

Two new species of *Ecdyonurus* Eaton of *lateralis* (Curt.) group (Ephemeroptera, Heptageniidae) from the Crimea and Western Caucasus

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Abstract — The paper describes the male imago, female subimago, egg, and nymph of *Ecdyonurus braaschi* n. sp. from the Crimea and the male imago, male subimago, female imago, egg, and nymph of *E. zimmermanni* n.sp. from Western Caucasus (USSR). Both species belong to the *lateralis* (Curt.) group.

Key words: running waters, mayflies, taxonomy, heptageniids.

1. Introduction

The specimens used for the following description of the two new species came from the collections of Mr. Dietrich Braasch of Potsdam and Mr. Wolfgang Zimmermann of the Museum der Natur at Gotha (GDR). Some time ago, the specimens were sent to the author together with an *Ephemeroptera* collection and he is very grateful to his German colleagues for their permission to use them for the description of the new species. It is with great pleasure that he names the species after their first discoverers.

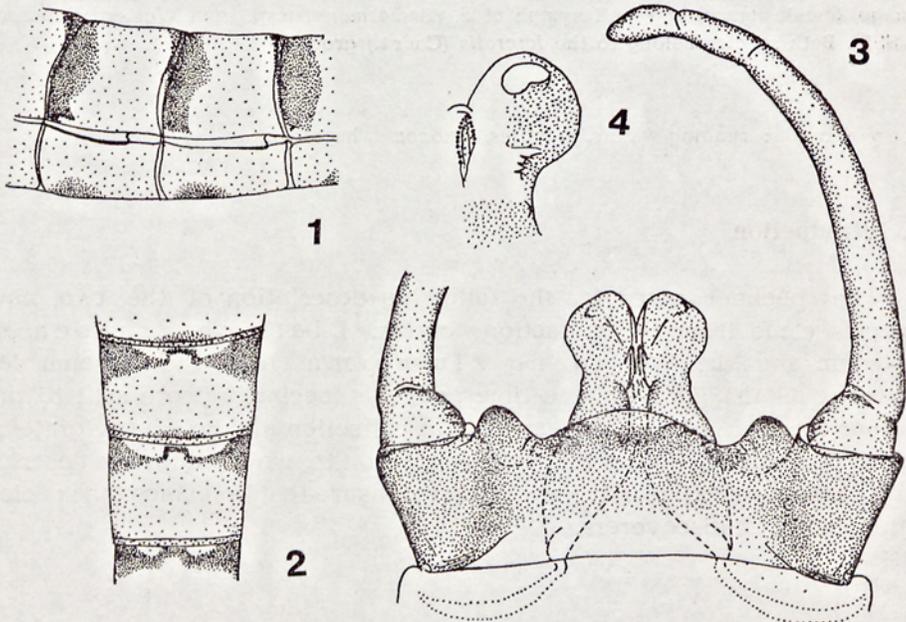
2. Description of species

Ecdyonurus braaschi n. sp. (alcohol 75%)

Male imago

Lengths: body 8—10 mm, forewing 8—10 mm, cerci 20—23 mm. Compound eyes dark, without light band, moderately high when viewed from the side, separated by a distance equal to the width of the central ocellus. Thorax dark brown. Wings transparent. Longitudinal and cross veins of forewings dark brown. Large cross vein dark. Stigmatic area with a whitish tinge, cross veins simple. Forelegs uniformly dark brown, other legs yellowish-grey, tarsi slightly darker. The first segment of the tarsus of the foreleg about one and a half times shorter than the second one. In other legs the first segments of the tarsi slightly longer than the second ones. Along the anterior margins of abdominal tergites characteristics rusty-brown bands (figs 1, 2). Neural ganglia showing a delicate violet pigmentation. Cerci dark brown at the bases, coloration gradually lighter toward their ends.

Genitalia. Styliger plate with large lobes on the posterior margin



Figs 1—4. *Ecdyonurus braaschi* n.sp., imago male. 1 — fragment of abdomen (segments 2—5), lateral view; 2 — idem, dorsal view; 3 — styliger, stylus, and penis, ventral view; 4 — lobe of penis, dorsal view

(fig. 3). Styles relatively short. Penis widest at the base. Penis lobes close to each other, slightly obliquely truncate at the end (fig. 3). On the dorsal side of the penis lobe a basal protuberance with several denticles (fig. 4). On outer margins of the penis at its narrowest part a very small protuberance. Titillators without teeth.

Male subimago and female imago — unknown

Female subimago

Lengths: body 8.5 mm, forewing 9 mm. Cerci lost. Compound eyes dark, no band. Body dark grey. Wings brownish-grey with venation slightly darker. Abdomen with diffuse markings resembling those of male imago. Neural ganglia with a delicate violet pigmentation.

Egg (from female subimago)

Length 150—185 μm , width 110—130 μm , Chorion fairly thin, surface granulated. Granules of medium size, scattered at moderate density. Attachment structures, all the same size, scattered uniformly and quite densely all over the egg surface (figs 5—7). 3—4 micropyle located at the equatorial part of the egg.

Nymph

Lengths: body 8—10 mm, tails slightly longer than the body. Head broad, rounded, broadest at the place between the base of the antennae and anterior part of compound eyes. Side parts of labrum acuminate (fig. 12), densely covered with hairs. Left and right mandible with 12—13 pennate setae, occupying almost entire margin between incisors and molar part of the mandible. Parapsides of hypopharynx covered by two kinds of hair (fig. 13). Second segment of maxillary palpus with partially separated, relatively long distal part. Glossae of the labium relatively narrow (fig. 14). Sides of pronotum curved more in the anterior parts (fig. 15). The dorsal surface of femurs covered with numerous slender and pointed spines (fig. 9). Hairs on the anterior margin of femurs at most only slightly longer than near spines. About 40 spines along the middle line of the hind tibia. Claws with 2—4 denticles. Sculpture of abdominal tergites consists conical microdenticles, more numerous at the posterior margin of tergite (fig. 8). Posterolateral projections of abdominal segments short and straight. Lamella of gill 1 relatively large, slightly obliquely truncate at the end (fig. 16). Lamellae of gills 2—6 assymetric, obtuse or rounded at the end (figs 17, 18). Lamella of gill 7 is the shortest, obtuse at the end, with sparse hairs (fig. 19). Spines at the ends of segments of caudal filaments relatively sparse, fairly slender and,

with the exception of some basal segments, distinctly shorter than the length of the adjacent segments (figs 10, 11).

Coloration. General coloration: grey-yellow-brownish with no distinct markings. Head uniformly yellow-brownish. A patch of intensely violet tissue can be observed along the upper margin and the sides of galeolacinia, along the anterior margins of the parapsides, around the anterior margins of paraglossae, and in the last segment of the labial palpus. Gills light grey, tracheation weakly contrasting. Imaginal markings on the abdominal segments, resembling those of male imago, visible beneath nymphal exuviae. Neural ganglia with a delicate violet tinge.

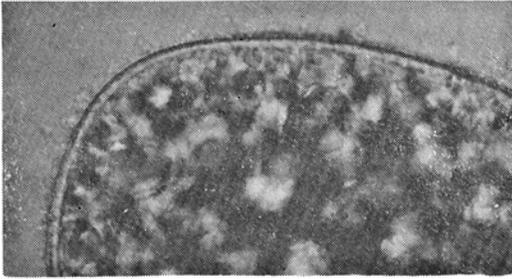
Material: Holotype male imago (genitalia on microscopic slide), paratypes: male imago, female subimago, 4 full-grown female nymphs, upper part of Beljбек stream, north of Ajpetričeskaja Yalta, Crimea (USSR), alt. 600—700 m, 1 June 1976 (coll. D. Braasch). Material in R. Sowa collection.

Relationships. In the imago stage the new species occupies a somewhat isolated position. It is relatively close to *E. lateralis* (Curt.) in the general shape of the styliger and penis. From this and other species of the *lateralis* group the *E. braaschi* n.sp. differs in the following combination of features: lobes of penis obliquely truncate at the end, spines at the lobe base placed on a protuberance, characteristic markings of anterior parts of abdominal tergites. In the nymph stage the new species appears close to *E. samalorum* Landa (Landa, Soldán 1982) and *E. ujhejlyii* Sowa (Sowa 1981), chiefly in the shape of gills 2—6. It differs, however, from these two and from the other species of the *lateralis* group in the shape of the labrum, the number of setae between the incisors and molar parts of mandibles, the shape of labial glossae, and in the shape of spines on the legs and caudal filaments.

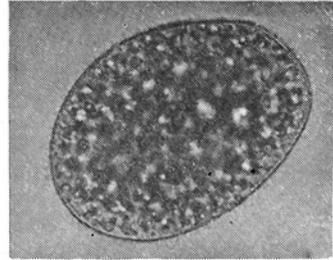
Ecdyonurus zimmermanni n. sp. (alcohol 75%)

Male imago

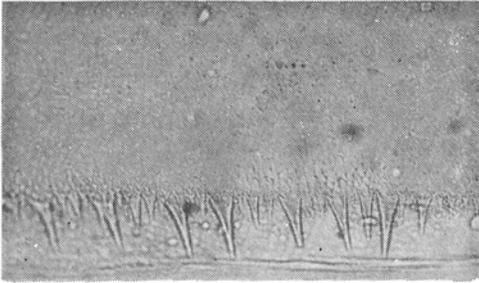
Lengths: body 8.5 mm, forewing 9.0 mm, cerci 22 mm. Compound eyes dark, without band, moderately high when viewed from the side, distance between the eyes slightly longer than the width of the middle ocellus. Thorax brown. Forewing transparent, venation uniformly dark brown, in the distal and posterior part relatively delicate. Large cross vein light. Cross veins in the stigmatic area straight. Abdomen light brown with diffuse pattern of markings including semicircular spots in posterior corners of tergites, indistinct spots in anterior corners of tergites, and triangular spots in central parts of several anterior tergites, near their frontal margins. Neural ganglia with weak to moderate violet pigmentation. Forelegs brown, other light, yellowish grey, with tarsi slightly dar-



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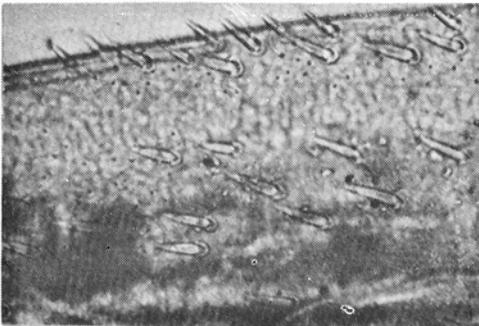
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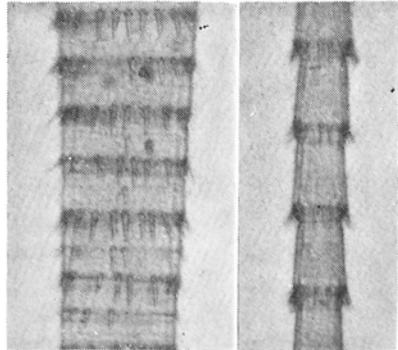
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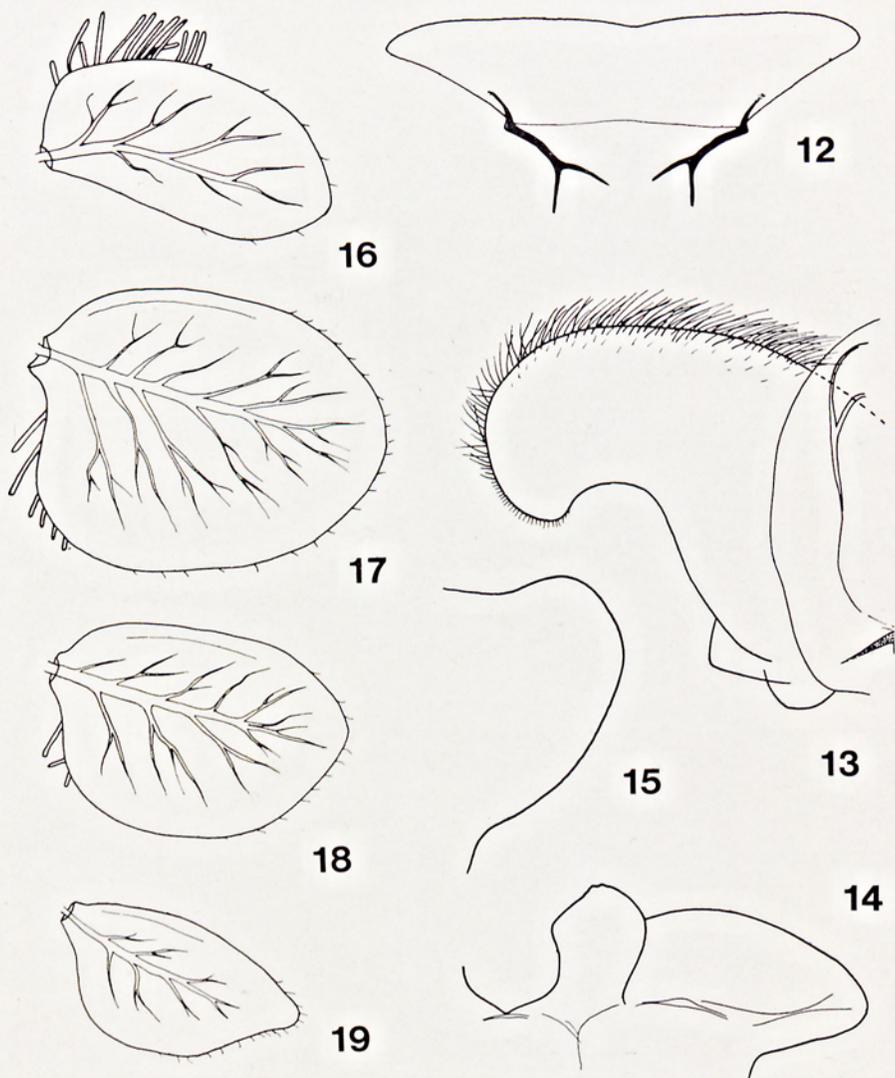
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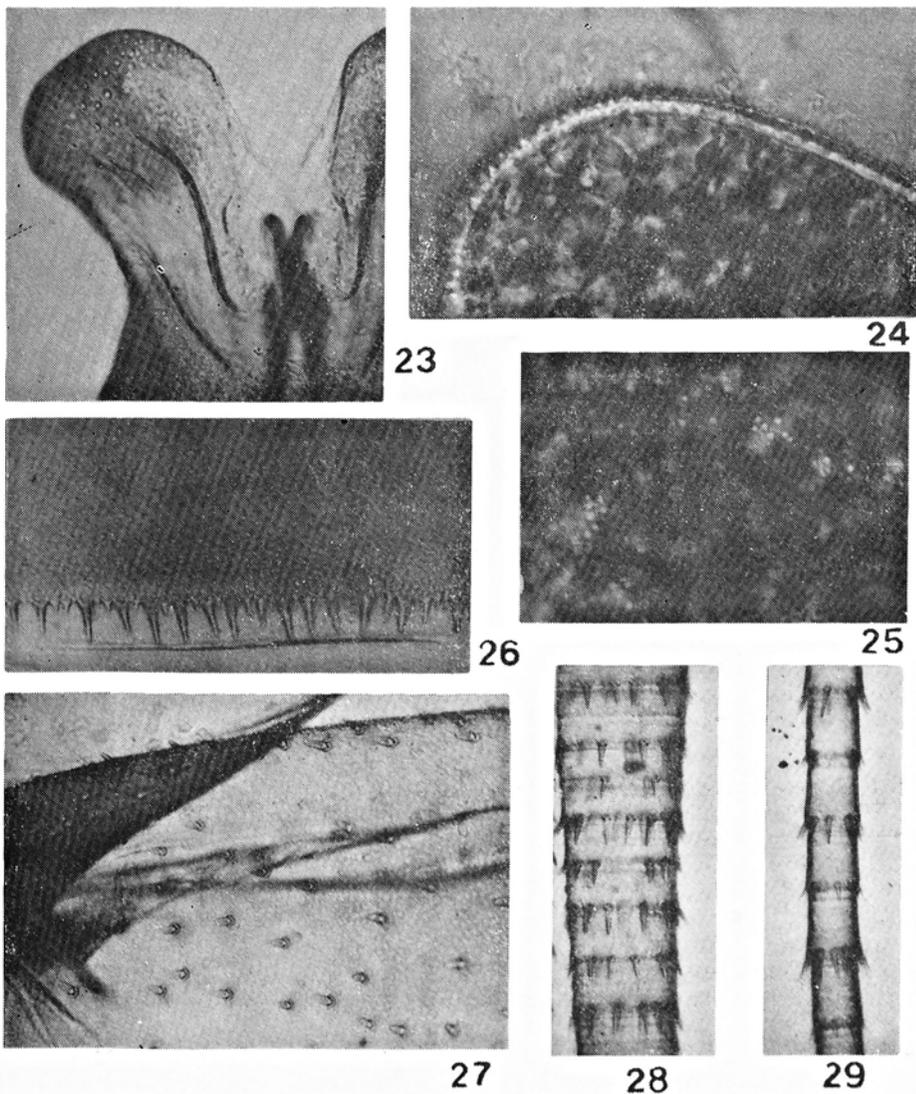
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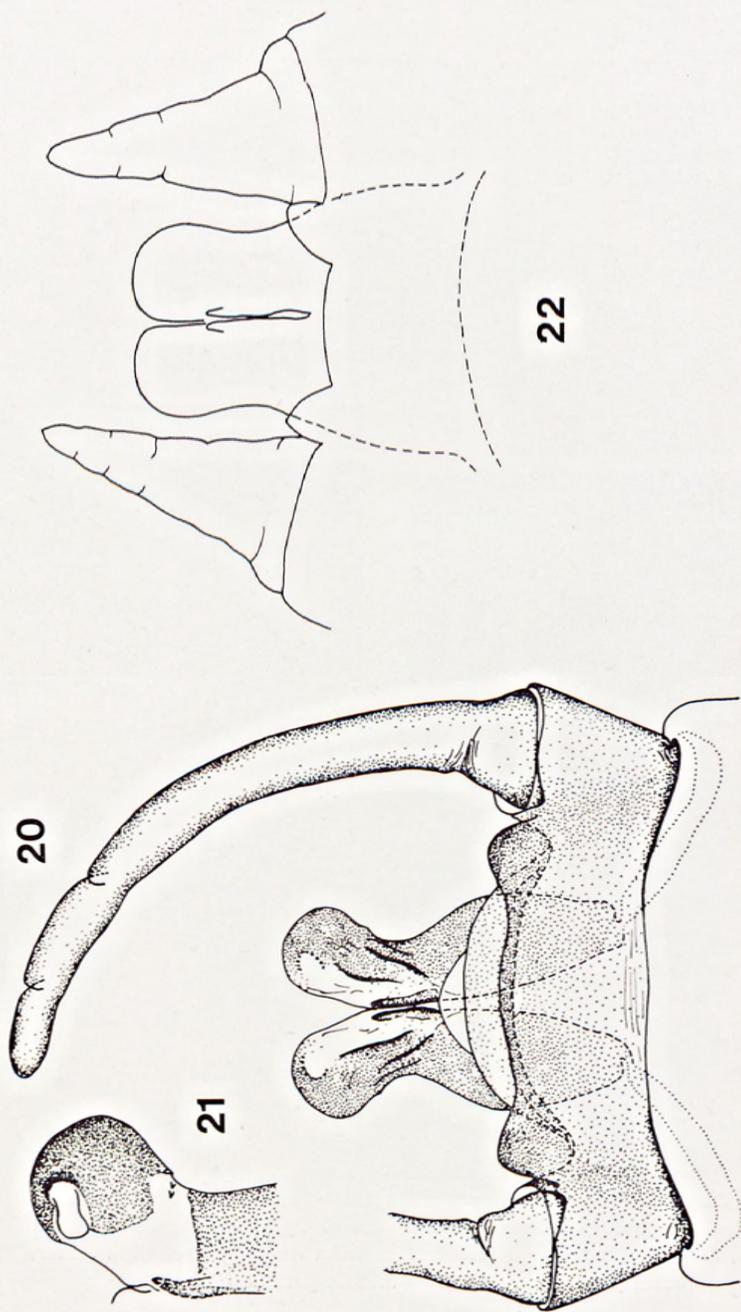
Figs 5—11. *Ecdyonurus braaschi* n.sp., egg (5—7) and nymph (8—11). 5 — egg; 6 — polar fragment of egg, more enlarged; 7 — surface of exochorion from equatorial part of egg; 8 — central part of abdominal tergite 5; 9 — fragment of dorsal surface from distal part of hind femur; 10 — basal part of cercus; 11 — middle part of cercus



Figs 12—19. *Ecdyonurus braaschi* n.sp., nymph. 12 — outline of labrum; 13 — fragment of hypopharynx; 14 — outline of fragment of labium; 15 — outline of lateral part of pronotum; 16 — first gill; 17 — third gill; 18 — sixth gill; 19 — seventh gill



Figs 23—29. *Ecdyonurus zimmermanni* n.sp., imago male (23), egg (24, 25) and nymph (26—29). 23 — fragment of penis, ventral view; 24 — fragment of polar part of egg; 25 — fragment of exochorion from equatorial part of egg; 26 — central part of abdominal tergite 5; 27 — fragment of dorsal surface from distal part of hind femur; 28 — basal part of cercus; 29 — middle part of cercus



Figs 20—22. *Ecdyonurus zimmermanni* n.sp., imago (20, 21) and subimago (22) male. 20 — genitalia, ventral view; 21 — lobe of penis, dorsal view; 22 — genitalia, ventral view

ker. The first segment of foreleg tarsus about one and a half shorter than the second one. The first segments of middle and hind leg tarsi slightly longer than second ones. Cerci brown.

Genitalia. Posterior margin of styliger with additional large semicircular fold partially covering the ventral part of penis (fig. 20). Lobes of styliger large, projecting slightly sideways. Penis with contrasting pigmentation. Lobes unfolding sideways with a V-shaped space between them. Ventral side of the lobes of penis with longitudinal folds (fig. 23), the dorsal side of the lobes with 2—4 denticles arranged in a transverse row at the bases of both penis lobes (fig. 21). A small protrusion from which these denticles grow is partially visible on the external margin of the lobe from the ventral side (fig. 20). Titillators with teeth.

Male subimago

Lengths: body 8—8.5 mm, forewing 8.5—9.0 mm, cerci 11—12 mm. Wings uniformly light grey. Markings on thorax and abdomen similar to those of imago male. Genitalia presented in fig. 22.

Female imago

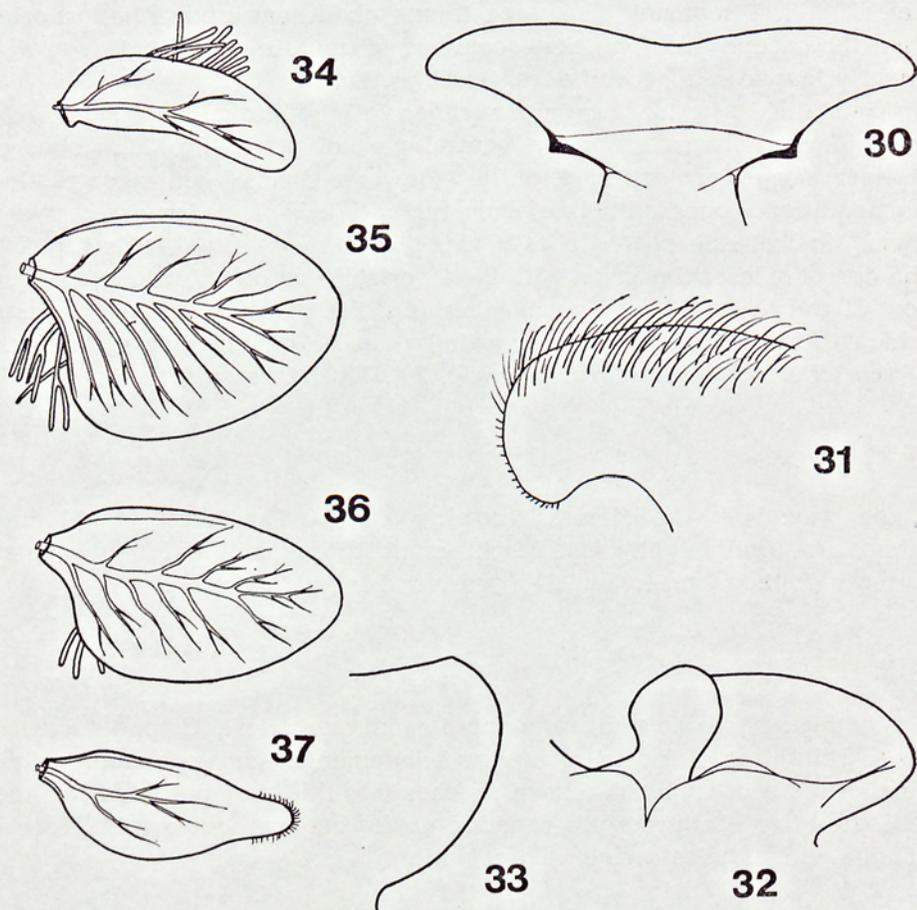
Lengths: body 9.5 mm, forewing 10 mm, cerci lost. Compound eyes dark. Coloration of thorax, wings, and abdomen the same as male imago. Genital plate of trapezoid shape reaches two-thirds of the length of the next sternite. Ninth sternite rounded at the end without a fold. Neural ganglia with a delicate violet pigmentation.

Egg (from female imago)

Length: 205—225 μm , width 135—145 μm . Chorion thick, fairly densely granulated (fig. 24). Granulations fairly large (fig. 25). Attachment structures numerous on both poles, fewer around the middle part. 3—4 micropyles in the equatorial zone.

Nymph

Lengths: body 8—8.5 mm, caudal filaments approximately the same. Head wide, oval, widest at the frontal parts of compound eyes. Labrum with concave anterior margin, on sides slightly curved backward (fig. 30). At the inner incisors of the mandibles 8 stout setae distinctly shorter than the incisors. Separated, distal part of the second article of maxillary palpus short. On top of galeolacinia 19—21 pectinate spines. Pattern of hairs on parapsides of hypopharynx shown in fig. 31. Glossae of labium relatively broad and rounded (fig. 32). Sides of the pronotum more curved



Figs. 30—37. *Ecdyonurus zimmermanni* n.sp., nymph. 30 — outline of labrum; 31 — fragment of hypopharyngeal parapside; 32 — outline of fragment of labium; 33 — outline of lateral part of pronotum; 34 — first gill; 35 — third gill; 36 — sixth gill; 37 — seventh gill

in their anterior part (fig. 33). Legs fairly slender. Upper surface of femurs with a moderate number of blunt spines (fig. 27). Upper surface of femurs, tibiae, and tarsi covered by numerous spinelike conical microdenticles. Along the tibia of the hind leg a row of spines consisting of about 20—30 units. Claws with 2—3 large denticles. Surface of abdominal tergites with distinct needle-shaped microdenticles, located along almost the entire length of tergites, in their middle parts (fig. 26). Posterolateral projections of the abdominal segments short, straight, reaching one-sixth to one-eighth of the length of the segment. Lamella of gill 1 narrow, slightly curved. Lamellae of gills 2—6 assymetric, rounded at the end. Lamella of gill 7 relatively narrow, at the end rounded and with abundant mar-

ginal hair cover (figs 34—37). Spines at the end of segments of caudal filaments numerous, short, and pointed (figs 28, 29).

Coloration. General coloration light, grey-yellow-brownish. Head light brown without markings on the front. Thorax with an indistinct pattern of paler spots. Femurs with an indistinct pattern of four spots, tibiae without a darker band. Tarsi slightly darker than the tibiae. Violet pigmentation of the neural ganglia and imaginal markings of the abdominal tergites only slightly visible.

Material: Holotype male imago (genitalia on microscopic slide), paratypes: 2 male subimagines, female imago, 4 full-grown nymphs, 2 nymphal exuviae (reared), source stream in the town Teberda, Western Caucasus, 27 June 1976 (coll. W. Zimmermann). Most of the specimens, including the holotype, in the author's collection, some paratypes in the collection of Mr. W. Zimmermann (Museum der Natur at Gotha).

Relationships. *Ecdyonurus zimmermanni* n.sp., in the nymphal stage, seems to be closely related (particularly in the morphology of mouthparts) to *E. squamatus* Braasch, the species known from Caucasus (Braasch 1978). It differs from this species in the rounded lamellae of gills 2—6, the shape of pronotal margins, and the smaller number of spines on the femurs. In imaginal stage the new species shows some distinctive features when compared with known species. In the form of penial lobes it resembles *E. fasciiculatus* Sowa and *E. ujhelyii* Sowa (Sowa 1974, 1981). It differs, however, from these two and other species of the *lateralis* group, among other features, in the shape of the penis stem, the form of the styliger, and in the markings of the abdomen.

3. Polish summary

Dwa nowe gatunki *Ecdyonurus* Eaton z grupy *lateralis* (Curt.) (Ephemeroptera, Heptageniidae) z Krymu i zachodniego Kaukazu

Praca zawiera opisy dwóch nowych gatunków jętek z rodzaju *Ecdyonurus* Eaton na podstawie materiałów otrzymanych od D. Braascha i W. Zimmermanna z Poczdamu i Gothy (NRD).

Ecdyonurus braaschi n.sp. opisany został w stadium imago samca, subimago samicy, jaja i nimfy (ryc. 1-19). Należy do grupy *lateralis* (Curt.) i złowiony został w jednym z potoków w pobliżu Jałty na Krymie. Od dotychczas znanych gatunków grupy *lateralis* odróżnia się następującą kombinacją cech morfologicznych: płaty prącia na końcu ukośnie ścięte, kolce u nasady płatu położone na wzgórku, charakterystyczny rysunek plam na tergitech odwołka (postacie skrzydlate), boki wargi górnej zaostrome, pierzaste szczeciny pomiędzy partią kłów i molarną żuwaczek liczne, języczki wargi dolnej stosunkowo wąskie, kolce na powierzchni ud i na końcu członów ogonów charakterystycznego kształtu (nimfy).

E. zimmermanni n.sp. opisany został w stadium imago (samiec i samica), subimago

(samiec), jaja i nimfy (ryc. 20-37). Należy również do grupy *lateralis* (Curt.). Odszukany został na terenie Teberdy w Zachodnim Kaukazie. Od dotychczas znanych gatunków grupy *lateralis* odróżnia się następującą kombinacją cech morfologicznych: charakterystyczny kształt pnia prącia, wygląd styligeru od strony brzusznej ciała, specyficzne uplinknienie tergitów odwłoka (postacie skrzydlate), zaokrąglone blaszki skrzelochawek 2—6, charakterystyczny zarys kształtu boków przedplecza, niezbyt liczne kolce na powierzchni ud (nimfy).

4. References

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