown to brown.

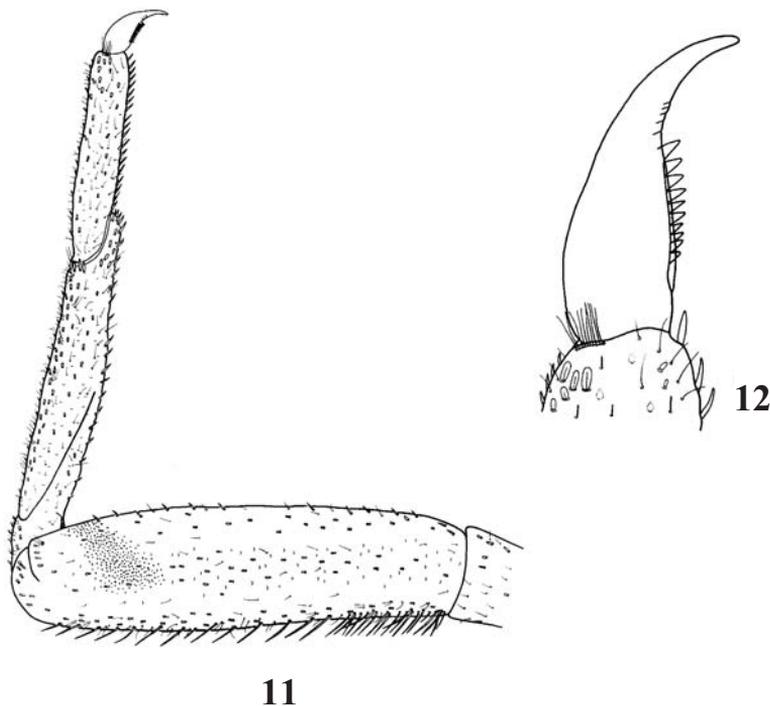
Head light brown to brown. Antennae brownish. Pedicel with spatulas arranged in one irregular row or scattered over the segment surface (Fig. 4). These spatulas mainly are not elongated, with parallel margins of these slightly drawn closer towards apex. Scape with small wide spatulas, which margins diverge towards apex. Labrum with 1 + 6-9 (mainly 7-8) long bristles (Fig. 5). Its lateral margins with few fine bristles. Distal segment of maxillary palps with setae and hairs, its apical part with rounded projection, bearing one distinct scale (Fig. 6). Mandibular incisors similar to those of *B. rhodani rhodani*, outer incisors broad, bluntly pointed (Fig. 7). Segment 3 of labial palps rounded and relatively wide, slightly asymmetrical and slightly pointed at the apex (Fig. 8). Length/width ratio of segments 2+3 of labial palps is 2.0-2.2 (in *B. rhodani rhodani* mainly 2.0) (THOMAS & SOLDÁN 1987). Glossae and paraglossae relatively narrow (Figs 9-10). Paraglossae with three regular rows of bristles at the apex.

Thorax pale, light brown to brown. Pronotum with diffuse dark medial strip and pair of light smudges laterally. Legs unicolorous, yellowish to yellowish-white. Femora occasionally with well visible diffuse dark spot distally (Fig. 11). Color of femora variable in specimens of the same population. External margin of femora with dense row of fine long setae distinctly pointed at the apex. These setae are thinner and longer than in *B. rhodani rhodani*, being arranged in 2-3 rows in proximal part of femora. Submarginal area of femora with bluntly pointed spines and spatulas. Inner margin with group of short, pointed setae and spines. Surface of femora with spatulas, triangular scales and short fine hairs. External and inner margin of tibiae and tarsi with short pointed spines and fine hairs, tibial surface with small spatulas, spines and their bases. Tarsi distally with spatulas. Tarsal claws pointed, bent, generally with 7-10 teeth and without hairs in all examined specimens (Fig. 12).

Abdominal terga generally light, yellowish-brown to brown: tergite 1 light, with medial strip and darker smudges distally; tergite 2 with diffuse central spot and two pale spots laterally; terga 3-4 and 6-8 generally with two lateral pale spots on dark background and with pale medial strip; tergite 5 the lightest, with diffuse central pale spot the same as in *B. rhodani rhodani* (occasionally the color of tergite 4 similar to that of tergite 5); tergite 9 light, with central pale spot; tergite 10 brown, only with medial pale strip. Sterna lighter than terga. Posterior margins of abdominal terga of various structure: posterior margin of tergite 1 generally with irregular row of sparse scales only, alternating with fine hairs; tergite 2 with row of sparse spatulas alternating with fine hairs and with 1-3 small triangular spines; terga 3-7 with row of sparse spatulas alternating with fine hairs and well apparent triangular spines (Figs 13-14); terga 8-10 with prevalence of triangular spines, which number on terga 8-9 often exceed the number of spatulas. Occasionally posterior margins of terga 2-4 without triangular spines, only with row of sparse spatulas and fine hairs. Surface of terga with numerous fine hairs, wide spatulas, triangular scales, base of spatulas and scales. These spatulas mainly smaller than spatulas on the posterior margins of terga. Gills slightly asymmetric, rounded distally (Fig. 15). Tracheization distinctly pigmented. External margin of gill 1 only with fine hairs, without any spines in all examined specimens. External margin of gills 2-7 with row of bluntly pointed spatulas, having the shape of robust spines in lateral view (Fig. 16). Inner margin of gills 1-7 with fine hairs. Paraproct plate with numerous teeth on the margin (at least 8 large teeth on inner margin),



Figs 4-10. *Baetis rhodani tauricus* ssp. n., larva: 4 – base of antenna; 5 – labrum; 6 – apex of maxillary palps; 7 – mandibular incisors; 8 – labial palp; 9 – glossa; 10 – paraglossa.

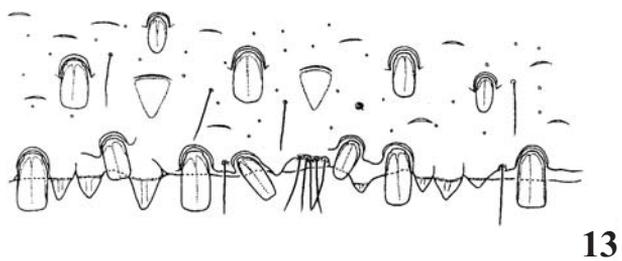


Figs 11-12. *Baetis rhodani tauricus* ssp. n., larva: 11 – hind leg; 12 – tarsal claw.

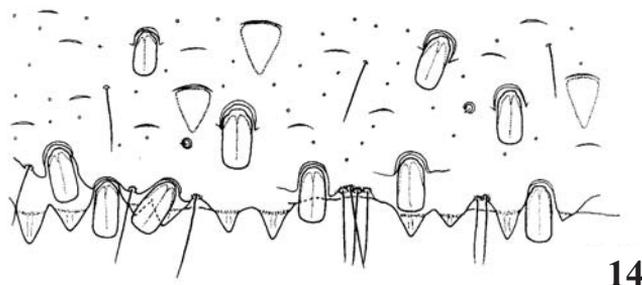
surface of paraproct with some spatulas (Fig. 17). Cerci yellowish, terminal filament of $3/4$ the cerci length. Joints of cerci segments slightly dark.

A f f i n i t i e s. *B. rhodani tauricus* ssp. n. belongs to the *rhodani* species-group (MÜLLER-LIEBENAU 1969). The subspecies can be distinguished from other species of the group by the following combination of characters: (1) pedicel spatulas not elongated, with parallel margins of these slightly drawn closer towards apex; (2) scape with small wide spatulas, the margins of which diverge towards apex; (3) labrum with 1 + 6-9 long bristles; (4) apex of distal segment of maxillary palps with rounded projection and one well visible scale; (5) segment 3 of labial palps rounded and relatively wide, slightly asymmetrical and slightly pointed at the apex; (6) paraglossae with three regular rows of bristles at the apex; (7) external margin of femora with dense row of fine long pointed setae; (8) tarsal claw generally with 7-10 teeth, without hairs; (9) color of abdominal terga; (10) spatulas, hairs and triangular spines on posterior margins of abdominal terga; (11) decoration of surface of abdominal terga; (12) gill 1 with fine hairs only; (13) external margin of gills 2-7 with row of bluntly pointed spatulas; (14) paraproct plate with at least 8 large teeth; (15) larval terminal filament of $3/4$ the cerci length; (16) faceted surface of turbinate eyes orange; (17) hind wings with three longitudinal veins; (18) segment 2 of forceps only slightly widening towards segment 3, the widened part being not more than $1/2$ its length; (19) inner margin of segment 2 of forceps almost straight or slightly concave; (20) segment 3 of forceps oval or slightly quadrangular, nearly as long as wide.

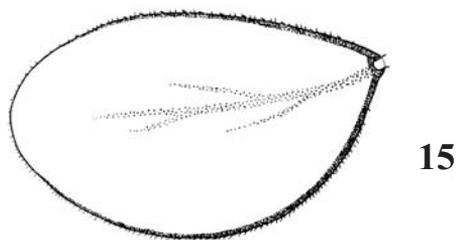
A combination of distinguishing characters in this new subspecies brings it close to *B. rhodani rhodani* and *B. rhodani sinespinosus*. At the same time, *B. rhodani tauricus* ssp. n. differs from the



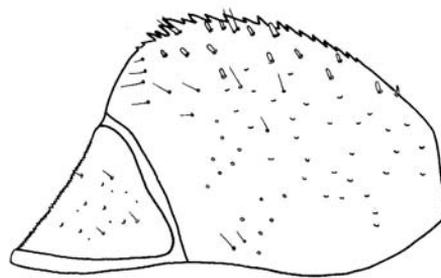
13



14



15



17



16

Figs 13-17. *Baetis rhodani tauricus* ssp. n., larva: 13 – posterior margin of abdominal tergite 4; 14 – posterior margin of abdominal tergite 7; 15 – fourth gill; 16 – external margin of fourth gill; 17 – paraproct plate.

former one by a number of characters in larva (1, 3, 5, 7, 10, 12) and in male imago (16, 18, 19), and from the latter one by a number of characters in larva (1, 2, 3, 4, 5, 6, 7, 11) (Table I).

Table I

Main morphological characteristics for distinguishing of some subspecies of the *Baetis rhodani* species-group

| Characteristics | <i>B. rhodani tauricus</i> ssp. n. | <i>B. rhodani rhodani</i> | <i>B. rhodani sinespinosus</i> |
|--|--|--|--|
| Pedichel spatulas | not elongated, widened at the apex | elongated, widened at the apex or bluntly pointed | elongated, pointed |
| Scape spatulas | small and wide | small and wide | almost absent |
| Labrum (number of long bristles) | 1 + 6-9 | 1 + 7-12 | 1 + 9-12 |
| Scale on apex of distal segment of maxillary palps | present | present | absent |
| Segment 3 of labial palps | rounded and relatively wide | rounded and relatively wide | rounded and relatively narrow |
| Paraglossae (number of regular rows of bristles) | 3 | 3 | 4 |
| Femoral spot | present or absent | absent | absent |
| External margin of femora | with dense row of fine long pointed bristles | with dense row of fine long bluntly pointed bristles | with sparse row of fine short pointed bristles |
| Tarsal claw | with 7-10 teeth | with 8-14 teeth | with about 15 teeth |
| Spatulas on surface of terga | present | present | absent |
| Triangular spines on posterior margin of terga 3-6 | present | absent | present |
| Facetted surface of turbinate yeas | orange | brown | – |
| Segment 2 of forceps | slightly widened towards segment 3 | clearly widened towards segment 3 | – |
| Inner margin of segment 2 | almost straight or slightly concave | clearly concave | – |

Owing to the presence of spatulas on scape and pedicel, and to the structure of posterior margin, surface of abdominal terga and the structure of gills *B. rhodani tauricus* ssp. n. is close to *B. braaschi*. In spite of all our trials, we have had no opportunity to study the type material of *B. braaschi* from the collection of Gotha Museum of Natural History. At our request, the holotype and one of the paratypes have been additionally looked through by Dr. Wolfgang ZIMMERMANN. As in *B. rhodani tauricus* ssp. n., the widened spatulas with parallel margins are indeed present on scape and pedicel in *B. braaschi*, however, these spatulas are more slender than those of the new subspecies. Spatulas on the posterior margin of abdominal terga in *B. braaschi* in contrast to *B. rhodani tauricus* ssp. n. are longer, thinner and more slender. All specimens of the type series of *B. braaschi* have 1 + 5 bristles on labrum and 5 strong teeth on inner margin of paraproct plate. Colour of abdominal terga in *B. braaschi* is rather uniform and on segments 2-9 looks like one light median strip and two lateral light spots (ZIMMERMANN 1980: Fig. 2; NOVIKOVA 1987: Fig. 1). By these characters and also by the presence of long, rounded and widened apically setae on external margin of femora (this kind of setae is found only in one species – *B. stipposus*) (NOVIKOVA 1987), *B. braaschi* can be easily distinguished from *B. rhodani tauricus* ssp. n.

D i s t r i b u t i o n a n d b i o l o g y. *B. rhodani tauricus* ssp. n. inhabits river valleys of the northern and southern macroslopes of the Crimean Mountains. Larvae were collected in undried up watercourses with fast current, with rocky bed mixed with detritus at the altitude of 200 m to 600 m. Water temperature in these localities may fluctuate from 6°C to 20°C. The mineralization of water fluctuates between 340 and 700 mg/l. In chemical composition of these waters, the ions NH_3^- (177-250 mg/l) and Na^{2+} (65-90 mg/l) predominate. They belong to hydrocarbonate class, calcium group, second type; water index $\text{C}_{\text{II}}^{\text{Ca}}$.

This new subspecies is a part of metarhithral community of the Crimean rivers, where it occurs together with such representatives of macrofauna as *Hydropsyche acuta* MARTYNOV, 1909, *Halesus tessellatus* (RAMBUR, 1842), *Hydroptila* sp. and *Wilhelmia balcanica* ENDERLEIN, 1924. Most probably, *B. rhodani tauricus* ssp. n. is endemic to the Crimea.

E t y m o l o g y. The name “*tauricus*” derives from Latin designation of the Crimea.

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