

RESEARCH PAPER

Two new species of *Hydrellia* (Diptera: Ephydriidae) from Central Europe, with redescriptions of *H. aurifer* and *H. frontalis*Tadeusz ZATWARNICKI¹⁾ & Zbyněk KEJVAL²⁾¹⁾ Institute of Biology, Opole University, ul. Oleska 22, 45-052 Opole, Poland; e-mail: zatwar@uni.opole.pl²⁾ Muzeum Chodska, Chodské náměstí 96, CZ-344 01 Domažlice, Czech Republic; e-mail: kejval@muzeum-chodska.comAccepted:
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Abstract. Two species of *Hydrellia* Robineau-Desvoidy, 1830 (Diptera: Ephydriidae) are newly described: *Hydrellia dolezali* sp. nov. and *H. pilsna* sp. nov., both from the Czech Republic. Redescriptions and new records of *H. aurifer* Cresson, 1932 and *H. frontalis* Loew, 1860 from the Czech Republic and the United Kingdom are given. The first case of sexual dimorphism in wing coloration in *Hydrellia* is provided.

Key words. Diptera, Ephydriidae, host plants, leaf-miners, male terminalia, sexual dimorphism, Czech Republic, United Kingdom, Palaearctic Region

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Introduction

Hydrellia Robineau-Desvoidy, 1830 includes about 200 known species (MATHIS & ZATWARNICKI 1995, with updates) and is one of the most speciose genera of shore flies. About a quarter of these species are known from Europe (ZATWARNICKI 2013) and are mostly ‘old species’ described in the 19th century by Carl Fredrik Fallén (1764–1830), Johann Wilhelm Meigen (1764–1845), Friedrich Hermann Loew (1807–1879), Christian Stenhammar (1783–1866), Alexander Henry Haliday (1806–1870), Pierre Justin Marie Macquart (1778–1855), André Jean Baptiste Robineau-Desvoidy (1799–1857), and Theodor Becker (1840–1928). Besides 48 valid European species there are 16 nomina dubia without existing types proposed mostly by P. J. M. Macquart and A. J. B. Robineau-Desvoidy in 1830–1835.

The essential diagnostic features of *Hydrellia* are those of male hypopygium and thus males are usually needed for reliable identification. The male hypopygium is known for all but two European species, *H. frontalis* Loew, 1860 and *H. vidua* Cresson, 1932. The European species can be identified using keys by BECKER (1926), COLLIN (1966), PAPP (1975), and CANZONERI & MENEGHINI (1983). Additional contributions to the knowledge of the taxonomy of *Hydrellia* were provided by ZATWARNICKI (1986, 1988, 2022).

The subject of our paper is the description of two new species of *Hydrellia* from Europe, along with new records and redescriptions of two very poorly known species, *H. aurifer* Cresson, 1932 and *H. frontalis*. Most specimens examined come from a faunistic survey carried out by the

junior author that has been ongoing in the western part of the Czech Republic (Bohemia) since 2020.

The presence of unknown species in a relatively well-explored area of Central Europe in the 21st century may seem surprising; however, *Hydrellia* are small flies, occurring mostly in wetlands, sometimes in flooded hard-to-reach places, and may be very local, due to host plant specialization (larvae are plant miners). All these facts are undoubtedly among the reasons why some species are still very rarely collected or they may even be waiting for discovery.

Materials and methods

The material studied is deposited in the following collections:

| | |
|-------|--|
| ANSP | Academy of Natural Sciences of Philadelphia, Philadelphia, USA (John K. Gelhaus and Jason Weintraub); |
| CULSP | Czech University of Life Sciences, Praha, Czech Republic (Miroslav Barták); |
| NMPC | National Museum of the Czech Republic, Praha, Czech Republic (Michal Tkoč); |
| MCH | Muzeum Chodska, Domažlice, Czech Republic; |
| MDAUK | Personal collection of Martin Drake, Axminster, United Kingdom; |
| SMOC | Slezské zemské muzeum, Opava, Czech Republic (Jindřich Roháček); |
| ZCM | Západočeské muzeum v Plzni, Plzeň, Czech Republic (Ivana Hradská and Jan Walter); |
| ZMHB | Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Berlin, Germany (Jenny Pohl and Sven Marotzke). |



The descriptive terminology of external characters follows CUMMING & WOOD (2017). For the modified clasping organ attached to the epandrium we use the term genital plate. Orientation of structures in the description of the male terminalia is the same as in nematoceros Diptera, i.e., the cerci indicate the dorsal side of the hypopygium and the hypandrium is regarded as ventral; the direction to the head of the fly is defined as anterior (and its opposite as posterior). Standard methods of examination were used, including the study of the male postabdominal structures. The presentation of label data is strictly verbatim for type specimens but standardized for other material examined. Separate labels are indicated by a double slash (//) and comments on label data are placed in square brackets. Abdomens of some specimens were detached and then the genitalia were dissected. After examination, all dissected parts were put into plastic vials containing glycerin and pinned below the respective specimens. Illustrations of the male terminalia of *Hydrellia aurifer* were made using a drawing tube attached to a Nikon Labophot-2 microscope and were rendered using the graphic software Micrografix Designer 7.0. Illustrations of other species were made using a drawing tube attached to an Olympus BH-2 BHS compound microscope. Photographs were taken with an Olympus EOS 5D Mark II camera attached to the same microscope (trinocular); images of the same specimen at different focal planes were combined with Zerene Stacker and edited with Adobe Photoshop 9.0.2 software.

Four different ratios are used in the descriptions below. They are defined as follows:

Gena to eye ratio – genal height measured at the maximum eye height / eye height.

Costal vein ratio – straight-line distance between the apices of R_{2+3} and R_{4+5} / distance between the apices of R_1 and R_{2+3} .

M vein ratio – straight-line distance along vein M between crossveins dm-cu and r-m / distance apicad of dm-cu.

Male fifth to fourth tergite ratio – length of the fifth male tergite / length of the fourth male tergite (measured at the median part of the abdomen in dorsal view).

Results

New species descriptions

Hydrellia dolezali sp. nov.

(Figs 1–7)

Type locality. Czech Republic, Plzeň-Bolevec, banks of Velký Bolevecký rybník (pond), 49°46'33.5"N 13°23'27"E, altitude 310 m (Fig. 34).

Type material. HOLOTYPE: ♂, labelled: 'CZ-Bocc 6246, 18.7.2023, PLZEŇ-Bolevec, Velký bolevecký rybník (pond banks), 310 m, Z. Kejval leg., 49°46'39"N 13°23'37"E [printed] // HOLOTYPE [red label, printed] // *Hydrellia dolezali* sp.nov. T. Zatwarnicki & Z. Kejval det. 2024 [printed]' (NMPC). PARATYPES: 2 ♂♂ 1 ♀, same locality data as holotype (NMPC); 10 ♂♂ 14 ♀♀, same locality data as holotype, except: 27.8.2024 (12 ex. in NMPC, 4 ex. in each CULSP, MCH, ZCM); 9 ♂♂ 5 ♀♀, 'CZ-Bocc 5845, 20.8.2024 1 km E of ALBERICE, pond banks/littoral, 610 m, Z. Kejval leg. 50°09'44"N 13°10'58"E [printed]' (NMPC, SMOC); 1 ♂, 'CZ-Bmer 6548, 23.8.2024 1.5 km SE of TCHOŘOVICE, Smyslov Res., pool banks/littoral, 460 m, Z. Kejval leg., 49°25'19"N 13°48'05"E [printed]' (NMPC).

Description. Male. Small shore flies, body length 2.1–2.4 mm; wing length 2.4–2.6 mm.

Head. Frons strongly transverse; parafrons dark, brownish, frontal vitta concolorous with parafrons (Fig. 2); pseudopostocellar seta nearly as long as inner vertical seta; ocellar seta more delicate and about 0.5 times as long as pseudopostocellar seta; fronto-orbital setae moderate, both distinctly shorter than pseudopostocellar seta. Antenna with scape and pedicel black, basal flagellomere black (Figs 1, 2); arista with 7 dorsal rays. Lunula grey; face in anterior view grey, brownish medially, in lateral view moderately arched; 6 facial setulae; palpus black, spatulate (Fig. 2); eye to gena ratio 7.0.

Thorax. Mesonotum entirely dark, unicolorous dark brown, subshiny with slight bluish-green reflection; pleurae grey, with bluish tinge (Fig. 1). Presutural dorsocentral setae small. Legs nearly entirely black, largely covered by grey microtomentum, trochanters partly with brownish tinge; mid tibia rather robust; fore femur bears postero-ventral row of small setulae; distal half of mid femur bears anterior row of moderate setulae. Wing hyaline with pale brownish veins, becoming darker distally; costal vein ratio 0.71; M vein ratio 0.73; knob of halter white, stem brown.

Abdomen. All terga dark brown, unicolorous, subshiny, with slight bluish-green reflection; male fifth to fourth tergite ratio 1.0. Epandrium in dorsal view narrowly U-shaped with rather wide lateral arms producing moderate cercal cavity, arms in lateral view allantoid, each bearing 4 strong setae; cercus in dorsal view semi-circular (Fig. 3), area between cerci and genital plate membranous and closed laterally by cordate sclerites; genital plate in dorsal view 1.22 times longer than wide, trapezoidal, with anterior margin cleft medially, and 8–9 conspicuous setulae on each corner (Fig. 3), in lateral view narrowly triangular; aedeagus elongate, in dorsal view 3.68 times longer than wide, spatulate with posterior margin slightly concave, sharply narrowed at 1/3 of its length, then tapered with wavy edges, apically mucronate (Fig. 4 left), in lateral view 3.80 times as long as wide, with posterior part uncinat, having rectangular base, and anterior part clavate, evenly tapered apically (Fig. 4 right); phallapodeme elongate, in dorsal view bar-like and moderately bifurcate anteriorly (Fig. 5), in lateral view slightly sinuate and bearing ventral excurvate triangular attachment at midlength (Fig. 6); postgonite forming arcuate spatula, with widened posterior section, its anterior process Z-shaped (Fig. 7); pregonite robust and long bifurcate apically, each process bearing apical setula (Fig. 7); hypandrium in dorsal view forms squircle (combination of rectangle and semi-circle) with rounded anterior margin (Fig. 5), in lateral view shoe-shaped with arcuate ventral margin (Fig. 6); 5th sternum U-shaped with numerous robust setulae, evenly pointing posteriorly; setulae unevenly arranged and spaced, markedly longer and more dense along posterior margin and rather small and scattered more anteriorly (Fig. 5).

Female. Identical with male for most external characters; body length 2.5–2.8 mm; wing length 2.6–2.8 mm; mid tibia not thickened (slender, compared to males).



Figs 1–7. *Hydrellia dolezali* sp. nov., male (paratype, Plzeň-Bolevec). 1 – head and thorax, lateral view; 2 – head, anterior view; 3 – epandrium, cerci, and genital plate, dorsal view; 4 – aedeagus in dorsal (left) and lateral (right) view; 5 – 5th sternum, gonites and phallapodeme, dorsal view; 6 – ditto, lateral view (drawing); 7 – detail of gonites, dorsal view. Scale bar = 0.2 mm (Figs 3–6).

Differential diagnosis. *Hydrellia dolezali* sp. nov. is undoubtedly close to *H. caledonica* Collin, 1966 as suggested by overall similarity of male characters. It can be distinguished from this species by black palpi, 6–7 arisal rays, more elongate aedeagus (2.6 times as long as wide in dorsal view for *H. caledonica*) that is narrowed in apical portion, equally-long projections of pregonites, and by uneven setation of sternite 5 (more evenly developed, with setulae on anterior portion more robust/dense and pointing anterior for *H. caledonica*).

Etymology. The species epithet, *dolezali*, is a genitive patronym to honor the late Zdeněk Doležal (1957–2007), a Czech entomologist and nature painter from Pilsen, who dealt with various groups of insects, including Diptera (mainly Syrphidae), and who was a great guide for the second author during his first excursions in the vicinity of Plzeň-Bolevec.

Biology. All specimens were collected exclusively by sweeping littoral vegetation of ponds/pools with exten-

sive stands of *Eleocharis palustris* (Figs 34, 36), which may be the host plant of this species. At the type locality these stands were isolated from other vegetation, situated in rather deep water (50–90 cm) and flies were also observed on stems of this plant, usually close to the water surface (Fig. 34).

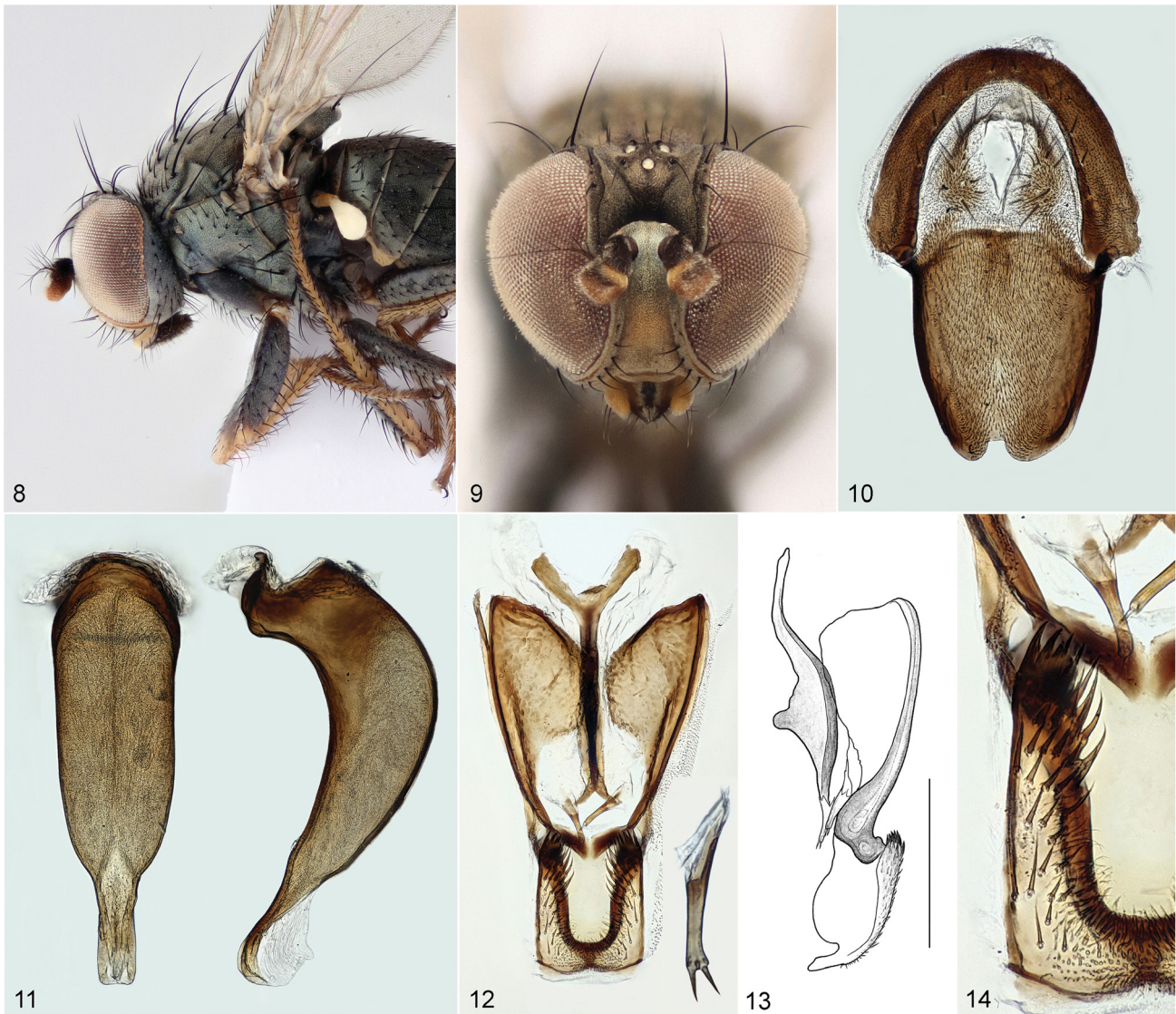
Distribution. Czech Republic.

Hydrellia pilsna sp. nov.

(Figs 8–14)

Type locality. Czech Republic, Plzeň-Bolevec, banks of Velký Bolevecký rybník (pond), 49°46'33.5"N 13°23'27"E, altitude 310 m (Fig. 35).

Type material. HOLOTYPE: ♂, 'CZ-Bocc 6246, 2.6.2022, PLZEŇ-Bolevec, Velký bolevecký rybník (pond banks), 310 m, Z. Kejval leg., 49°46'29"N 13°23'28"E [printed] // HOLOTYPE [red label, printed] // *Hydrellia pilsna* sp. nov. T. Zatwarnicki & Z. Kejval det. 2024 [printed]' (NMPC). PARATYPES: 4 ♀♀, same locality data as holotype (NMPC); 1 ♀, same data, except: 49°46'34.6"N 13°23'49"E, 6.6.2022 (NMPC); 18 ♂♂ 23 ♀♀, same data, except: 49°46'29"N 13°23'28"E, 18.7.2023 (25 ex. in NMPC, 4 ex. in each CULSP, MCH, SMOC, ZCM).



Figs 8–14. *Hydrellia pilsna* sp. nov., male (paratype). 8 – head and thorax, lateral view; 9 – head, anterior view; 10 – epandrium, cerci, and genital plate, dorsal view; 11 – aedeagus in dorsal (left) and lateral (right) view; 12 – 5th sternum, gonites and phallapodeme (dorsal view), and detail of pregonite; 13 – ditto, lateral view (drawing); 14 – detail of 5th sternum (half), dorsal view. Scale bar = 0.2 mm (Figs 10–13, except detail of pregonite).

Description. Male. Small shore flies; body length 1.6–1.9 mm, wing length 2.0–2.4 mm.

Head. Frons longer than wide; parafrons dark, dull black with grey margin along eye margin, frontal vitta concolorous with parafrons (Fig. 9); length of pseudopost-ocellar seta is 1/2 of inner vertical seta length; ocellar seta stronger and 1.5 times longer than pseudopostocellar seta; fronto-orbital setae moderate, posterior one subequal to pseudopostocellar seta, anterior one 1/3 longer. Antenna with scape and pedicel black, basal flagellomere reddish with darker dorsal portion (Figs 8, 9); arista with 4 dorsal rays. Lunula grey; face in anterior view greyish brown, and more or less extensively paler/reddish medially, in lateral view gently and shallowly arched; 6 facial setulae; palpus reddish, spatulate (Figs 8, 9); eye to gena ratio 16.7.

Thorax. Mesonotum largely greyish-brown; post-pronotum, notopleuron and supra-alar area, and side of

scutellum grey; pleurae light grey (Fig. 8); presutural dorsocentral setae short. Legs distinctly bicolorous, coxae and majority of femora black, covered by grey microtomentum, trochanters, apices of femora, tibiae and tarsi reddish, apical tarsomeres sometimes moderately darkened (Fig. 8); fore femur bears postero-ventral row of small setulae; distal half of mid femur bears anterior row of moderate setulae. Wing hyaline with yellowish veins; costal vein ratio 0.58–0.76; M vein ratio 0.62–0.67; knob of halter white, stem yellow.

Abdomen. Terga dark brown, subshiny; male fifth to fourth tergite ratio 1.10. Epandrium in dorsal view narrowly U-shaped with moderately wide lateral arms, producing moderate cercal cavity (Fig. 10), arm in lateral view irregularly ovate, tapering posteriorly and rounded anteriorly, each bearing 5 strong setae; cercus small, in dorsal view irregularly triangular (Fig. 10); genital plate in dorsal view 1.05 times longer than wide, semi-oval,

its anterior margin broadly rounded with deep medial indentation (Fig. 10), in lateral view ellipsoidal; aedeagus elongate, in dorsal view 3.50 times longer than wide, cylindrical with posterior margin slightly indented and tapered anteriorly to narrow clavate projection (Fig. 11 left), in lateral view 3.83 times as long as wide, lunate, broad basally, with its anterior section tapered apically to digital projection that is slightly corniform apically, with posterior margin distinctly concave, forming postero-ventral triangular fold (Fig. 11 right); phallapodeme in dorsal view narrow, Y-shaped, and bifurcated apically (Fig. 12), in lateral view sinuate with broad medial section and narrowed towards ends (Fig. 13); postgonite J-shaped with posterior section bearing semi-circular lobe, in lateral view semi-clavate with wavy ventral margin; anterior process of postgonite L-shaped (Fig. 14); pregonite slender, straight, digitiform, bearing 2 apical setulae (Fig. 12); hypandrium in dorsal view bullet-shaped with rounded anterior margin (Figs 12, 14), in lateral view longer than wide, shallowly depressed (Fig. 13); 5th sternum U-shaped with numerous moderately long setulae, rather evenly pointing posteriad; setulae mostly sparsely scattered, denser, longer and more robust on/ along posterior margin (Figs 12, 14).

Female. Identical with male for most external characters; body length 1.9–2.4 mm; wing length 1.9–2.8 mm.

Differential diagnosis. *Hydrellia pilsna* sp. nov. may resemble *H. concii* Canzoneri & Meneghini, 1975 by conspicuously bicoloured legs, short fronto-orbital setae, 6 facial setulae, and general shape of aedeagus (especially in dorsal view). However, it can be distinguished from this species by arista with 4 dorsal rays, slender mid tibia in males (modified/swollen ‘allargate’ for *H. concii*), much less conspicuous median notch on anterior margin of genital plate, and lack of median subapical projection of aedeagus.

Etymology. The species epithet, *pilsna*, comes from the city of Plzeň (Pilsna, Pylzna or Plzna in some Latin documents from the 14th century) and the Pilsner beer (also pilsener or simply pils), which is a sort of beer that took its name from the name of the city. In the past, Velký Bolevecký pond (type locality) was used as a source of ice for cooling beer by the famous Pilsner Urquell brewery, where the world’s first pale lager was produced in Plzeň in 1842. The epithet is a noun in apposition.

Biology. All specimens were collected exclusively by sweeping littoral vegetation (Fig. 35). The largest sample (18.vii.2023) was taken at a site with the following major plant genera/species: *Alisma plantago-aquatica* (a few/ single), *Bolboschoenus* sp., *Glyceria fluitans*, *Eleocharis palustris*, *Nuphar lutea*, *Phragmites australis*, and *Schoenoplectus lacustris* (a few) and *Typha* sp.

The pond originally had a low water level and more diverse vegetation in the succession stage, which substantially changed after artificial filling. Since autumn 2022 the water level has gradually risen by about one meter and in 2024 the species was no longer found at the site.

Distribution. Czech Republic.

Species re-descriptions

Hydrellia aurifer Cresson, 1932

(Figs 15–24)

Hydrellia aurifer Cresson, 1932: 21.

Type locality. Western Ukraine (see Remarks).

Type material examined. HOLOTYPE: ♂, double mounted in poor condition (Fig. 20), labelled: ‘Halicia 8. 79 (Wachtl) Mik [date handwritten, the rest printed] // ♂ TYPE No. 6614 Hydrellia AURIFERA E. T. Cresson, Jr. [red label, number and name handwritten, the rest printed]’ (ANSP).

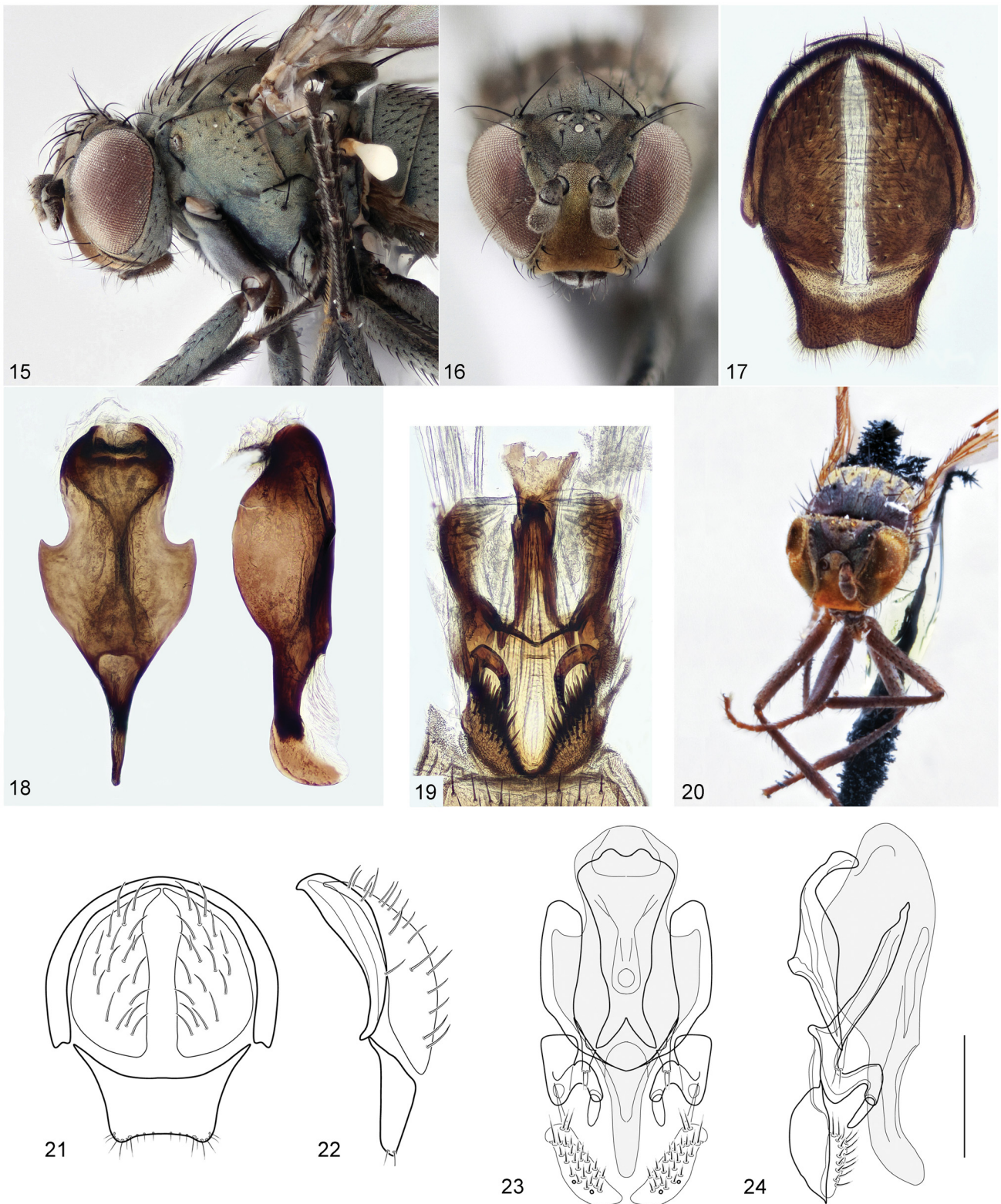
Additional specimens examined. CZECH REPUBLIC: BOHEMIA: Dolní Lhota, 49°22′31″N 13°14′41.5″E, alt. 400 m, Luňáky Nature Reserve, overgrown bottom of pond, yellow pan trap, 20.V.2022, Z. Kejval leg., 1 ♂ (MCH). UNITED KINGDOM: CAMBRIDGESHIRE: Ouse Washes, Mepal, 52°25′42.2″N 00°08′55.7″E, swept, 23.vii.2004, M. Drake leg., 1 ♂ (MDAUK).

Redescription. **Male.** Small shore flies; body length 2.7 mm, wing length 2.8 mm.

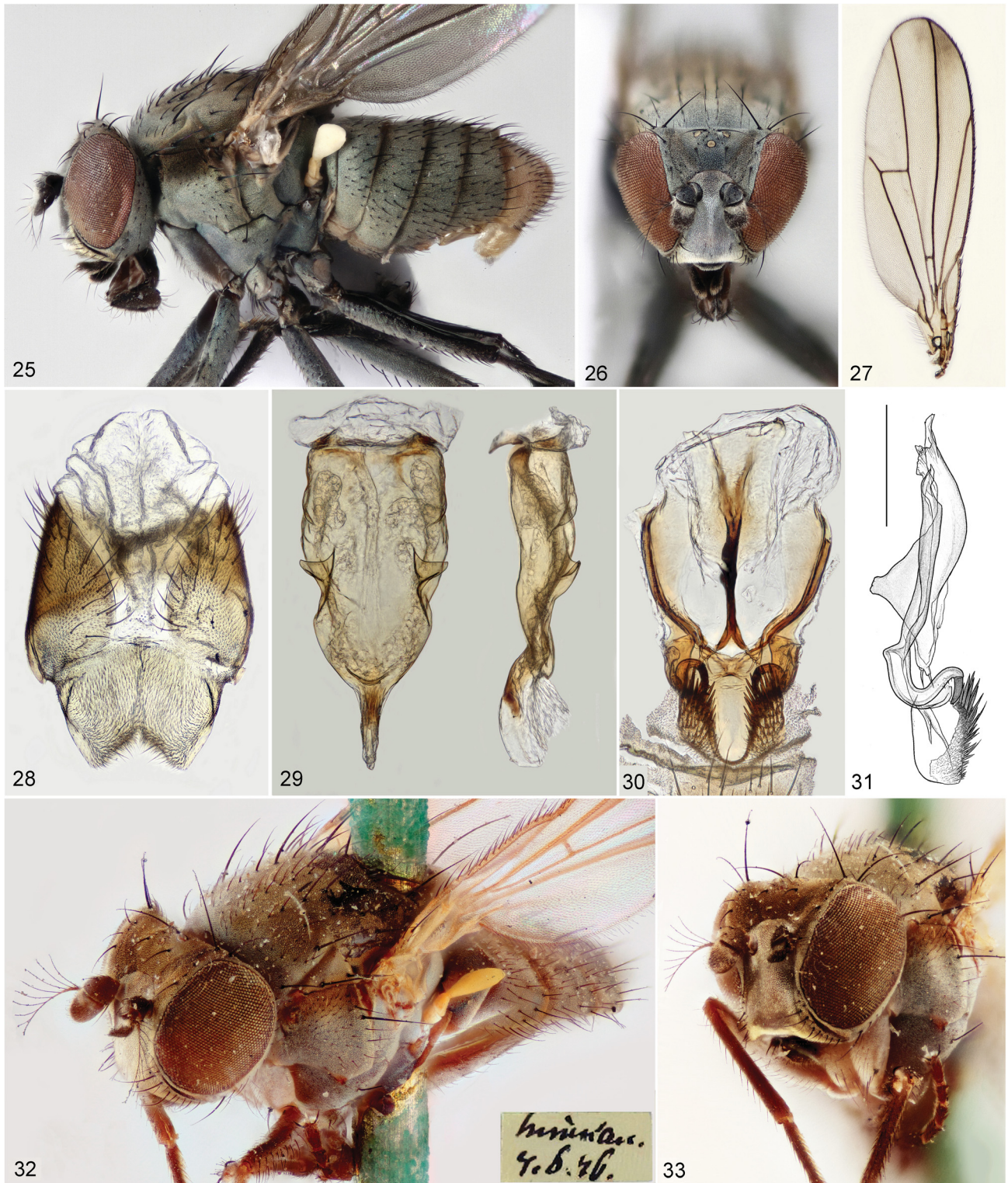
Head. Frons strongly transverse; parafrons brownish-grey, frontal vitta slightly paler, dark grey (Fig. 16); ocellar, pseudopostocellar and fronto-orbital setae nearly equal, rather long, about 0.8 times as long as inner vertical seta. Antenna with scape and pedicel brownish black, basal flagellomere brownish black (Figs 15, 16); arista with 5–7 dorsal rays. Lunula brownish grey; face in anterior view brown with cupreous tinge, in lateral view slightly evenly arcuate; 6 facial setulae, minute to rather long; palpus dark brown, moderately broadened distally (Fig. 16); eye to gena ratio 5.80.

Thorax. Mesonotum subshiny, largely brownish or brownish grey, moderately paler, grey with slight bluish tinge anteriorly and laterally on notopleuron, scutellum brownish grey; pleura paler, grey with slight bluish tinge (Fig. 15). Presutural dorsocentral setae nearly as long as first postsutural seta. Legs comparatively long, entirely dark grey to brownish grey (Fig. 15), fore coxa and tibia with slight bluish tinge; covered by grey microtomentum, except for posterior side of hind legs; fore femur bears postero-ventral row of setulae; distal half of mid femur bears anterior row of setulae. Wing slightly infuscate; veins largely brownish black, paler at wing base; costal vein ratio 0.64; M vein ratio 0.67; knob of halter white, stem pale reddish.

Abdomen. All terga dull and largely dark grey, moderately paler with slight bluish tinge on lateral sides; male fifth to fourth tergite ratio about 1.0. Epandrium in dorsal view broadly U-shaped with narrow lateral arms (Figs 17, 21), producing large cercal cavity, arms in lateral view narrow, sickle-shaped (Fig. 22), each bearing at least 3 strong setae (Figs 17); cercus conspicuously large, in dorsal view subtriangular (Figs 17, 21); genital plate in dorsal view moderately transverse, 0.6 times as long as wide, trapezoidal, with apical margin subtruncate, shallowly emarginate medially, and shortly densely setose (Figs 17, 21), in lateral view lanceolate (Fig. 22); aedeagus elongate, in dorsal view 2.32 times as long as wide, arrowhead-shaped with medio-lateral flaps, rounded posterior margin, and strongly narrowed anterior portion (Fig. 18), in lateral 3.65 times as long as wide, irregularly ovoid, with anterior corniform process (Figs 18, 24); phallapodeme in dorsal



Figs 15–24. *Hydrellia aurifer* Cresson, 1932. 15–19 – male (Czech Republic, Dolní Lhota): 15 – head and thorax, lateral view; 16 – head, anterior view; 17 – epandrium, cerci, and genital plate, dorsal view; 18 – aedeagus in dorsal (left) and lateral (right) view; 19 – 5th sternum, gonites and phallapodeme, dorsal view. 20–24 – male (holotype, Ukraine): 20 – body in antero-oblique view; 21 – epandrium, cerci, and genital plate, dorsal view; 22 – ditto, lateral view; 23 – 5th sternum and internal terminalia, dorsal view; 24 – ditto, lateral view. Scale bar = 0.1 mm (Figs 17–19, 21–24).



Figs 25–33. *Hydrellia frontalis* Loew, 1860. 25–31 – male (Czech Republic, Dolní Lhota): 25 – body in lateral view; 26 – head, anterior view; 27 – wing; 28 – epandrium, cerci, and genital plate, dorsal view; 29 – aedeagus in dorsal (left) and lateral (right) view; 30 – 5th sternum, gonites and phallapodeme, dorsal view; 31 – ditto, lateral view (drawing). 32, 33 – female (holotype, Poland): 32 – body in latero-oblique view and locality label; 33 – body, antero-lateral view. Scale bar = 0.2 mm (Figs 28–31).

view spatulate to shortly bifurcate anteriorly (Figs 19, 23), in lateral view reversed J-shaped with small ventro-medial projection (Fig. 24); postgonite in dorsal view J-shaped with major section rhomboidal, anterior process of postgonite Z-shaped with broader base (Figs 19, 23); postgonite in lateral view narrow, with anterior process Z-shaped (Fig. 24); pregonite short, straight, with apex narrowed and bearing two setulae (Figs 23, 24); hypandrium in dorsal view bullet-shaped with rounded anterior margin (Figs 23), in lateral view semi-circular, moderately depressed (Fig. 24); 5th sternum consisting of two oval sclerites, narrowly separated medially, with numerous setulae arranged along postero-median margins and on adjacent ventral surface (Figs 19, 23, 24).

Female. Unknown.

Biology. The two new records come from the following habitats: strongly overgrown bottom of shallow pond (CZ) and ditch margin in swamp-like pasture in an annually flooded river floodplain, dominated by *Glyceria maxima* and *Sparganium erectum*, with *Mentha aquatica*, *Eleocharis palustris* and some *Butomus umbellatus* (UK, M. Drake, pers. comm.). The specimens were collected by sweeping vegetation and by using water pan traps (yellow and white, diameter ca. 20 cm).

Distribution. Czech Republic (new record), Ukraine (CRESSON 1932), United Kingdom (new record).

Remarks. CRESSON (1932) described *Hydrellia aurifer* from a single male specimen originating from 'Halicja' (= Galicja, Galizien), which was an eastern province of the former Austro-Hungarian Empire. Its collector, Fryderyk (also as Fritz) Wachtl, was from 1876 a superintendent forester at Taniawa, a village located 20 km S of Stryj (present Ukraine). He later had a position close to Wien (Vienna) and may have visited Taniawa during summers (HELLRIGL 2015). The holotype specimen bears a bit different species name '*Hydrellia aurifera*' which is probably just an initial version. The species epithet ending in *-fer* should be treated as noun in apposition (see ICZN 1999: 31.2.2).

Hydrellia frontalis Loew, 1860

(Figs 25–33)

Hydrellia frontalis Loew, 1860: 19.

Type locality. Poland, Wrocław env. (see Remarks).

Type material examined. HOLOTYPE: ♀, directly pinned in good condition (Figs 32, 33), labelled: '... 4. 6. 46 [handwritten, partly illegible, Fig. 32] // Coll H. Loew [printed] // *Hydrellia frontalis* m. [handwritten] // Holotypus [red label, printed] // 14436 [printed] // Zool. Mus. Berlin [light yellow label, printed]' (ZMHB).

Additional specimens examined. CZECH REPUBLIC: BOHEMIA: Dolní Lhota, 49°22'31"N 13°14'41.5"E, alt. 400 m, Luňáky Nature Reserve, overgrown bottom of pond, yellow/white pan traps (2 days), 26.vii.2024, Z. Kejval leg., 2 ♂♂ 2 ♀♀ (MCH, NMPC); same data, except: 31.vii.2024, 1 ♂ 1 ♀ (MCH). Tchořovice, 49°25'19"N 13°48'05"E, alt. 460 m, Smyslov Nature Monument, sweeping littoral vegetation of small pool, 23.viii.2024, Z. Kejval leg., 1 ♀ (MCH).

Redescription. **Male.** Small shore flies; body length 2.6 mm, wing length 2.8–3.0 mm.

Head. Frons strongly transverse; parafrons brownish-grey and with narrow bluish-grey strip along median

margin of eyes, frontal vitta grey with slight bluish tinge (Fig. 26); ocellar, pseudopostocellar and fronto-orbital setae nearly equal, rather short, about 0.4 times as long as inner vertical seta. Antenna with scape and pedicel brownish black, basal flagellomere brownish black (Figs 25, 26); arista with 7–8 dorsal rays. Lunula brownish grey; face in anterior view silvery grey, in lateral view rather flattened; 7–8 facial setulae, minute to moderately long; palpus black, slightly broadened distally (Figs 25, 26); eye to gena ratio 8.2.

Thorax. Mesonotum subshiny, grey with slight bluish tinge anteriorly, more or less distinctly brownish posteriorly and especially on lateral sides, scutellum brownish, notopleura distinctly brown; pleurae largely grey, with bluish tinge, only dorsal half/third of anepisternum brown (Fig. 25). Presutural dorsocentral setae markedly shorter than first postsutural seta. Legs comparatively long, nearly entirely dark grey (Fig. 25), front coxa usually entirely pale reddish-brown, sometimes rather greyish laterally, as shown in photo 25, all trochanters, base and apex of tibiae with brownish tinge; covered by grey microtomentum, except for posterior side of hind leg; fore femur antero-ventrally on distal half with row of minute densely spaced spine-like setulae; distal half of mid femur with anterior row of moderately long setulae. Wing hyaline, with yellowish tinge, and with vaguely outlined dark apical spot, along apical part of vein R₄₊₅ (Fig. 27); veins largely brownish, paler at wing base, brownish black apically; costal vein ratio 0.78; M vein ratio 0.62; knob of halter white, stem pale reddish.

Abdomen. All terga largely grey with slight bluish tinge, except for narrow brownish strip along basal margin; external male terminalia pale brown; male fifth to fourth tergite ratio 0.8. Epandrium narrow without distinct setae, producing large cercal cavity; cercus conspicuously large, in dorsal view irregularly triangular (Fig. 28); genital plate in dorsal view moderately transverse, 0.7 times as long as wide, obcordate and its apical margin with deep triangular median emargination (Fig. 28), in lateral view narrowly triangular; aedeagus elongate, in dorsal view 2.29 times as long as wide, cylindrical with posterior margin slightly depressed, then tapered and narrow in anterior quarter, bearing latero-medial tooth-like shaped projections (Fig. 29 left), in lateral view 5.19 times as long as wide, irregularly stringbean-shaped with two-flaps on dorsal margin (Fig. 29 right); phallopodeme in dorsal view spatulate, with posterior part showing V-shaped dark chitinization, and anterior part bifurcated apically (Fig. 30), in lateral view L-shaped, of moderate width, with posterior margin forming zigzag (Fig. 31); postgonite in dorsal view forms arcuate spatula (Fig. 30), in lateral view elongate and narrow, with anterior process sinuate (Fig. 31); pregonite short, strongly narrowed apically, bearing one apical and one subapical setula (Figs 30, 31); hypandrium in dorsal view bullet-shaped with rounded anterior margin (Fig. 30), in lateral view moderately depressed (Fig. 31); 5th sternum U-shaped and largely covered by setulae, pointing evenly posteriorly; setulae markedly more robust and longer posteriorly (Fig. 30).

Female. Identical with male for most external characters; body length 2.9–3.0 mm; wing length 3.0–3.1 mm; arista



Figs 34–37. Habitats. 34 – Plzeň-Bolevec, *Eleocharis palustris* stands in Velký Bolevecký pond, and detail of a *Hydrellia* specimen on its stem (marked by arrow), 35 – same locality, a place where *H. pilsna* sp. nov. was collected nearby in number in 2023; 36 – Albeřice, littoral of pond with *Eleocharis* sp. and *Schoenoplectus lacustris*; 37 – Dolní Lhota, Luňáky Nature Reserve, muddy bottom of pond with stands of *Glyceria maxima* and *Juncus effusus*.

with 6–8 dorsal rays; 9–13 facial setulae (Figs 32, 33); eye to gena ratio 7.8–9.2; darker apical spot of wings indistinct or at most very slightly indicated; costal vein ratio 0.59; M vein ratio 0.76; cercus yellowish to pale reddish.

Biology. The specimens from the Luňáky Nature Reserve come from strongly overgrown muddy bottom of largely drained pond (Fig. 37). They were all collected by using water pan traps (yellow and white, diameter ca. 20 cm) placed at the edges of vegetation with dominant *Glyceria maxima* and *Juncus effusus*.

Distribution. Czech Republic (KARNECKÁ 1985, here confirmed), Poland (LOEW 1860).

Remarks. LOEW (1860) described *Hydrellia frontalis* from a single specimen collected in the vicinity of Wrocław (‘Nähe von Breslau’) in Poland. It was later recorded from the Czech Republic (Bohemia: Nítovice, Skopaný pond, ca. 49°10'10.6"N 14°47'37"E, 1 ♂) (KARNECKÁ 1985), but this record, as well as other suspect findings by H. Karnecká, was questioned by KUBÁTOVÁ-HIRŠOVÁ (2003), and the species was later removed from the Czech checklist (cf. KUBÁTOVÁ-HIRŠOVÁ 2009). The collection of H. Karnecká was never studied by other specialists and is in very poor condition in NMPC (M. Tkoč, pers. comm.).

The holotype is in good condition and the newly collected specimens (females) match it well, especially in having dark palpi, pale fore coxa, darkened brownish dorsal part of anepisternum and brownish base of abdominal terga. The darkened apex of wing in males of *H. frontalis* (Fig. 27) appears to be a unique case of sexual dimorphism within the genus.

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References

- BECKER T. 1926: 56a Ephydriidae und 56b Canaceidae. In: LINDNER E. (ed.): *Die Fliegen der Palaearktischen Region. Band VI. 1.* E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 115 pp.
- CANZONERI S. & MENEGHINI D. 1983: Ephydriidae e Canaceidae, In: *Fauna d'Italia, Vol. XX.* Ed. Calderini, Bologna, 337 pp.
- COLLIN J. E. 1966: A contribution towards the knowledge of the male genitalia of species of *Hydrellia* (Diptera, Ephydriidae). *Bollettino del Museo Civico di Storia Naturale di Venezia* **16**: 7–18, 26 pl.
- CRESSON E. T. 1932: Studies in the dipterous family Ephydriidae, paper IV. *Transactions of the American Entomological Society* **58**: 1–34.
- CUMMING J. M. & WOOD D. M. 2017: Adult morphology and terminology. Pp. 89–133. In: KIRK-SPRIGGS A. H. & SINCLAIR B. J. (eds): *Manual of Afrotropical Diptera. Vol. 1. Introductory chapters and keys to Diptera families. Suricata* 4. SANBI Graphics and Editing, Pretoria, 425 pp.
- HELLRIGL K. 2015: Memorandum für Friedrich Wachtl (1840–1913) zum hundertsten Todesjahr: Fritz A. Wachtl, K. K. O. Professor für Forstschutz und Forstliche Entomologie an der Hochschule für Bodencultur in Wien (Boku). *Forest Observer* **7**: 183–230.
- ICZN 1999: *International Code of Zoological Nomenclature. 4th Edition.* The International Trust for Zoological Nomenclature, London, 306 pp.
- KARNECKÁ H. 1985: A review of species of *Hydrellia* (Rob.-Desv.) found in Bohemia (Diptera, Ephydriidae). *Acta Entomologica Boemoslovaca* **82**: 315–319.
- KUBÁTOVÁ-HIRŠOVÁ H. 2003: *Shore flies (Diptera: Ephydriidae) of the Czech Republic and Slovakia.* Unpublished doctoral thesis. Přírodovědecká fakulta, Masarykova Univerzita, Brno, 200 pp.
- KUBÁTOVÁ-HIRŠOVÁ H. 2009: Ephydriidae Zetterstedt, 1837. In: JEDLIČKA L., KÚDELA M. & STLOUKALOVÁ V. (eds): *Checklist of Diptera of the Czech Republic and Slovakia.* Electronic version 2. + CD-ROM: ISBN 978-80-969629-4-5
- LOEW H. 1860: Die Europaischen Ephydrinidae und die bisher in Schlesien beobachteten Arten derselben. Neue Beiträge zur Kenntnis der Dipteren. Teil 7. Mittler und Sohn, Berlin, 46 pp.
- MATHIS W. N. & ZATWARNICKI T. 1995: World catalog of shore flies (Diptera: Ephydriidae). *International Memoirs of Entomology* **4**: i–vi + 1–423.
- PAPP L. 1975: Vizilegyek-Ephydriidae. In: *Fauna Hungariae, Vol. 15/6.* Akadémiai Kiadó, Budapest, 128 pp.
- ZATWARNICKI T. 1986: New synonyms of Palearctic *Hydrellia* (Diptera, Ephydriidae). *Polskie Pismo Entomologiczne* **56**: 133–142.
- ZATWARNICKI T. 1988: Materials to the knowledge of the genus *Hydrellia* Robineau-Desvoidy (Diptera, Ephydriidae). *Polskie Pismo Entomologiczne* **58**: 587–634.
- ZATWARNICKI T. 2013: Family Ephydriidae (Animalia: Eumetazoa: Arthropoda: Hexapoda: Insecta: Diptera: Brachycera). In: *Fauna Europaea*. <http://www.faunaeur.org>.
- ZATWARNICKI T. 2022: Notes on selected genera of shore flies (Diptera: Ephydriidae), with removals to Drosophilidae, Heleomyzidae and Milichiidae. *Annales Zoologici* **72**: 389–432.