

RESEARCH PAPER

## Taxonomic notes on the genus *Hydrobaenus* with description of *H. simferopolus* sp. nov. from Crimea (Diptera: Chironomidae)

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**Abstract.** A new species of the genus *Hydrobaenus* Fries, 1830, *H. simferopolus* sp. nov. (Diptera: Chironomidae: Orthocladiinae), is described based on adult male collected in the Crimean Peninsula (Ukraine). Main distinguishing characters are: anal point cup-shaped with a small nose-like apex; virga composed of 3 strong equal spines; inferior volsella consisting of 2 lobes (proximal one broadly planned and covered with curved setae, distal one large nose-like and bare). A new combination of *Parorthocladius korneyevi* Baranov, 2011 for *H. korneyevi* (Baranov, 2011) comb. nov. is provided with additional differentiating characters found in male adult including: tergite IX with a median dorsal crest; anal point long, drop-like, covered with setae and ending with thumb-shaped apex; virga composed of 6–8 subequal thin long spines; inferior volsella with 2 unequal lobes (proximal one spherical and much larger); gonostylus massively bulbous and densely covered with long and short setae, crista dorsalis consists of a subapical strong tooth-like, smooth and orally projecting ridge. The male adults of both *H. dentistylus* Moubayed, 1985 and *H. lugubris* Fries, 1830 are also illustrated, diagnosed and shortly redescribed with some main distinguishing and supplementary characters. Remarks and comments on the taxonomic position, ecology and geographical distribution of the four *Hydrobaenus* species are given.

**Key words.** Diptera, Chironomidae, *Hydrobaenus simferopolus* sp. nov., *Hydrobaenus korneyevi*, new combination, new species, Ukraine, Palearctic Region

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### Introduction

Knowledge on the taxonomy, geographical distribution and ecology of the known *Hydrobaenus* species from Europe and the Palearctic Region was extensively highlighted by: FRIES (1830, 1831), SÆTHER (1976), MOUBAYED (1985), CRANSTON et al. (1989), LANGTON & COBO (1992), SASA & KIKUCHI (1995), ASARI et al. (2004), CRANSTON et al. (2007), MAKARCHENKO & MAKARCHENKO (2009, 2010, 2011, 2017), ZERGUINE & ROSSARO (2010), BARANOV (2011a,b), ASHE & O'CONNOR (2012), ANDERSEN et al. (2013); SÆTHER & SPIES (2013), MAKARCHENKO et al. (2017). In this paper, four *Hydrobaenus* species are examined and diagnosed based on material composed of male adults collected in Ukraine,

Lebanon, and France. *Hydrobaenus simferopolus* sp. nov. is described based on material collected by the junior author in Ukraine. A new combination of *Parorthocladius korneyevi* Baranov, 2011 (erroneously placed into the genus *Parorthocladius*, BARANOV 2011a) for *Hydrobaenus korneyevi* (Baranov, 2011) is also provided. *Hydrobaenus korneyevi* comb. n. is diagnosed and shortly redescribed based on the original male holotype and 3 male paratypes, which are part of the type material that the junior author used in his original description (BARANOV 2011a). Male adults of both *H. dentistylus* Moubayed, 1958 (paratype, Lebanon) and *H. lugubris* Fries, 1830 (NE-France) are diagnosed, illustrated and shortly redescribed.



Worldwide, about 43 known *Hydrobaenus* species were reported by ASHE & O'CONNOR (2012); this number was upgraded to 44 including the recently described *H. golovinensis* Makarchenko & Makarchenko, 2017 from Far Eastern Russia. Consequently, both *H. simferopolus* sp. nov. and *H. korneyevi* increase the total number of worldwide valid species of the genus *Hydrobaenus* to 46. For each of the four examined *Hydrobaenus* species, some of the differentiating features provided in the literature (SÆTHER 1976, MOUBAYED 1985, BARANOV 2011) can be supplemented or corrected based on the combination of characters illustrated in this paper. Remarks and discussion on some related species and comments on the ecology and geographical distribution of the four *Hydrobaenus* species are given.

### Material and methods

All the examined specimens were mounted in polyvinyl lactophenol; the remaining material including the paratypes was preserved in 80% ethanol. Material of male adults was cleared of musculature in 90% lactic acid (head, thorax, abdomen, and anal segment) for 60 to 80 minutes; this can be left overnight at room temperature without any detrimental effect or damage. The specimens were checked under a binocular microscope after 20 minutes in lactic acid to determine how the clearing was progressing. When clearing was complete the specimens were washed in 50–60% ethanol (in two repeated steps) to ensure that all traces of lactic acid were removed. Compared to clearing with potassium hydroxide, or other clearing solutions, no deterioration of the typical “original” structure is reported when using lactic acid. Eye on one side was dissected from the head to ensure that the hairs on the inner margin of the eye are more clearly visible. Before the final slide mountings (dorsally) of the type and paratype material, the hypopygium including tergite IX, anal point, gonocoxite, and gonostylus, were viewed ventrally and laterally to examine and draw from both sides all the necessary details of the species. In particular, the ventral view of hypopygium was illustrated when anal point and tergite IX were removed. Morphological terminology and measurements largely follow SÆTHER (1980) and CRANSTON et al. (1989) for the adults.

The material examined is deposited in the following collections:

IBNC	Biological Institute of Far Eastern Branch of Russian Academy of Science, Vladivostok, Russia;
JBMF	Joel Breil's private collection, Montpellier, France;
SIZK	Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine, Kiev, Ukraine;
ZSMC	Zoologische Staatssammlung, München, Germany.

### Description

#### *Hydrobaenus dentistylus* Moubayed, 1985

(Figs 1–9, 23–24)

**Type material examined.** PARATYPES: **LEBANON:** Litany River, Bekaa plain, 800–850 m a.s.l., 29.iii.1982, 5 ♂♂, J. Moubayed-Breil lgt. (2 ♂♂ IBNC, 2 ♂♂ JBMF, 1 ♂ ZSMC).

**Diagnostic characters.** The differentiating characters provided in the original paper (MOUBAYED 1985) can be

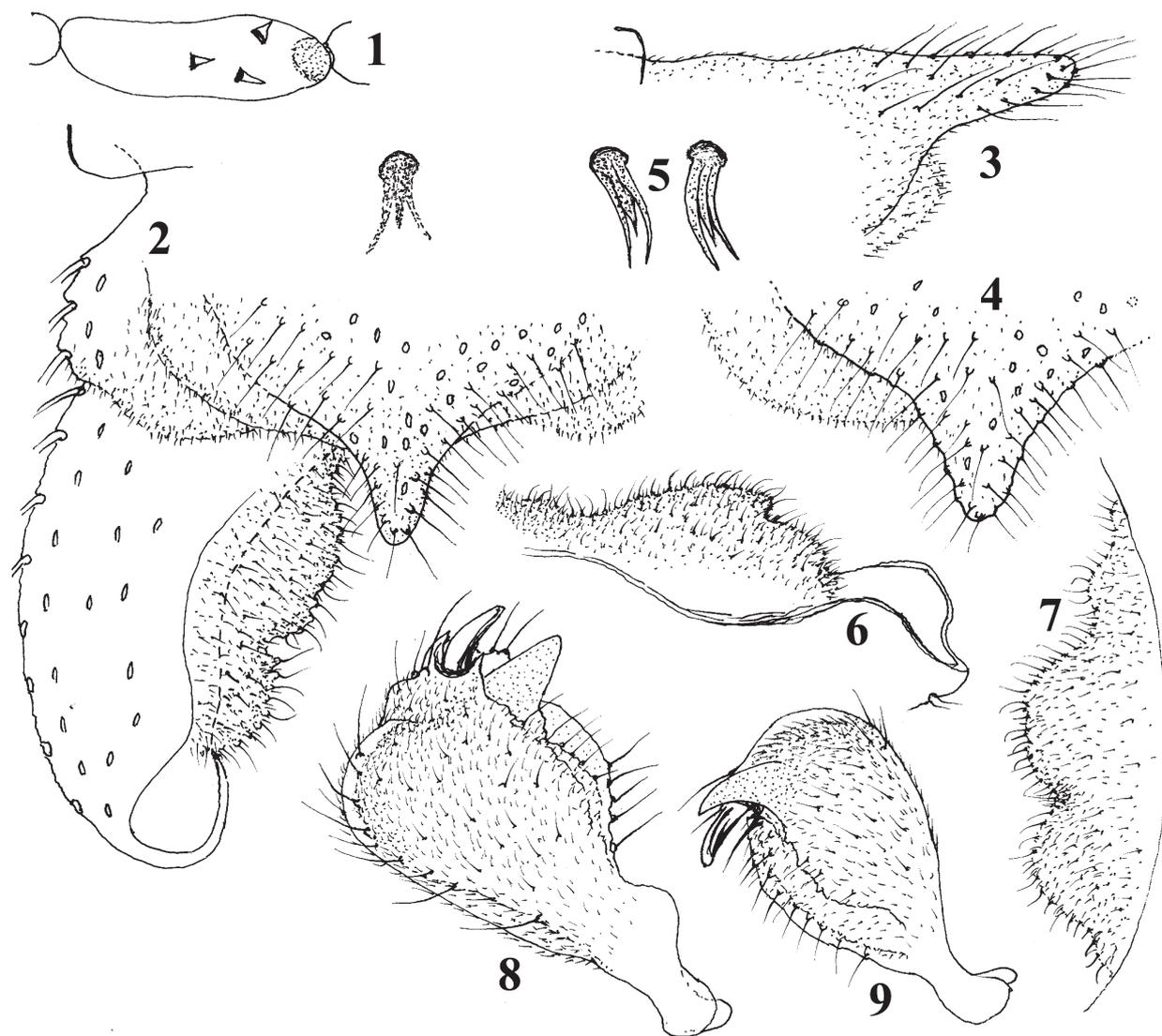
summarized and supplemented by the following main distinguishing characters found in the male adult: antenna, palp and legs not reduced; lobes of anteprepronotum gaping; acrostichals 4–5 in total, reduced, starting some distance from anteprepronotum; anal point drop-like, tergite IX and anal point densely covered with about 60–70 setae reaching apex of anal point; virga consisting of 3 curved unequal teeth (median one shorter); inferior volsella consisting of 2 unequal large lobes with proximal lobe broader; gonostylus bulb-like, globular and bearing a distinct pre-apical pointed tooth placed close to the megaseta.

**Redescription.** **Male adult** (n = 5; Figs 1–9, 23–24). Small to medium sized *Hydrobaenus* species. Total length 2.85–3.00 mm. Wing length 2.20–2.40 mm. General colouration contrasting brown to blackish. Head dark brown, antennae pale; thorax contrasting brown to blackish, mesonotal stripes distinctly blackish; wing pale; legs dark brown to blackish. Tergites I–VIII brown; anal segment brown to dark brown, crista dorsalis dark brown.

**Head.** Eyes bare. Temporals consist of 9–11 setae including 5–6 inner and 4–5 outer verticals. Antenna and palp are not reduced. Antenna 810–830 µm long, 13-segmented, length (µm) of segments: 1, 50; 2–12, 30–35 (nearly sub-equal), last flagellomere 420–430; distal part of last flagellomere (Figs 35–36) moderately clubbed ending with forked rounded apex; antennal groove beginning on segment 1 and reaching ultimate flagellomere; AR 1.10. Clypeus with 8 setae. Palp 5-segmented, palpomere 3 (Fig. 1) with 3–4 sensilla clavata.

**Thorax.** Acrostichals reduced, consisting of 4–5 uniserial setae beginning some distance from anteprepronotum; anteprepronotum with 6–7 lateral anteprepronotals, lobes well gaping as in *H. simferopolus* sp. nov. (Fig. 28); prealars 4–5 in 1 row. Scutellum with 8 uniserial setae. Wing. Brachiolum with 1 seta. Distribution of setae on veins: R, 8–12; R<sub>1</sub>, 25–7; remaining veins bare. Squama with 9 uniserial setae. Legs. Sensilla chaetica present on tibia and tarsomeres ta<sub>1</sub>–ta<sub>5</sub> of PI, PII and PIII.

**Hypopygium** in dorsal view with gonostylus removed (Fig. 2). Tergite IX (Figs 2–3) broadly rectangular, narrowing distally, slightly sinuous in lateral view (Fig. 3), 60–70 setae present on both tergite IX and anal point. Anal point (dorsal, Figs 2, 4; lateral, Fig. 3) about 40–45 µm long, 30 µm maximum width at base, drop-like and densely covered with setae. Virga (Figs 2, 5) consisting of 3 long spines about 45 µm long, fused at base, median one shorter. Gonocoxite 250–260 µm long, maximum width 120–125 µm, with rounded apex; inferior volsella (dorsal, Figs 2, 7; lateral, Fig. 6) 95–105 µm long, 30–35 µm maximum width, consisting of 2 large lobes; proximal lobe distinctly larger. Gonostylus (Figs 8–9) 115 µm long, maximum width 65–70 µm, massively spherical to bulb-shaped medially and distally; hyaline area present on posterolateral side; anterior margin swollen and bearing 5–6 setae placed on proximal part; crista dorsalis consisting of 1 triangular characteristic and strong pre-apical teeth, orally directed and placed close to megaseta, clearly visible in both dorsal and lateral view (Figs 8–9); megaseta dark brown, conspicuous and slightly bent inwards.



Figs 1–9. Male adult of *Hydrobaenus dentistylus* Moubayed, 1985. 1 – palpomere 3; 2 – hypopygium, dorsal view with gonostylus removed; 3 – tergite IX and anal point in lateral view; 4 – anal point, dorsal; 5 – virga, two aspects; 6–7 – inferior volsella (6 – lateral view; 7 – dorsal view); 8–9 – gonostylus (8 – dorsal view; 9 – lateral view).

**Ecology.** Large material composed of adults and pupae of *H. dentistylus* is recorded from shallow flowing water with rich aquatic vegetation. Emergence reported in early springtime: from March to April. Chironomid species encountered in the type locality of *H. dentistylus* include: *Potthastia gaedii* (Meigen, 1838), *P. longimanus* Kieffer, 1922, *Sympotthastia zavreli* Pagast, 1947, *Smittia durandae* Moubayed, 1989, *Polypedilum anjarum* Moubayed, 1989, *P. aegyptium* Kieffer, 1925, *P. longisetum* Moubayed, 1992, *P. yammounei* Moubayed, 1992, *Micropsectra lindrothi* Goetghebuer, 1931, *M. sofiae* Stur & Ekrem, 2006, *Rheotanytarsus curtistylus* (Goetghebuer, 1921), *R. rhenanus* Klink, 1983 and *R. ringei* Lehman, 1970.

**Distribution.** *Hydrobaenus dentistylus* is considered a typical biogeographic representative of the Levantine Province. This species is only known from its type locality: middle basin of the Litany River, Bekaa plain, Lebanon, alt. 800–850 m.

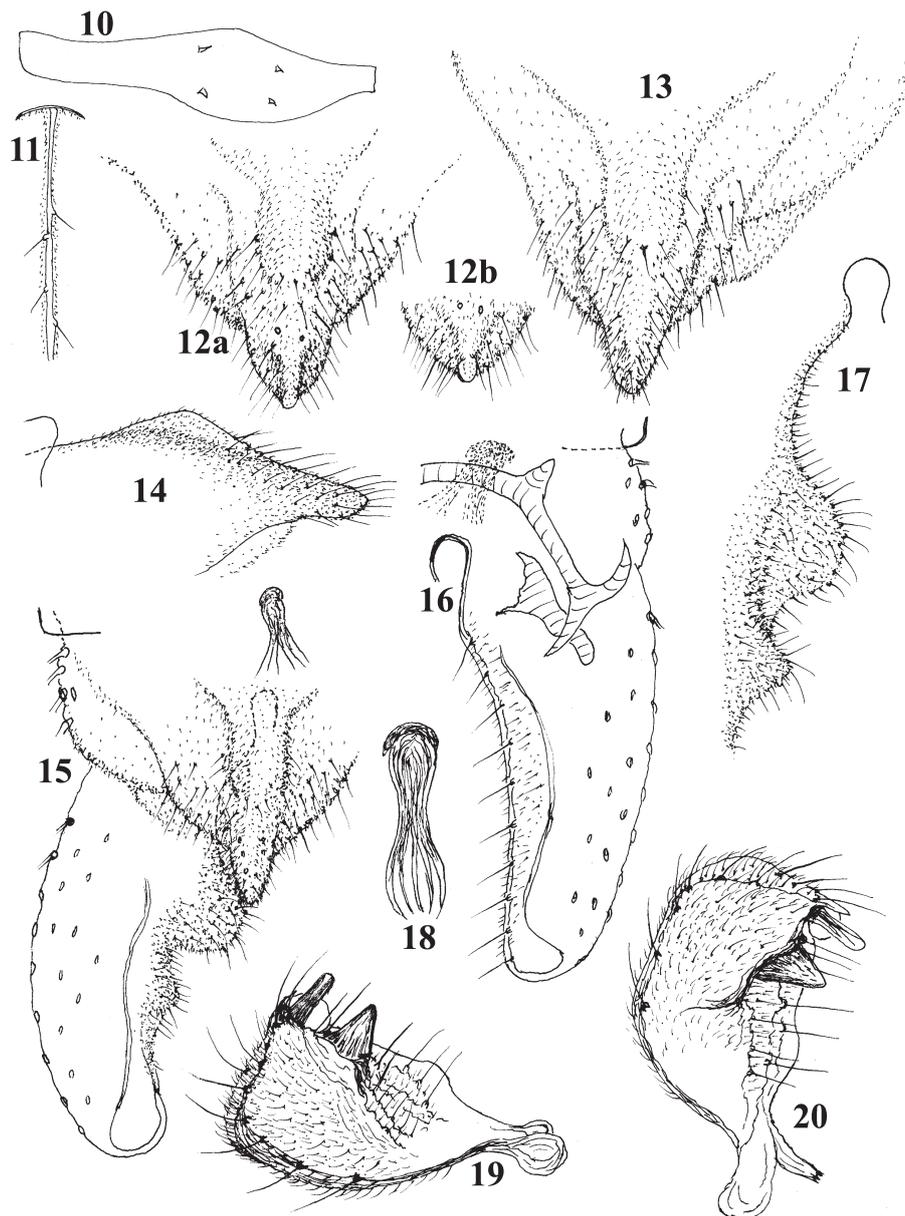
***Hydrobaenus korneyevi* (Baranov, 2011),  
comb. nov.**

(Figs 10–20, 25–26, 29)

*Parorthocladius korneyevi* Baranov, 2011a: 406.

**Type material examined.** HOLOTYPE: ♂ (SIZK), 'UKRAINE: CRIMEA: leg. V. Baranov; Simferopol, Salgir River, 29.XI.2010, handnet'. PARATYPES: 2 ♂♂ (JBMF), same locality as for holotype.

**Diagnosis.** The description of male adult of *H. korneyevi*, as provided in the original paper (BARANOV 2011a), can be completed and supplemented with the following additional characters: lobes of antepronotum distinctly gaping; acrostichals reduced, composed of 4–5 setae starting some distance from antepronotum; sensilla chaetica present on tibia and tarsomeres  $ta_1$ – $ta_5$  of PI, PII and PIII; tergite IX broadly triangular and narrowing distally, bearing medially a distinct elevated truncate hump; distal part of tergite IX and anal point densely covered with about 60 setae which are placed mainly on sides of dorsal hump; anal point tri-



Figs 10–20. Male adult of *Hydrobaenus korneyevi* (Baranov, 2011). 10 – palpomere 3; 11 – distribution pattern of acrostichals; 12–13 – tergite IX and anal point (12–13 – dorsal view; 14 – lateral view); 15–16 – hypopygium, gonostylus removed (15 – dorsal view; 16 – ventral view, tergite IX and anal point removed); 17 – inferior volsella, dorsal view; 18 – virga; 19–20 – gonostylus (19 – dorsal view; 20 – lateral view).

angular to drop-shaped, elongate, nearly parallel-sided to weakly narrowing distally, ending with a short finger-like apex; virga consisting of 6–8 long subequal thin spines; inferior volsella composed of 2 distinct lobes, proximal one semi-spherical and much larger; gonostylus massively bulbous medially, with blackish long and short setae covering posterior and lateral sides; crista dorsalis consisting of strong preapical triangular tooth, orally projecting and placed close to megaseta, which is markedly bent inwards.  
**Redescription. Male adult** (n = 3; Figs 10–20, 25–26, 29). Large sized *Hydrobaenus* species. Total length 4.40–4.60 mm; wing length 2.60–2.70 mm. General colouration blackish with contrasting brown to blackish thorax and legs. Mesonotal stripes distinctly blackish; legs dark brown to blackish; tergites I–VIII brown to dark brown; anal segment blackish, crista dorsalis distinctly dark brown.

**Head.** Eyes bare. Temporals consisting of 12–13 setae including 7–8 inner and 5 outer verticals. Antenna 810–830  $\mu\text{m}$  long, 13-segmented, length ( $\mu\text{m}$ ) of segments: 1, 50; 2–12, 30–35 (nearly sub-equal), last flagellomere 420–430; distal part of last flagellomere (Figs 23–24) moderately clubbed ending with forked rounded apex; antennal groove beginning on segment 1 and reaching ultimate flagellomere; AR 1.10. Clypeus with 8 setae. Palp 5-segmented, not reduced, palpomere 3 (Fig. 10) with 4–5 sensilla clavata.

**Thorax.** Lobes of anteprepronotum (Fig. 29) distinctly gapping, lateral anteprepronotals 6–7; acrostichals (Fig. 11) reduced, composed of 4–5 setae in 1 row, starting some distance from anteprepronotum; dorsocentrals 15–17 in 2 rows; prealars 4–5 in 1 row. Scutellum with 13–14 setae in 2 rows. Wing. Brachiolum with 1 seta. Distribution of

setae on veins: R, 8–9; R<sub>1</sub>, 0; R<sub>2+3</sub>, 1–2; remaining veins bare. Squama with 10–14 setae in 1–2 rows. Legs. Sensilla chaetica present on tibia and tarsomeres ta<sub>1</sub>–ta<sub>5</sub> of PI, PII and PIII. Length (µm) and proportions of legs as in Table 1.

Hypopygium in dorsal and ventral view (Figs 15–16). Tergite IX broadly triangular, narrowing distally, with elevated truncate hump medially (Figs 12–14) which is clearly visible in lateral view, distal part of tergite IX and anal point densely covered with setae (about 60). Anal point (Figs 12–14) about 90–100 µm long, 60–70 µm maximum width at base and 20–25 µm at apex, long triangle to parallel-sided, slightly narrowing distally, entirely covered with setae (less at base than at apex), apex ending with small finger-like apex (Figs 12a–12b). Virga (Figs 15–16, 18) consisting of 6–8 subequal fine spines about 55–60 µm long and fused at base. Gonocoxite 250–260 µm long, maximum width 125–130 µm, with rounded apex; inferior volsella (dorsal, Figs 15, 17) composed of 2 large lobes, proximal lobe distinctly larger and semi-circular. Gonostylus (Figs 19–20) 120–125 µm long, maximum width 60–70 µm, massively bulb-shaped; posterior and posterolateral margins densely covered with characteristic short and stout blackish setae, posterior and lateral side with 9–10 long stout characteristic setae; crista dorsalis consistently chitinous, triangular with pointed apex, orally directed and placed pre-apically close to megaseta, clearly visible in both dorsal and lateral view (Figs 19–20); megaseta about 20 µm long, markedly bent inwards.

**Taxonomic position.** The male adult of *H. korneyevi* resembles that of *H. dentistylus* and *H. lugubris* in having a similar shape of inferior volsella and a high number of setae on tergite IX and anal point. Nevertheless, the massive structure of gonostylus and the strong triangular crista dorsalis look more similar to those of *H. dentistylus*. However, *H. korneyevi* can be separated from other related *Hydrobaenus* species by the following characters: presence of a distinct truncate elevated hump on median part of tergite IX (clearly visible in lateral view); anal point long triangle to long drop-shaped, often ending in a finger-like apex (Figs 12a–12b); virga with 6–8 long thin spines; lobes of inferior volsella differently shaped, proximal one rounded and much larger; gonostylus densely covered with blackish short and long setae, crista dorsalis strong tooth-like, triangular with pointed apex, placed pre-apically close to megaseta.

**Ecology.** Male adults of *H. korneyevi* are collected only during winter time between December and January: dates of emergence recorded in the Salgir River basin are: 29.12.2010 and 21.1.2013. Adults were recorded swarming, flying and moving on the vegetation and on the snow at low temperatures (< -2°C). Species is recorded from piedmont rivers, with gravel substrates and plenty of accumulated organic matter, such as leaves and bark.

**Distribution.** *Hydrobaenus korneyevi* is reported from the Central part of the Crimean Peninsula, including its type locality (the Salgir river in Gagarin Park in the centre of Simferopol) as well as from Botanical Garden of Taurida State University and from Western Bulganak river, next to Pozharske village (BARANOV 2011a,b).

### *Hydrobaenus lugubris* Fries, 1830

(Figs 21, 22, 27, 30–34)

**Material examined.** FRANCE: Vosges Region, Mairy and Valtin areas, 400–600 m a.s.l., 24.ii.2014 & 11.iii.2014, 47 ♂♂ 6 ♀♀, Gennaro Coppa lgt. (JBMF); Natural Reserve of Lake Remoray, 27.xi.2017, 2 ♀♀ (pupal exuviae), Bruno Tissot lgt. (JBMF).

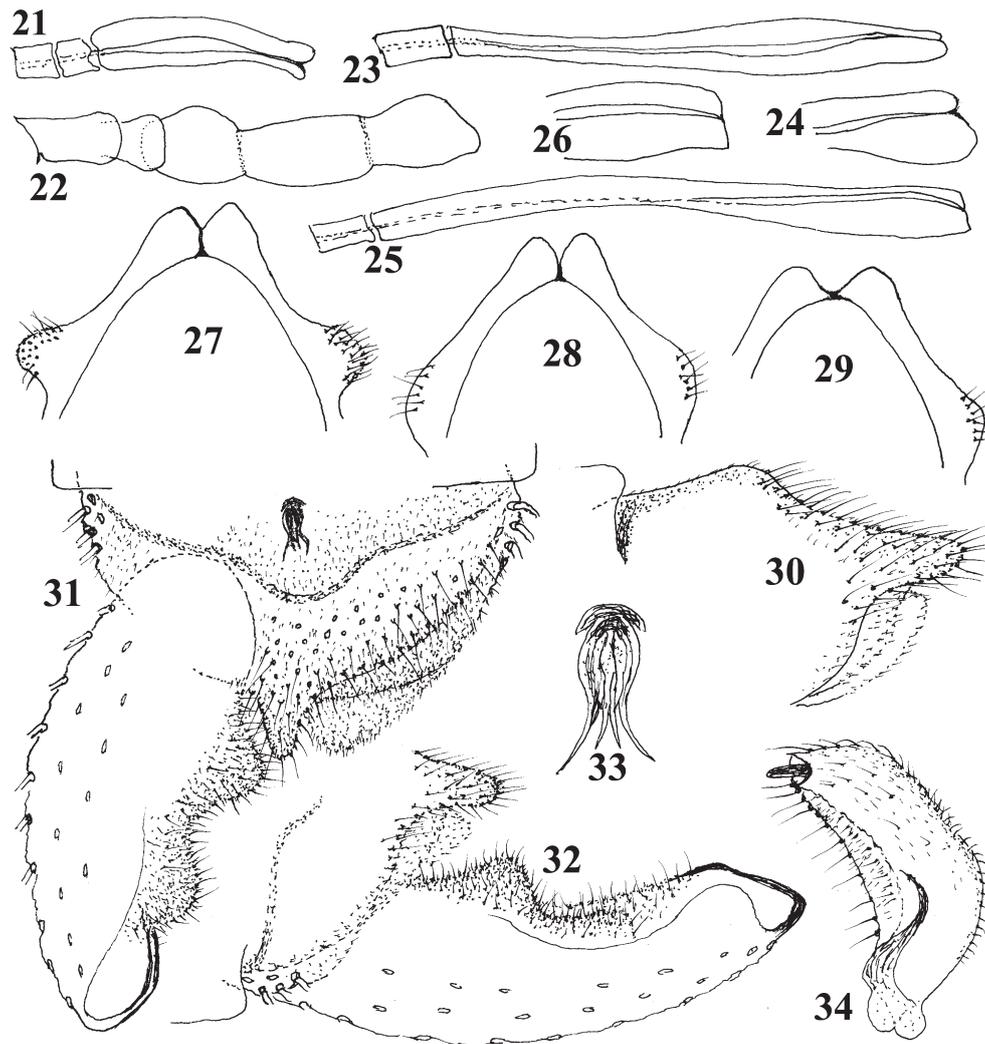
**Diagnosis.** Male adult of *H. lugubris* resembles that of *H. dentistylus* and *H. korneyevi* in having: a similar shape of inferior volsella; high number of dorsal setae on tergite IX and anal point. Its description, as provided in SÆTHER (1976), can be supplemented by the following additional relevant characters: antenna, palp and legs reduced; palpomere 3 without 3 sensilla clavata; acrostichals not reduced, composed of 4–6 curved setae in 1 row; sensilla chaetica present on tibia and tarsomeres ta<sub>1</sub>–ta<sub>5</sub> of PI–PIII, tarsomere ta<sub>4</sub> of PI–PII distinctly shorter than ta<sub>5</sub>, BR of all legs lower than 1 (0.60–0.95); tergite IX with distinct elevated hump clearly visible in lateral view), anterior part with blackish transverse band, about 130–140 setae present on tergite I and anal point; anal point drop-shaped; virga present, consisting of 4–5 long unequal thin spines; inferior volsella composed of 2 subequal well separated lobes; gonostylus without crista dorsalis.

**Redescription.** *Male adult* (n = 5; Figs 21–22, 27, 31–34, 38). Medium sized *Hydrobaenus* species. Total length 3.60–3.80 mm; wing length 1.75–1.85 mm. General colouration contrasting brownish to yellowish with contrasting brown to dark brown thorax, legs and abdomen. Head brownish; legs dark brown; abdomen with contrasting brownish to yellowish tergites and sternites, anal segment brown to dark brown.

Head. Eyes bare. Temporals consisting of 21–23 setae including 13–14 inner and 8–9 outer verticals. Antenna and palp reduced. Antenna 410–430 µm long, 13-segmented; last flagellomere (Fig. 21, with 2 preceding segments) 180–190 µm long, entirely divided with forked rounded apex (Fig. 21); antennal groove beginning on segment 1 and reaching ultimate flagellomere; AR 0.53–0.61. Clypeus with about 40 setae placed in 6–7 rows. Palp (Fig. 22) reduced, 5-segmented, palpomeres 1–4 fused, palpomere 3 without sensilla clavata.

Thorax. Acrostichals (Fig. 38) not reduced, consisting of 4–6 markedly curved setae 30–35 µm long, starting some distance from anteprepronotum and placed in 1 row; anteprepronotum (Fig. 29) with 17–21 lateral anteprepronotals; prealars 5–5 in 1 row. Scutellum with 30–35 setae in 5–6 rows. Wing. Brachiolum with 5–6 setae. Distribution of setae on veins: R, 17–19; R<sub>1</sub>, 4–5; R<sub>2+3</sub>, 5–6; R<sub>4+5</sub>, 2–3, remaining veins bare. Squama with 10–13 uniserial setae. Legs. Sensilla chaetica present on tibia and tarsomeres ta<sub>1</sub>–ta<sub>5</sub> of PI–PIII, tarsomere ta<sub>4</sub> of PI–PII distinctly shorter than ta<sub>5</sub>, BR of all legs lower than 1 (0.60–0.95). Length (µm) and proportions of legs as in Table 2.

Hypopygium in dorsal view (Fig. 31). Tergite IX semi-circular, narrowing distally, distinctly truncate medially (clearly visible in lateral view, Fig. 30), about 130–140 setae present on tergite IX and anal point. Anal point drop-like; virga consisting of 4–5 long unequal thin spines; inferior volsella composed of 2 subequal well separated



Figs 21–34. Male adult of *Hydrobaenus* spp. 21 – *H. lugubris*: last flagellomere and two preceding segments; 22 – palp, reduced. 23–26 – last flagellomere and preceding segment: 23–24 – *H. dentistylus*; 25–26 – *H. korneyevi*. 27–29 – antepronotum: 27 – *H. lugubris*; 28 – *H. simferopolus* sp. nov.; 29 – *H. korneyevi*. 30 – *H. lugubris*, tergite IX and anal point, lateral view; 31–32 – hypopygium with gonostylus removed (31 – dorsal view; 32 – lateral view); 33 – virga; 34 – gonostylus, lateral.

large lobes. Gonostylus (Fig. 34, lateral) elongated and narrowing distally, anterior area with 9–10 stout setae which are orally directed, crista dorsalis as low elongated ridge or absent; megaseta conspicuous and slightly bent inwards.

**Ecology.** Up to 50 male and female adults of *H. lugubris* have been examined based on large material collected in cold limnocyrenes and pristine peat bogs located in NE-France. Emergence of chironomid fauna reported from February to March revealed that *H. lugubris* largely dominates the other associated species which are mainly encountered during the first seasonal inundations of floodplains of some rivers and streams located in both the Vosges Region and upper basin of the River Doubs. Species encountered in the same localities with *H. lugubris* include: *Bryophaenocladus aestivus* (Brundin, 1947), *B. nidorum* (Edwards, 1929), *Chaetocladus dentiforceps* (Edwards, 1929), *C. melaleucus* (Meigen, 1818), *C. perennis* (Meigen, 1830), *Limnophyes pentaplastus* (Kieffer, 1921), *L. difficilis* Brundin, 1947, *Metriocnemus albolineatus* Meigen, 1818, *M. eurynotus* (Holmgren, 1883), *M. fuscipes* (Holmgren, 1818), *M. hirticollis* (Staege, 1839).

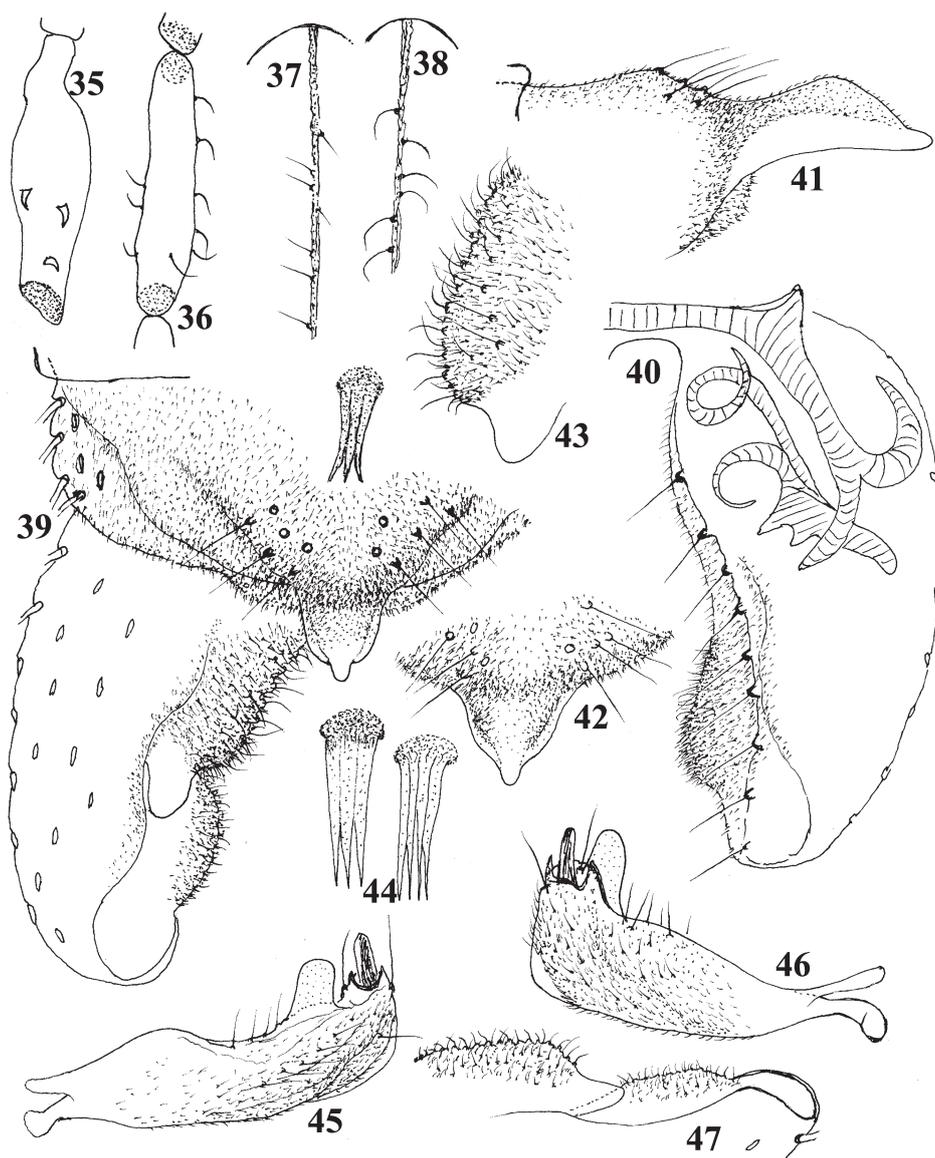
**Distribution.** *Hydrobaenus lugubris* is actually widespread in Europe and the Palearctic Region (FRIES 1830, ZETTERSTEDT 1850, GIARD 1904, SÆTHER 1976, SERRA-TOSIO & LAVILLE 1991, BARANOV 2011b). In France, this species was reported for the first time from North Western areas (GIARD 1904). Records cited here from NE-France, after MOUBAYED-BREIL (2017), are coming from Vosges Region and the upper basin of the Doubs River (altitude 400–600 m). This is considered to be the second record from France.

#### *Hydrobaenus simferopolus* sp. nov.

(Figs 29, 35–37, 39–47)

**Type material.** HOLOTYPE: ♂ (SIZK), 'UKRAINE: CRIMEA: leg. V. Baranov; Simferopol, Salgir River, 29.XI.2010, handnet'. PARATYPE: ♂ (JBMF) (mounted on the same slide), same locality as for holotype.

**Diagnosis.** Based on some typical and specific characters found in the hypopygium of *H. simferopolus* sp. nov., in particular the singular shape of its phallapodeme, this new species apparently belongs to a separate group. This new species can be easily distinguished from all members of



Figs 35–47. Male adult of *Hydrobaenus* spp. 35–36 – *H. simferopolus* sp. nov.: 35 – palpomere 3; 36 – palpomere 4. 37–38 – distribution pattern of acrostichals: 37 – *H. simferopolus* sp. nov.; 38 – *H. lugubris*. 39–40 – *H. simferopolus* sp. nov., hypopygium, gonostylus removed (39 – dorsal view; 40 – ventral view, tergite IX and anal point removed). 41–42 – tergite IX and anal point (41 – lateral; 42 – dorsal). 43 – inferior volsella, dorsal; 44 – virga, two aspects; 45–46 – gonostylus (45 – dorsal view; 46 – ventrolateral view). 47 – gonocoxite and inferior volsella, lateral.

the genus by having: acrostichals not reduced, consisting of 5–6 long markedly curved setae; tergite IX without setae, dorsal margin sinuous; laterosternite IX with 7 setae on each side; anal point large, drop-shaped, proximal half with 12 setae, distal half bare and ending with a thumb-like apex; virga composed of 3 strong equal teeth; phallapodeme characteristic, terminating in 2 unusual and characteristic spirals; inferior volsella consisting of a large plain lobe ending with a hyaline and bare nose-like apex which is projecting downwards; gonocoxite with a swollen ventral lobe placed distally; gonostylus linearly elongated and slender, posterior part hyaline and bare; crista dorsalis large tooth-like, smooth apically and nearly hyaline, orally projecting and placed pre-apically close to the megaseta. **Description. Male adult** (n = 2; Figs 28, 35–37, 39–47). Medium sized *Hydrobaenus* species. Total length 3.50–

3.60 mm; wing length 2.45–2.50 mm. General colouration contrasting brown to dark brown. Thorax dark brown with blackish mesonotal stripes. Legs dark brown. Tergites I–VIII and anal segment dark brown; crista dorsalis distinctly hyaline to yellowish.

Head. Eyes bare. Temporals consisting of 10–11 setae including 6–7 inner and 4 outer verticals. Palp 5-segmented, not reduced; length (in  $\mu\text{m}$ ) of segments: 35, 45, 63, 136, 225; palpomere 3 (Fig. 35) with 3 sensilla clavata, palpomere 4 (Fig. 36) with 2 circular area of microtrichia placed proximally and distally. Clypeus with 6 setae in 2 rows.

Thorax. Anteprepronotum with gaping lobes (Fig. 28), lateral anteprepronotals 3–4; acrostichals (Fig. 37) not reduced, composed of 6–7 distinctly pin-like setae starting some distance from anteprepronotum; dorsocentrals 10 in 1 row;

**Table 1.** *Hydrobaenus korneyevi*. Length ( $\mu\text{m}$ ) and proportions of prothoracic (PI), mesothoracic (PII) and metathoracic (PIII) legs. Abbreviations: **fe** – femur; **ti** – tibia; **ta<sub>1</sub>–ta<sub>5</sub>** – tarsomeres 1–5; **LR** – leg ratio: ratio of length of metatarsus to length of tibia; **BV** – combined length of femur, tibia and basitarsus divided by combined length of tarsomeres 2–5; **SV** – ratio of the length of femur plus tibia to the length of metatarsus; **BR** – ratio of the length of the longest seta of tarsus, divided by minimum width of tarsus measured in distal third.

Leg	fe	ti	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR	BV	SV	BR
<i>Hydrobaenus korneyevi</i>											
PI	1010	1020	715	405	295	205	145	0.70	2.62	2.84	1.75
PII	990	1060	465	240	190	135	130	0.44	3.62	4.41	1.65
PIII	1015	1060	570	290	240	145	130	0.54	3.29	3.64	1.90
<i>Hydrobaenus lugubris</i>											
PI	980	1010	450	215	160	120	145	0.45	3.81	4.42	0.90
PII	1005	1035	250	145	120	95	140	0.24	4.58	8.16	0.60
PIII	1120	1005	360	180	150	100	120	0.36	4.52	5.90	0.95
<i>Hydrobaenus simferopolus</i>											
PI	640	820	730					0.90			2.20
PII	760	770	315	190	110	95	85	0.41	3.84	4.86	2.10
PIII	720	895	445	235	170	105	95	0.50	3.41	3.63	1.80

prealars 5–7 in 1 row. Scutellum with 10 uniserial setae. Wing. Brachiolum with 1 seta. Distribution of setae on veins: R 4–5 placed on proximal part; remaining veins bare. Squama with 12–13 setae in 1–2 rows. Legs. Tarsomeres ta<sub>2</sub>–ta<sub>5</sub> of PI are missing; sensilla chaetica present on tibia of PI and tarsomeres ta<sub>1</sub>–ta<sub>5</sub> of PII–PIII. Length ( $\mu\text{m}$ ) and proportions of legs as in Table 3.

Hypopygium in dorsal, ventral and lateral view as in Figs 39, 40, and 47. Tergite IX broadly semi-circular, narrowing distally, dorsal margin sinuous (clearly visible in lateral view, Fig. 41); posterior area (Fig. 39) with 12–14 dorsal setae placed near the base of anal point (6–7 setae on each side). Laterosternite IX with 7 setae on each side. Anal point (Figs 39, 41–42) 75–85  $\mu\text{m}$  long, 60  $\mu\text{m}$  maximum width in median part; broad drop-shaped ending with thumb-like apex; distal part hyaline and lacking microtrichia. Virga (Figs 39, 44) 45–50  $\mu\text{m}$  long, consisting of 3–4 equal pointed teeth, entirely fused except for distal part. Phallapodeme unusually shaped, characteristic, terminating in 2 characteristic spirals (Fig. 40). Gonocoxite 285–300  $\mu\text{m}$  long, with rounded apex; ventral margin with large swollen lobe. Inferior volsella (dorsal, Figs 39, 43; lateral, Fig. 47) 100–105  $\mu\text{m}$  long, consisting of 2 unequal elongated lobes, proximal one nearly plain larger and covered with setae, distal lobe nose-like, hyaline and bare. Gonostylus (Figs 45–46) 120–125  $\mu\text{m}$  long, maximum width 50–55  $\mu\text{m}$ , linearly elongated and slender, bearing distinct hyaline and bare posterior area; crista dorsalis strong tooth-like, hyaline with smooth and rounded apex, orally projecting and placed pre-apically close to megaseta. **Taxonomic position.** Male adult of *H. simferopolus* sp. nov. can be keyed near that of *H. dentistylus* based on the following resembling characters: lobes of antepnotum not in contact (Fig. 28); acrostichals not reduced; virga composed of 3 strong pointed teeth; inferior volsella bilobed; crista dorsalis large tooth-like, orally projecting and placed pre-apically. However, the newly described species can be easily distinguished by the following combination of characters: acrostichals consisting of 6–7 long pin-like setae; tergite IX without setae while densely covered with setae in *H. dentistylus* (Fig. 2; MOUBAYED 1985: Fig. 1b); anal point large, drop-shaped, with a thumb-like apex (Figs

39, 42), while densely covered with setae in *H. dentistylus* (Figs 2, 4; Fig. 1b, MOUBAYED 1985) and differently figured in lateral view (Fig. 41 for *H. simferopolus* sp. nov., Fig. 3 for *H. dentistylus*); phallapodeme (Fig. 40) unusually shaped and terminating in 2 characteristic spirals; basal lobe of inferior volsella (Figs 39, 47) ending with a nose-like lobe which is hyaline, bare and projecting downwards; gonostylus (Figs 45–46) linearly elongated and slender, while bulb-like and spherical in *H. dentistylus* (Figs 8–9; MOUBAYED 1985: Figs 1b, 2); crista dorsalis large tooth-like, hyaline and smooth (Figs 45–46) while triangular with pointed apex and consistently chitinous in *H. dentistylus*. **Etymology.** The new species is named '*simferopolus*' after the Ukrainian city of Simferopol where the type material was collected; adjective.

**Ecology.** A typical rheophilic and oxybiontic species occurring in pristine section of streams and rivers. Species is active in winter, observed in a few swarms over water and on the grass at the near zero to sub-zero temperatures (from 5°C to -1°C). Specimens were active before the sunset in December and January.

**Distribution.** Only known from the type locality which is situated in the Crimean Peninsula (Crimea, Ukraine), Salgir River, Gagarin City Park, Simferopol City.

## Conclusions

Based on material composed of male adults collected in Ukraine, Lebanon, and France, four *Hydrobaenus* species are examined and diagnosed. Taxonomic notes provided include: description of *H. simferopolus* sp. nov. on the basis of material collected in Ukraine (Crimean Peninsula); new combination of *Parorthocalius korneyevi* Baranov, 2011 (erroneously placed in the genus *Parorthocladus*, BARANOV 2011a) for *Hydrobaenus korneyevi* (Baranov, 2011); short redescription of *H. dentistylus* (Bekaa, Lebanon) and *H. lugubris* (NE-France). According to ASHE & O'CONNOR (2012) and MAKARCHENKO & MAKARCHENKO (2017), worldwide there are currently 44 known *Hydrobaenus* species. The faunal results provided in this paper increase the total number of worldwide known *Hydrobaenus* species from 44 to 46. Consequently, the number of known species of the genus from Ukraine is currently upgraded from 1 to

3, including the newly described species (*H. simferopolus* sp. nov.), *H. korneyevi*, and *H. lugubris*, which used to be the single recorded *Hydrobaenus* species from this country (BARANOV 2011b).

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