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A new species of *Hydrobaenus* Fries, 1830 (Diptera, Chironomidae) from Algeria

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Abstract

Hydrobaenus olfa **n. sp.** from Algeria is described and illustrated as male, pupal exuviae and larva. The new species is assigned to the genus *Hydrobaenus* Fries, 1830 according to morphological characters observable in all the three stages, it is easily separated from all the other known species of the genus because of the high number of anal macrosetae on anal lobe of pupa; this character state is actually unknown within all the known species of the *Hydrobaenus* group, whereas it is observed in other genera within Orthocladiinae as in the genus *Propsilocerus* Kieffer, 1923. For this reason the description of the genus *Hydrobaenus* must be emended. This character gives additional evidence to the phylogenetic relationships between the primitive genera of Orthocladiinae.

Key words: Chironomidae, Orthocladiinae, *Hydrobaenus*, new species, taxonomy, Algeria

Introduction

The genus *Hydrobaenus* Fries, 1830 is Holarctic and contains at least 22 known species; at least 13 of them known as larvae and 14 as pupae (Cranston *et al.* 2007; Henson 1957; Hidetake *et al.* 2004; Holmgren 1869; Langton & Cobo 1992; Moubayed 1985; Sæther 1976, 1989; Wiederholm 1983, 1986, 1989). The larvae are known to inhabit the littoral zone of lakes, ponds, puddles, ditches, rivers and streams. At least some species aestivate forming a circular shaped canopy-like structure around the second instar larva (Hudson 1971; Sæther 1976) and appear to have only one generation a year with a very early emergence period. Most species probably mate on the substratum (Cranston *et al.* 2007).

Most species of *Hydrobaenus* are northern, but one Nearctic species reaches Florida and at least two Palaearctic species have been collected in the southern slopes of the Alps. *Hydrobaenus lugubris* Fries, 1830 was collected in many north Italian lakes and *H. distylus* (Potthast, 1914) in streams and rivers. *Hydrobaenus conformis* (Holmgren, 1869) is recorded from Algeria (Moubayed *et al.* 2007), *Hydrobaenus dentistylus* Moubayed, 1985 from Lebanon (Moubayed 1985) and *Hydrobaenus* Pe 1 Langton from Morocco (Langton 1991). All these Mediterranean records are from cold water localities. These evidences support that *Hydrobaenus* is cold stenothermal, preferring oligotrophic conditions.

In January 2004 larvae, pupal exuviae and pharate adults of a still undescribed *Hydrobaenus* species of the genus were collected in a pond in Algeria. The specimens were collected in winter in an area where oligotrophic waters prevail; the novelty in the ecological valence of the genus is the adaptation of this species to waters with high salinity (Zerguine *et al.* 2009).

Methods and terminology

Collections were carried out in several ponds in Algeria in January 2004. Larvae, pupal exuviae and pharate adults were fixed in 70% ethanol. Body parts were cleared with potassium hydroxide, dehydrated in acetic

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acid, butanol, phenol 3: xylene 1 (Wirth & Marston, 1968) and slide-mounted in Canada balsam. Larval head capsule, pupal exuviae and adult male were dissected as described in Wiederholm (1983, 1986, 1989). Terminology and abbreviations used in the descriptions follow Sæther (1976), except that the term "taeniate setae" is used for broad, flattened, lamellar, filamentous seta on the pupa (Langton 1994).

Measurements are according to Sæther (1976) and are given in µm, except wing, pupal and larval length which are given in mm. Measures are from holotype male imago and pupal exuviae and from paratype larvae.

Hydrobaenus Fries, 1830

The description of the genus (Sæther 1976; Wiederholm 1986) must be emended with the following addition: anal lobe of pupa with 3 or 6–7 anal macrosetae.

Hydrobaenus olfa n. sp.

Type material: Holotype: 1 pharate ♂, Algeria: Garaet Ank El Djmel, 35° 46.298' N, 6° 52.00' E, 15.I.2004. Paratypes: 1 ♂, 4 pupal exuviae, 4 larvae, as for holotype**.** Type material deposited in University of Milano, DiPSA Dept., Italy.

Etymology: The species is named after Olfa, the name of the son of the first author.

Diagnostic characters: The species can be easily separated from all the other known species of *Hydrobaenus* for the high number of anal macrosetae (6–8) on anal lobes of pupa. The larval and adult male characters emphasize that the species is near to *Hydrobaenus pilipes* (Malloch, 1915). The male imago has a slender relatively well developed anal point, devoid of setae, gonostylus without an outer corner and a developed crista dorsalis, the larva has an AR about 2, a large bifid yellow median tooth and a narrow small dark first lateral tooth.

Male (n = 2). Medium sized species, wing length 3.22 mm.

Antenna. With 13 flagellomeres; groove beginning at flagellomere 4; sensilla chaetica on flagellomeres 2–3 and terminal. Antennal ratio 2.33, ultimate flagellomere 828 µm long.

Head. Eye bare, with parallel-sided dorsomedian extension. Temporal setae clearly separated into two groups, with 5 inner verticals reduced in size, 3 larger outer verticals, 2 postorbitals. Cibarial pump with anterior margin concave, narrow anteriorly, broadened posteriorly. Palp normal with 5 segment; palpomeres lengths (µm): 39, 42, 140, 109, 165. Apex of 3rd palpomere with 3 sensilla clavata.

Thorax. Antepronotum moderately developed; lobes joined along a broad suture with anterior notch, in broad contact, 7 lateral antepronotals; 8 acrostichals reduced in size, placed in a row, beginning some distance from antepronotum; 11 dorsocentrals arising from a white spot; 10 strong prealars, arising from a white spot; 7 scutellars on two rows. Anterior and posterior anepisternum II and preepisternum without setae.

Wing badly preserved in type material. Membrane without setae, with distinct punctation. Anal lobe somewhat reduced. Costa moderately extended; R_{2+3} running and ending midway between R_1 and R_{4+5}; R_{4+5} ending distally of M_3; An ending distally of FCu; Cu_1 slightly curved apically. R with setae, R_1 and R_{4+5} without setae. Squama fringed with more than 50 setae arranged in many rows.

Legs. Pseudospurs present on ta_1 of mid and hind legs. Sensilla chaetica on tarsomere 1 of hind leg absent. Setae on ta_1 of p_3 c. 140 µm long. Pulvilli absent. LR c. 0.57. Legs measurements in Table 1.

Abdomen. Tergites with irregularly scattered setae; T IX with about 20 setae.

Hypopygium (Fig. 1). Anal point well developed 40 µm long, transparent, with parallel sides; apex without setae and microtrichia, with numerous setae at base. Phallapodeme and aedeagal lobe well developed. Anterior margin of transverse sternapodeme convex, oral projections pointed, never conspicuously thickened. Virga consisting of 2 well developed spines 30–40 µm long and 2 other slender and lighter spines. Gonocoxite with well developed inferior volsella well separable into a dorsal and a ventral lobe. Dorsal lobe squared, with short setae and microtrichia, ventral lobe developed beyond dorsal lobe. Superior volsella not developed.

Gonostylus rounded apically, with a rounded outer corner, without an outer projection; crista dorsalis absent; megaseta 17 µm long.

TABLE 1. Length (in µm) and proportions of legs of *Hydrobaenus olfa* **n. sp.**, male (n = 1).

	fe	ti	ta_1	ta_2	ta_3	ta_4	ta_5	LR	BR
p_1	1075	1199	849	482	335	213	166	0.708	2.69
p_2	1005	1058	526	326	218	146	159	0.497	2.62
p_3	1092	1338	702	394	126	75	74	0.525	4.63

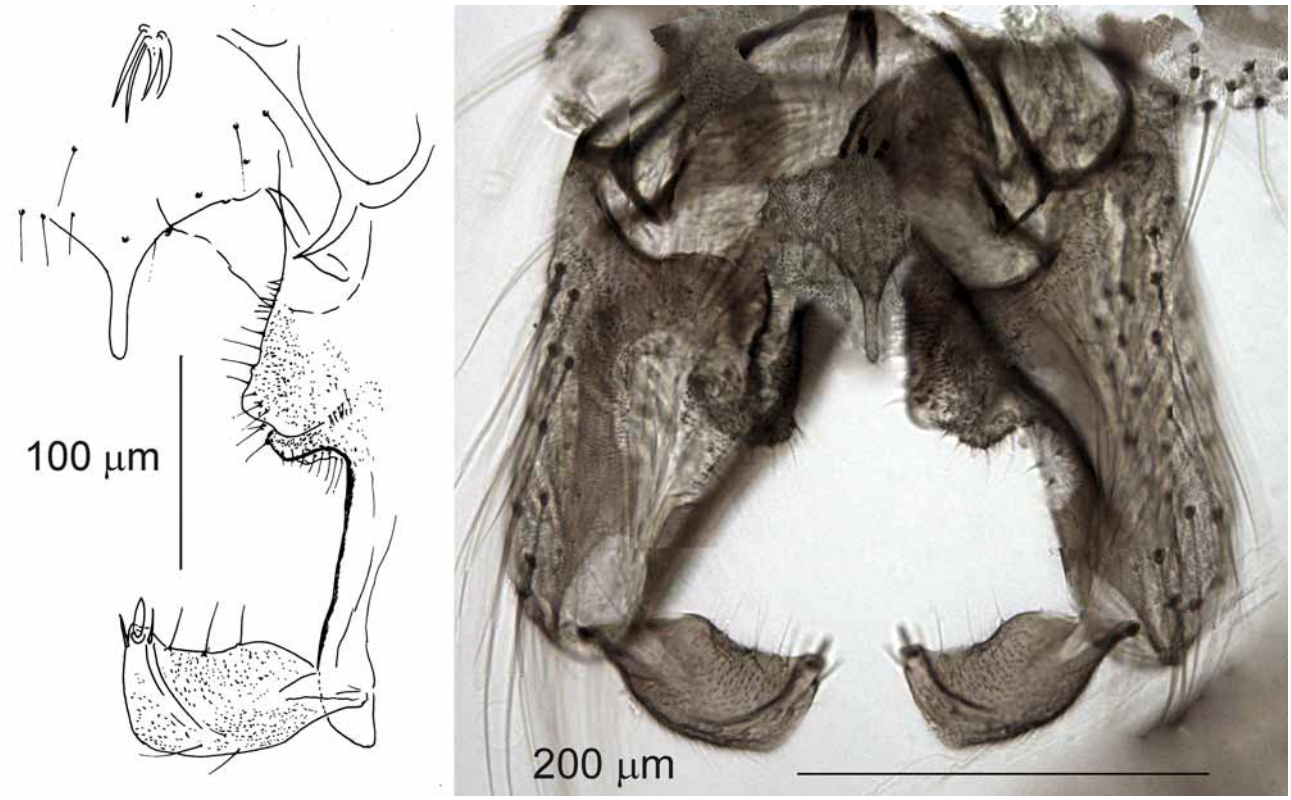

FIGURE 1. *Hydrobaenus olfa* **n. sp.**, adult male. Hypopygium.

Pupa (n = 5). Medium sized pupae, 6.06 mm long, abdomen 4.85 mm long.

Cephalothorax. Frontal apotome rugose; with well developed warts. Frontal setae present on frontal apotome. Antennal sheath above pedicel smooth. Ocular field with 1 postorbital and 1 vertical. Two antepronotals, c. 100 µm long. Thoracic horn c. 500 µm long (Fig. 2), with pointed apex, sparsely covered with strong spinules. Three precorneals present, arranged in a triangle, 180, 100, 80 µm long; 4 dorsocentrals present, dc_2 closer to dc_1 than to dc_3; prealar minute. Thorax weakly rugulose. Wing sheath smooth.

Abdomen (Fig. 2). Tergite I without anteromedian shagreen; T II with faint median shagreen; T III–VI with more extensive, stronger shagreen; T VII–IX with faint anteromedian shagreen. Sternites I and IX without anteromedian shagreen; faint anteromedian and posteromedian shagreen present on remaining sternites. Tergite II with posterior hooklets. Pedes spurii A present on sternites IV–VII; pedes spurii B on segment II, well developed. Apophyses dark and well delineated on both tergites and sternites. Segment I with 4–5 D setae, 2–3 L setae and 3 V setae. Segments II–VI each with 5 D setae, 4 L setae, no taeniate setae on segments IV–VI. Segment VII with 4 taeniate L setae; segment VIII with 5 taeniate L setae, 200–250 µm long.

Anal lobe (Fig. 2). With 6–8 equally long anal macrosetae placed on well developed tubercles and with full fringe of about 40, 160 µm long, setae, fringe always reaching macrosetae. Apex of anal lobe rugulose,

with lines. Male genital sac ending near apex of anal lobe. Genital sheath not ending in papilla but constricted at apex.

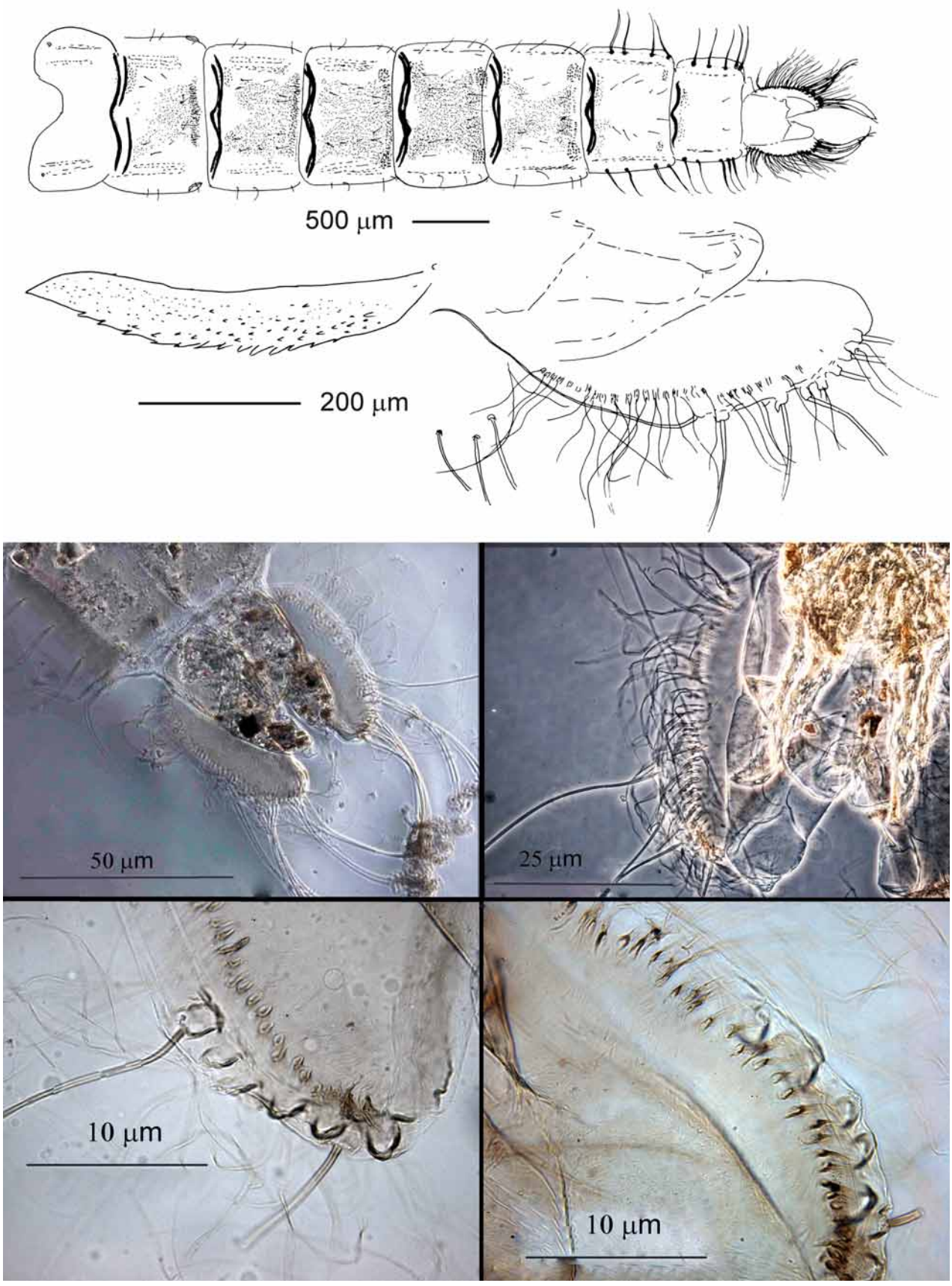

FIGURE 2. *Hydrobaenus olfa* **n. sp.**, pupal exuviae. Abdomen, thoracic horn and anal lobes.

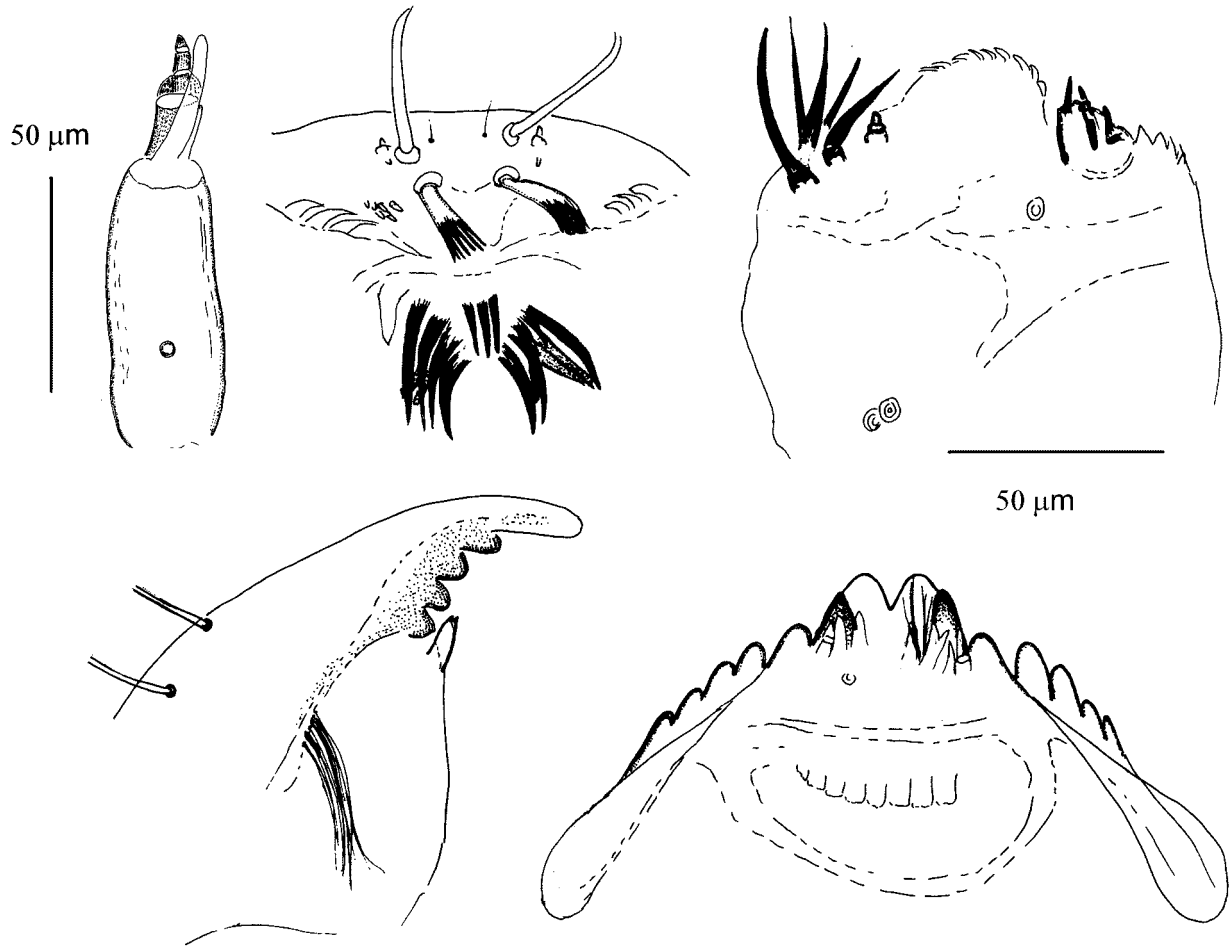

FIGURE 3. *Hydrobaenus olfa* **n. sp.**, larva. Antenna, labrum, mandible, maxilla and mentum.

Larva (n = 4). Medium sized to large larvae, about 9 mm long.

Antenna (Fig. 3). With 6 segments, segments consecutively smaller, segment 6 vestigial. Antennal segments lengths (in µm): 76.1, 16.7, 11, 6, 3, 1. Antennal ratio about 2. Ring organ near base of first segment. Blade slightly shorter than flagellum. Lauterborn organs distinct, about as long as third segment.

Labrum (Fig. 3). S I coarsely plumose. Labral lamella simple, triangular, very weakly sclerotized. Pecten epipharyngis consisting of 3 simple, sclerotized smooth spines; 7–8 pairs of chaetulae laterales present, all smooth, 2 chaetulae basales present bifid at apex. Premandible with 2 apical teeth and small inner accessory tooth; brush absent.

Mandible (Fig. 3). Apical tooth 18 µm long, shorter than combined width of 3 inner teeth (25 µm), with a darkened molar area resembling a 4th tooth. Seta subdentalis apically with a small indentation. Branches of seta interna smooth.

Mentum (Fig. 3). With large, bifid median tooth and 6 pairs of lateral teeth. Median tooth 12 µm wide, pale; first lateral teeth 4 µm wide, darker and lower than median tooth; second lateral teeth 8 µm wide; other teeth consecutively smaller. Ventromental plate well developed; beard absent.

Maxilla (Fig. 3). Anterior lacinial chaeta apparently neither longitudinally curled, nor forming nearly complete cylinder. No lamella of galea serrated. Pecten galearis not developed.

Body. Procercus well developed, sclerotized posteriorly, 50–60 µm high, 30–40 µm wide, dark with 7 apical setae (anal setae). Anal setae 580–600 µm long. Anal tubules not swollen, shorter than posterior parapods. Posterior parapods 357 µm long in one paratype, 227 µm long in the other paratype (3 instar ?). Supraanal seta 262–300 µm long in one paratype, 103 µm long in the other paratype.

Habitat. The type locality, Garaet Ank El Djmel, is a big pond of about 3.5 ha and a depth of 0.6 m. It belongs to the complex wetlands of the Eastern Hauts plateaux in Algeria. Garaet Ank El Djmel has a sandy

bed and is very salty of about 10 mS cm^{-1}. The specimens were collected on 15 January 2004 where the average air of temperature was 5.2°C and the average water temperature was 6.3°C.

Discussion

The species has 6–8 anal macrosetae on the anal lobe of the pupal exuviae. For this character it should key to the genus *Propsilocerus* Kieffer, 1923 according to Wiederholm (1986).

However, based on all the other characters of larva, pupa and male the species is easily included within the genus *Hydrobaenus*.

The short acrostichals beginning some distance from the antepronotum, the presence of pseudospurs on some tarsomere, the convex anterior margin of the transverse sternapodeme, the well developed pointed oral projection of the sternapodeme, together with the short anal point without setae, will include the male imago into the genus *Hydrobaenus*.

The pupal exuviae, with a short fringe on the anal lobe, well delineated dark apophyses on caudal margins of tergites and sternites, make the inclusion of pupa in the genus *Hydrobaenus* legitimate and allow separating the species from other Orthocladiinae genera, except *Oliveridia* Sæther, *Propsilocerus* and *Euryhapsis* Oliver. *Oliveridia* has apical spines on the anal lobe and conspicuously long male genital sac, far overreaching the anal lobe; *Euryhapsis* has dark posterior spines on tergites and sternites. *H. olfa* **n. sp.** species is similar to *Propsilocerus* due to the presence of 6–8 anal macrosetae on the anal lobe, but *Propsilocerus* differs distinctly as pupa, in having the bifid thoracic horn, frontal setae on prefrons and pedes spurii A on tergite IV only (Sæther & Wang, 1996).

The new species is easily included in the genus *Hydrobaenus* also in the larval stage. The larvae of *Trissocladius* Kieffer, *Zalutschia* Lipina, *Oliveridia* and *Chaetocladius* Kieffer are similar. *Trissocladius* has the median teeth of mentum lower than first lateral tooth; the anterior lacinial chaeta appears not to differ from the remaining lacinial chaetae; for this character *Hydrobaenus olfa* is similar to *Trissocladius*. *Zalutschia* is similar due to the wider median mental teeth and the reduced first lateral tooth, but it has a weak beard and the anterior lacinial chaeta is broad, flat and apically pointed. *Oliveridia* has a single median tooth and conspicuously serrated shorter chaetulae laterales. *Chaetocladius* has paired or no labral lamellae and premandibular brush.

The adult male will key to *Hydrobaenus pilipes* (Malloch, 1915) using Sæther (1976) because of the rounded gonostylus, without a large median swelling and without a pronounced crista dorsalis; palp not reduced; AR higher than 2; LR higher than 0.5; antenna with 13 segments; the presence of a well developed anal point; and the high number of setae on squama. The absence of taeniate L setae on segment VI and the presence of a sharply pointed thoracic horn includes the species into the *distylus* group, but the presence of 5 taeniate setae on tergite VIII and of 6–8 anal macrosetae do not allow to identify the species in pupal stage using the keys to *Hydrobaenus* by Langton (1991) and Sæther (1976).

The strong supraanal seta (SA), the high procercus, the normally developed anal tubuli, the small first lateral tooth of mentum, the coarsely plumose SI and the reduced accessory tooth of the premandible, should go to *H. pilipes* using the key to larvae (Sæther, 1976).

The presence of more than 3 anal macrosetae is unusual within Orthocladiinae, but is observed in few primitive genera as *Propsilocerus* Kieffer, *Brillia* group (Sæther & Wang, 1992, 1996: trend 41) *Psectrocladius* Kieffer; more than 3 macrosetae are also found in other subfamilies of Chironomidae like Buchonomyiinae, some Diamesinae (*Protanypus*) and some Prodiamesinae (*Odontomesa*, *Prodiamesa*). This character was never observed before now within the *Hydrobaenus* group (Sæther 1976, 1989; Sæther & Wang 1996). It can be assumed that a high number of anal macrosetae (more than 3) is symplesiomorphous within Orthocladiinae, or otherwise it can be interpreted as a parallel trend within the Orthocladiinae genera which posses it or interpreted as an underlying synapomorphy (Sæther, 1979), as such it could enforce the relationship between the *Hydrobaenus* group and other genera as *Propsilocerus* (Sæther & Wang 1996).

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