

An identification key for the European species of *Hyadina* Haliday and a new interpretation of *Hyadina vernalis* (Robineau-Desvoidy)

(Diptera, Ephydriidae)

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Hyadina vernalis (Robineau-Desvoidy, 1830) is interpreted as senior synonym of *Hyadina humeralis* auct., nec Becker, 1896 (status rev.). An illustrated key for the European *Hyadina* species is presented and terminalia of seven species are illustrated. For each of the ten European *Hyadina* species the diagnosis, distribution and biology are summarized. New faunistic records are listed from Croatia, Finland, France, Georgia, and Jordan.

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Introduction

The genus *Hyadina* Haliday, 1837 comprises 46 species worldwide (Mathis & Zatwarnicki 1995, 2003, 2004a,b, 2019, Zhang & Yang 2009). Twenty species occur in the Palearctic region and 10 species in Europe. *Hyadina* occurs mainly at different wetlands and most species prefer semiaquatic conditions. Investigations in the Nearctic came to the conclusion that larvae of different *Hyadina* species live from *Cylindrospermum* (Cyanobacteria) and might be specialised in nature to this blue-green algae genus (Foote 1977). Nothing is known about the food of European *Hyadina* and therefore our understanding about distribution and habitats is at an early stage.

Due to the lack of an identification key that includes all European species it is a challenge to identify European *Hyadina*. The necessary use of original descriptions is frustrating because the separation of European *Hyadina* species is not difficult at all. But the interpretation of names turned out to be difficult with several mistakes made before. Another problem is that the common European *Hyadina humeralis* auct. has recently no valid name. The aim of this work is therefore (a) to find a name

for *Hyadina humeralis* auct., (b) to present a key for the European *Hyadina* and (c) compile the knowledge concerning distribution and biology of the European *Hyadina*.

Material and methods

The genus *Hyadina* is most recently described in Mathis & Zatwarnicki (2004a) and Zatwarnicki & Ryczko (2014). Identification and the key presented here is based on the works of Becker (1926), Frey (1945), Mathis & Zatwarnicki (2004a), Gibbs (2005), Krivosheina & Ozerov (2022) and Zatwarnicki (2022). I was able to check material of every species except *H. nigricornis* and *H. agostinhoi*. Nomenclature was checked against the original descriptions. Terminology is adopted from Cumming & Wood (2017) and Mathis & Zatwarnicki (2004a) and illustrated in Figs 16–19. To investigate the male terminalia the abdomen was dissected, macerated for about 3 hours in an aqueous solution of sodium hydroxide $\text{NaOH}_{(aq)}$, neutralized with acetic acid $\text{CH}_3\text{-COOH}$ and stored together with the specimen in a microvial filled with glycerine $\text{C}_3\text{H}_5(\text{OH})_3$. Costal index I is defined as the distance between the apices of R_1 and R_{2+3} [section 2 of costa] divided by the straight line distance between the apices of R_{2+3} and R_{4+5} [section 3 of costa].

Results

Status of *Hyadina vernalis* (Robineau-Desvoidy)

(1) The reason to discuss the taxonomic position of *H. vernalis* is the lack of a name for *Hyadina humeralis* auct., nec. Becker, 1896. Mathis & Zatwarnicki (2004a) designated a lectotype for *H. humeralis* and synonymized this species with *Hyadina guttata* (Fallén, 1813). This synonymy could recently be verified by examination of the lectotype of *H. humeralis* in the collection of the Zoological Museum Berlin. It has these labels: (i) "Liegnitz / IV. 36816."; (ii) "Lectotype / *Hyadina* ♂ / *humeralis* Becker / By Mathis & Zatwar.". As mentioned by Mathis & Zatwarnicki (2004a) concerning *H. humeralis* auct.: "apparently there is no available name for this species". This unsatisfactory situation has not changed within the last twenty years.

(2) *Hyadina vernalis* has been described in the short and unsatisfactory way as was characteristic for Robineau-Desvoidy and it is hardly possible to recognise the species. The type material is assumed to be destroyed (Mathis & Zatwarnicki 1995). However, Haliday (1839) synonymized *H. vernalis* with *H. guttata*. Coquillett (1910) designated *H. vernalis* as type species of *Hydrina* Robineau-Desvoidy, 1830 which is therefore treated as a synonym of *Hyadina*. The complex story of the use of *Hydrina* is summarized in detail by Hollmann-Schirmacher (1998).

(3) When accepting *H. vernalis* as belong to *Hyadina* as proposed by Haliday (1839) and accepted by all subsequent authors it cannot be interpreted as *H. guttata*. Robineau-Desvoidy (1830) described the wing as "les ailes sans macule distincte". *Hyadina guttata* has distinct white spots at the wing (Fig. 8).

(4) On the other hand the description of *H. vernalis* fits completely to *H. humeralis* auct. that does not have these white spots. Therefore I would propose to interpretate *H. vernalis* as a valid species and conspecific with *H. humeralis* auct. (**status rev.**). There are no characters described in the original description of *H. vernalis* that contradicts this interpretation. There is no locus typicus given for *H. vernalis* but it was probably described from the surroundings of Paris. *Hyadina vernalis* is widely distributed in Europe and will occur there, too.

With this proposed solution there will be a name for *H. humeralis* auct., the synonymy of *Hydrina* and *Hyadina* must not be changed, and the obviously wrong synonymy of *H. vernalis* with *H. rufipes* is resolved.

Key for the European *Hyadina* species

- 1 Scutellum without velvet black lateral markings (Fig. 5); scutum dusted with distinct submedial stripes (Fig. 5); frons completely densely grey dusted (Fig. 5) 2
- Scutellum with velvet black markings at lateral edges (Fig. 7) or completely velvet black (Fig. 6); scutum subshining without distinct stripes (Figs 6–7); frons at least partly subshining (Figs 6–7) 3
- 2 R_{2+3} short, costal index $I \approx 0.5$ (Fig. 9); no distinct acrostichal setae; wing brown infuscate, with 2–3 white spots, typically bent over the abdomen (Fig. 9); femora and tibiae black; face with distinct nose like projection below antenna; ♂ sternites 3–5 as Fig. 27; ♂ terminalia as Figs 24–26: surstylus and cerci broadly rounded, surstylus apically with dense setulae; postgonite apically with distinct large seta *H. minima* (Papp)
- R_{2+3} long, costal index $I \approx 1$ (Fig. 10); four rows of small but distinct acrostichal setae; wing only slightly brown infuscate, without white spots; knees yellow; face flat; ♂ sternites 3–5 as Fig. 31; ♂ terminalia as Figs 28–30: surstylus and cerci pointed, surstylus without dense setulae; postgonite small and bent ventrally, with one indistinct seta apically *H. pollinosa* Oldenberg
- 3 Inner and outer vertical setae developed (Fig. 3) 4
- Only inner vertical seta developed 6
- 4 No strong orbital seta; at least first flagellomere orange ventrally; palpus orange brown; legs usually mainly orange brown; ♂ sternite 5 with an obvious ridge densely covered with setae, sternites 3–4 fragmentary (Fig. 35); ♂ terminalia as Figs 32–34: surstylus almost triangular with 3 obvious setae of which the middle one is based on a more or less pronounced protuberance, cercus broad in dorsal view *H. rufipes* (Meigen)
- Strong orbital seta about as strong as vertical setae (Fig. 3); antenna black (Figs 1,3); palpus black (Fig. 3); legs black (Fig. 1) 5
- 5 Brachypterous or R_{2+3} extremely short, costal index $I < 0.2$ (Fig. 13); face silver dusted with velvet black gena (Fig. 3); frons with velvet black lateral edges (Fig. 4); ♂ terminalia illustrated in Clausen (1984) *H. vockerothi* Clausen

- R_{2+3} normally developed with costal index $I > 0.8$ (Figs 1,2); face and gena uniformly silver dusted (Fig. 1); frons subshining; ♂ terminalia and sternites not described so far *H. nigricornis* Frey
- 6 Scutellum completely velvet black (Fig. 6); frontal triangle broadly shining laterally, subshining medially (Fig. 6); ♂ sternites 3–5 reduced to separated sclerotized plates, with minute setulae only, sternite 5 anteriorly only presented by two small sclerites (Fig. 39); ♂ terminalia as Figs 36–38: surstylus apically bent medially, cercus broad in dorsal view *H. scutellata* (Haliday)
- Scutellum only laterally velvet black (Fig. 7); frontal triangle completely subshining (Fig. 7) 7
- 7 Tergite 5 completely subshining, with short setulae and scattered longer setulae (Fig. 15); face silver grey dusted 8
- Tergite 5 mainly shining, might be medially subshining, with scattered long setulae only (Fig. 14); face golden or silver dusted 9
- 8 Wing without white patches (Fig. 12); palps black to orange brown; anepisternum with small velvet black spot in anterodorsal corner; legs might be dark; ♂ sternite 5 with an obvious ridge densely covered with setae, sternites 3–4 fragmentary (Fig. 43); ♂ terminalia as Figs 40–42: surstylus separated from epandrium, short, with a dominant seta usually arising from a dorsolateral evagination and 3–4 prominent apical setae, cercus broad in dorsal view; widely distributed in Europe *H. vernalis* (Robineau-Desvoidy)
- Wing with white patches before and behind dm-cu (as Fig. 8); palps orange; anepisternum without black spot; legs light orange brown; ♂ sternite 5 with obvious large lateral setae (Fig. 19); ♂ terminalia as Figs 16–18: surstylus small, almost triangular, with 1+2 distinct setae, cercus narrow in dorsal view, postgonite broad; restricted in Europe to Madeira and the Canary Islands *H. fenestrata* Becker
- 9 Legs typically almost completely orange brown, and always larger parts orange brown; face golden (♂) or silver dusted (♀); anepisternum anterodorsally widely velvet black; ♂ sternite 5 posteriorly obviously widened (Fig. 23); ♂ terminalia as Figs 20–22: surstylus short, in

dorsal view bulging medially and with strong anterolateral seta, cercus broad in dorsal view; widely distributed in Europe *H. guttata* (Fallén)

- Legs black, only tarsi and knees yellow; face in ♂ and ♀ silver dusted; anepisternum anterodorsally only with small velvet black spot; ♂ terminalia and sternites not described so far; to date only known from the Azores *H. agostinhoi* (Frey)

Overview of the European species of *Hyadina*

Hyadina agostinhoi Frey, 1945

Hydrina agostinhoi Frey 1945: 84–85; type-locality: “Mig.: Pico do Castanheiro”, “Lagoa Canario”, “Pico da Vara”, “Pico: Lagoa do Caiado”, “Fayal: Caldeira”, “Flores: Santa Cruz, oberhalb des Meeresufers”; ST ♂♀ [MZH, Mathis & Zatwarnicki 1995].

Hydrina agostinhoi var. *pseudopelina* Frey 1945: 85; type-locality: “Flor.: Ribeira Fazenda”; HT ♂/♀ [MZH, Mathis & Zatwarnicki 1995] – synonymy by Cogan (1984).

Diagnosis. Belongs to the species with (i) only inner vertical seta and (ii) scutellum velvet black laterally. Can be distinguished from the other three European species of this group by the almost completely black legs. Terminalia not illustrated to date. No material examined by the author.

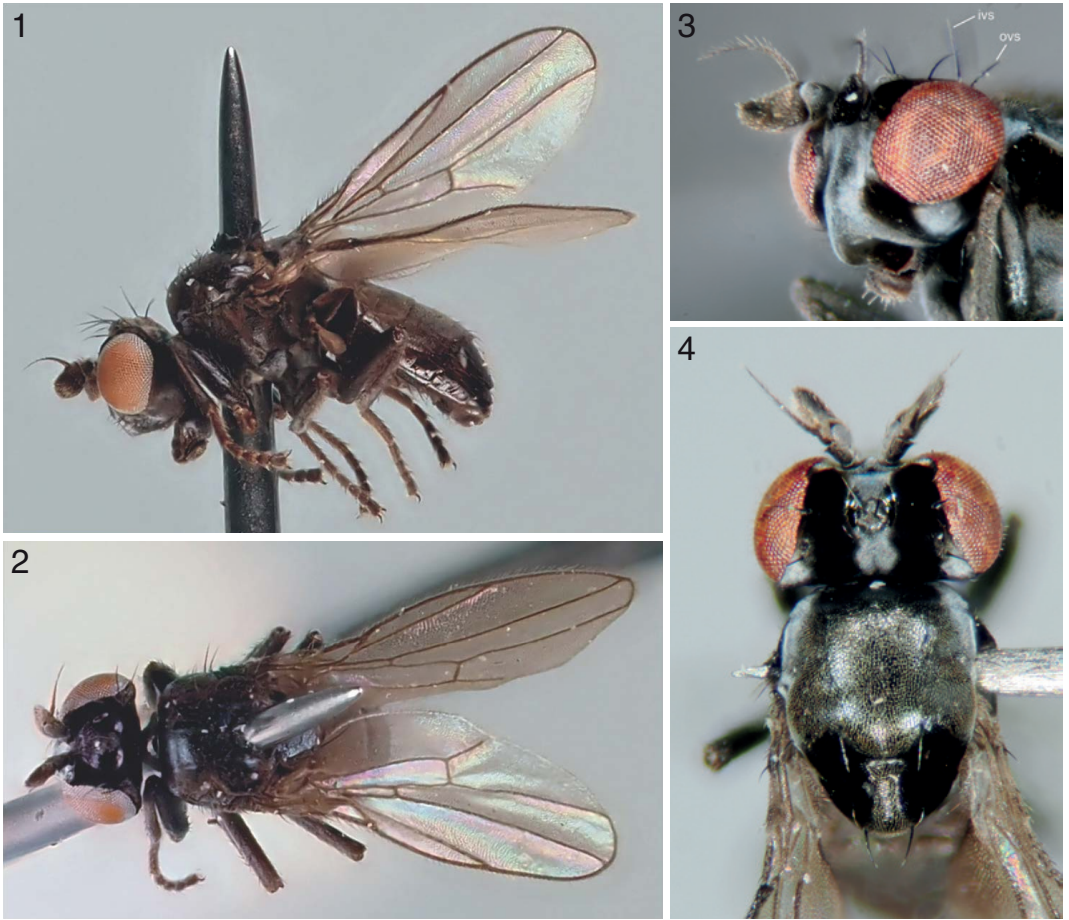
Distribution. So far only known from the type series from the Azores (Flores Island, Faial, Pico Island, São Miguel).

Biology. Has been recorded from May to July at different biotopes (lakes, beach, wet rock wall).

Taxonomy. As mentioned by Frey (1945) *H. agostinhoi* might be only a dark legged form of *H. guttata* and examination of the male terminalia should be done when material is available. One male from mainland Portugal will key out as *H. agostinhoi* due to almost completely black legs but fits otherwise to *H. guttata* (22.iii.2018, Setúbal, rice fields n Carvalhal [38.313°N 8.746°W], leg. et coll. Stuke). Strobl (1900) describes such specimens from Spain as *H. guttata* var. *obscuripes* and *H. guttata* var. *nigripes*.

Hyadina fenestrata Becker, 1903

Hyadina fenestrata Becker 1903: 173; type-locality: “As-suan” [Egypt]; LT ♀, des. by Mathis & Zatwarnicki (2004a) [ZMHB, Mathis & Zatwarnicki 2004a].



Figs 1-4. *Hyadina nigricornis* Frey and *H. vockerothi* Clausen. **1.** Holotype of *H. nigricornis* Frey, lateral view; **2.** holotype of *H. nigricornis* Frey, dorsal view; **3.** head of *H. vockerothi* Clausen, anterolateral view; **4.** head and thorax of *H. vockerothi* Clausen, dorsal view. *ivs*, inner vertical seta; *ovs*, outer vertical seta.

Unpublished material: JORDAN: 1♂, 22.x.2010, Ayoun Musa (Spring of Moses) [31.775°N 35.739°E], leg. et coll. Stuke.

Diagnosis. *Hyadina fenestrata* is an inconspicuous species within the group that is characterised by (i) only inner vertical seta and (ii) scutellum velvet black laterally (as Fig. 7). The lack of a black spot at the anepisternum is a good indicator for this species but a careful examination of the characters given in the key above should be used to verify the identification. Terminalia as Figs 16-18.

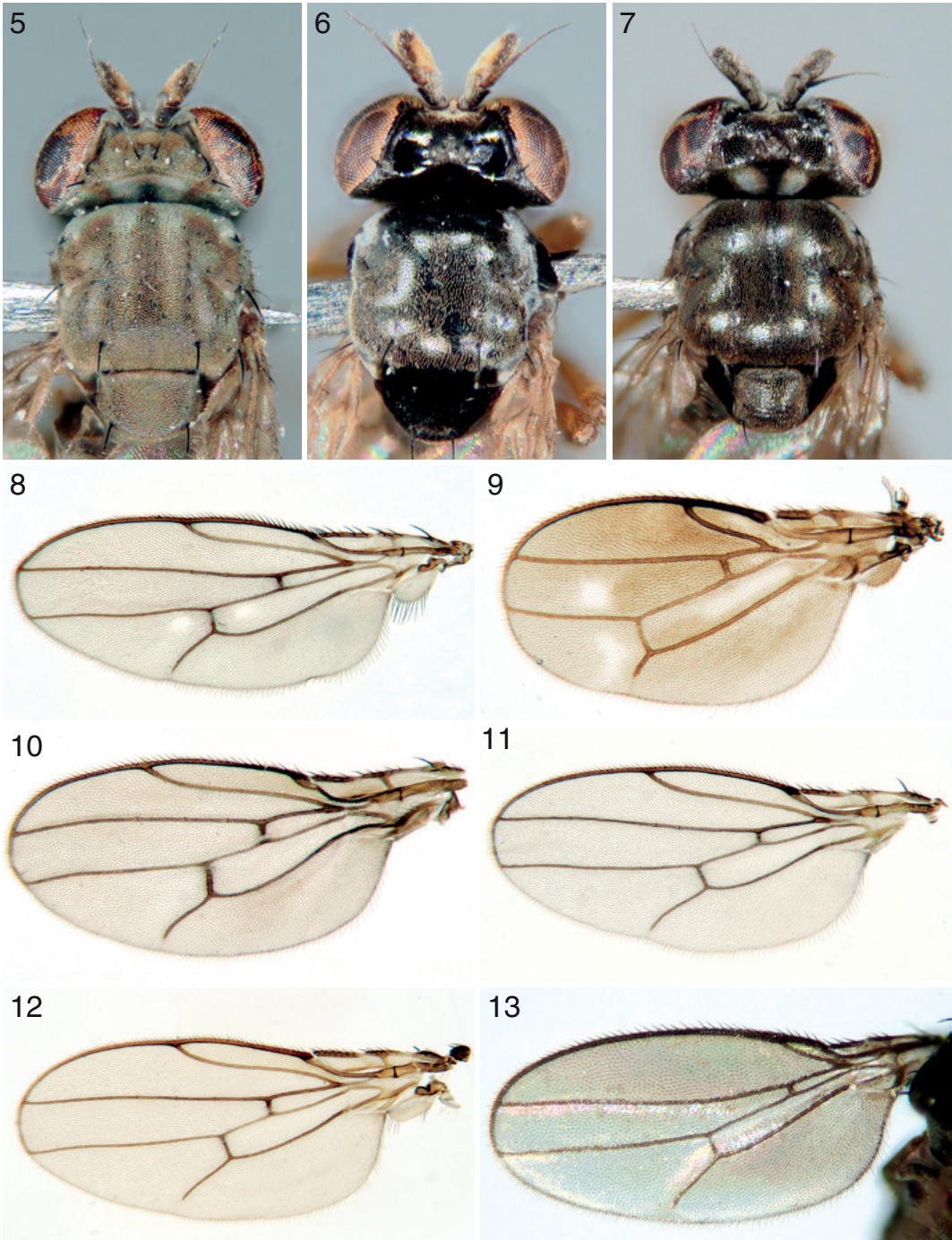
Distribution. Within Europe this species has so far only been recorded from the Canary Islands (Tenerife, Gran Canaria, La Palma) (Becker 1908, Cresson 1930) and Madeira (Stuke 2012). Despite these isolated records the species is widely distrib-

uted and probably not rare with records from Egypt (Becker 1903, El-Hawagry et al. 2018), Israel (Mathis & Zatwarnicki 2004a), Jordan (material listed above), Oman (Mathis et al. 2017), Seychelles (Mathis & Zatwarnicki 2003), United Arabian Emirates (Mathis et al. 2017), Taiwan (Cresson 1930) and the Philippines (Cresson 1930).

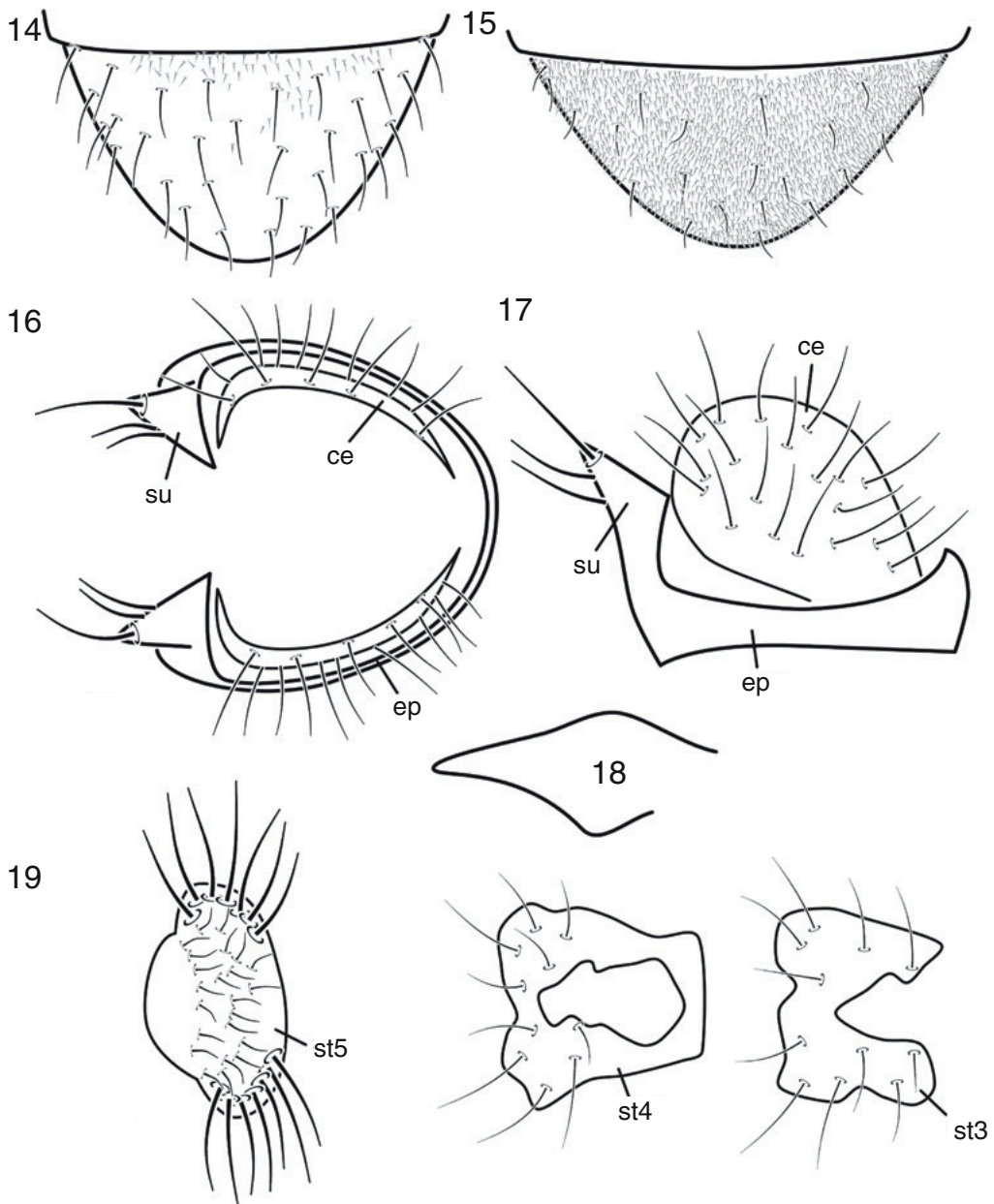
Biology. Adults have been recorded all year round at wetlands.

Hyadina guttata (Fallén, 1813)

Notiphila guttata Fallén 1813: 253; type-locality: "Scania" [Sweden]; LT ♂, des. by Mathis & Zatwarnicki (2004a) [MZLU, Mathis & Zatwarnicki 2004a].



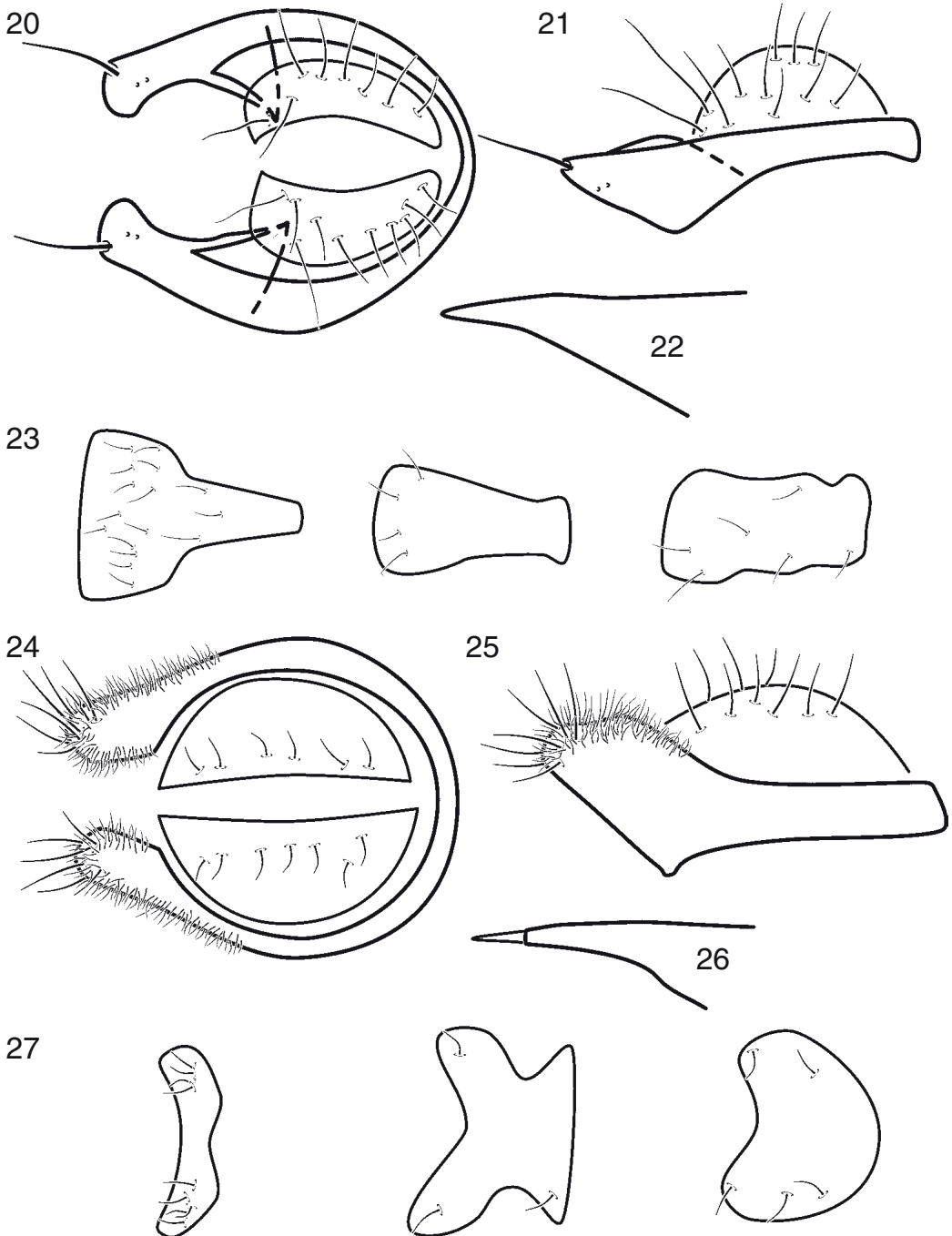
Figs 5-13. Head, thorax and wing of *Hyadina* species. 5. Head and thorax of *H. pollinosa* Oldenberg, dorsal view; 6. head and thorax of *H. scutellata* (Haliday), dorsal view; 7. head and thorax of *H. vernalis* (Robineau-Desvoidy), dorsal view; 8. wing of *H. guttata* (Fallén), dorsal view; 9. wing of *H. minima* (Papp), dorsal view; 10. wing of *H. pollinosa* Oldenberg, dorsal view; 11. wing of *H. rufipes* (Meigen), dorsal view; 12. wing of *H. vernalis* (Robineau-Desvoidy), dorsal view; 13. wing of *H. vockerothi* Clausen, dorsal view.



Figs 14-19. Abdomen of *Hyadina* species. **14.** Tergite 5 of *H. guttata* (Fallén), dorsal view; **15.** tergite 5 of *H. vernalis* (Robineau-Desvoidy), dorsal view; **16.** epandrium and cerci of *H. fenestrata* Becker, dorsal view; **17.** epandrium and cerci of *H. fenestrata* Becker, lateral view; **18.** tip of postgonite of *H. fenestrata* Becker, lateral view; **19.** sternites 3 (right) – 5 (left) of *H. fenestrata* Becker, ventral view. **ce**, cercus; **ep**, epandrium; **st3**, sternite 3; **st4**, sternite 4; **st5**, sternite 5; **su**, surstylus.

Hydrellia viridis Macquart 1835: 527; type-locality: “Du nord de la France”; no information available about type material [MNHN, Mathis & Zatwarnicki 1995], synonymy by Becker (1905).

Hyadina humeralis Becker 1896: 195-196; type-locality: “Scania” [Sweden]; LT ♂, des. by Mathis & Zatwarnicki (2004a) [ZMHB, Mathis & Zatwarnicki 2004a], synonymy by Mathis & Zatwarnicki (2004a).



Figs 20-27. Postabdomen of *Hyadina guttata* (Fallén) and *H. minima* (Papp). **20.** Epandrium and cerci of *H. guttata* (Fallén), dorsal view; **21.** epandrium and cerci of *H. guttata* (Fallén), lateral view; **22.** tip of postgonite of *H. guttata* (Fallén), lateral view; **23.** sternites 3 (right) – 5 (left) of *H. guttata* (Fallén), ventral view. **24.** epandrium and cerci of *H. minima* (Papp), dorsal view; **25.** epandrium and cerci of *H. minima* (Papp), lateral view; **26.** Tip of postgonite of *H. minima* (Papp), lateral view; **27.** Sternites 3 (right) – 5 (left) of *H. minima* (Papp), ventral view.

Hyadina guttata Hal. var. *obscuripes* Strobl 1900: 2–3; type-locality: “Algeciras, S. Morena, Irun” [Spain]; ST 1♂ 4♀ [NMBA, Chvála 2008], synonymy by Cogan (1984).

Hyadina guttata Hal. var. *nigripes* Strobl 1900: 3; type-locality: “Irun” [Spain]; HT ♂ [NMBA, Chvála 2008], synonymy by Cogan (1984).

Diagnosis. *Hyadina guttata* belongs to the group that is characterised by (i) only inner vertical seta and (ii) scutellum velvet black laterally (as Fig. 7). Males are straightforward to recognise by the golden dusted face. Except for the black legged *H. agostinhoi*, *H. guttata* differs by the shining tergite 5 that has at least laterally no microtrichia beside the scattered long hairs (Fig. 14). Terminalia as Figs 20–22.

Distribution. *Hyadina guttata* is widely distributed in Europe and might be the most common *Hyadina* species. The only European distribution border is in the north with the northernmost records known so far from 66° N in Finland (GBIF 2023a). Outside Europe it is found in North Africa with records from Morocco (Vitte 1988, 1991) to Egypt (Hollmann-Schirmmacher 1998, El-Hawagry et al. 2018), from Turkey (Hollmann-Schirmmacher 1998, Popescu-Mirceni 2011), Israel (Mathis & Zatwarnicki 2004a) and the Far East of Russia (Krivoshchina 1986).

Biology. *Hyadina guttata* lives in a wide range of habitats as summarized by Bährmann (1995). He points out that *H. guttata* might be common on xerothermic meadows. At least regionally it prefers wetlands in the widest sense including for example wet meadows, forests, or fens. It can be classified as ubiquitous. Of course, it might have very special habitat requirements that occur in different habitats that are not known so far. *Hyadina guttata* has been recorded all through the year with a peak in April and May (personal observation) and a second peak in autumn (Bährmann 1995), is probably polyvoltine and might overwinter as adult fly. The Laboulbeniales *Stigmatomyces spiralis* Thaxter, 1901 is reported from *H. guttata* (Dainat & Dainat 1973 as *S. hyadinae* Balazuc, 1974 as *S. hyadinae* Rossi, 1993).

Hyadina minima (Papp, 1975)

Lytogaster minima Papp 1975: 214–215; type-locality: “Pest, fűvész kert (=botanical garden), tópart (=lake-shore)” [Hungary]; HT ♂ [HNHM, Papp 1975].

Hyadina borkumensis Stuke 2020: 48–49; type-locality: “Niedersachsen, Leer, Borkum, Primärdünen und Dünentäler, Nordweststrand”, “53.598° N 6.662° E” [Germany]; HT ♀ [ZMHB, Stuke 2020], synonymy by Zatwarnicki (2022).

Diagnosis. Due to the lack of any velvet black on the scutellum (as Fig. 5) only to be confused with *H. pollinosa*. *Hyadina minima* is easily recognised by the short R_{2+3} (Fig. 9) with costal index $I \approx 0.5$. Terminalia as Figs 24–26.

Distribution. *Hyadina minima* is a rare species with three known locations from Germany (Bährmann 2009, Stuke & Bährmann 2013, Stuke 2020, 2023), the locus typicus in Hungary (Papp 1975) and one location in Czech Republic (Zatwarnicki 1991, 2022).

Biology. *Hyadina minima* is a halobiont species and has been caught in wetlands with places hardly vegetated. Most records are from inland salt places, but it occurs at the coast in wet dune valleys as well. Adults occur from April to July which might indicate several generations.

Hyadina nigricornis Frey, 1930

Hyadina nigricornis Frey 1930: 92; type-locality: “in Terijoki (Ik) bei Ollila auf einer feuchtigeren Niederung zwischen den Sanddünen” [Russia]; HT ♂ [MZH, Mathis & Zatwarnicki 1995].

Hyadina nigrifacies Zatwarnicki 1996: 121, misspelling.

Diagnosis. This species is recognised at once by its black appearance (Figs 1,2) and the normally developed R_{2+3} (Fig. 1). Terminalia not illustrated to date. No material examined by the author.

Distribution. *Hyadina nigricornis* has been caught only three times: The male holotype was collected in Zelenogorsk (Saint Petersburg, Russia), Dahl (1966) reported one specimen from Halltorp (Sweden) and Zatwarnicki & Andersen (2023) reported one specimen from Norway. Records of Zatwarnicki (1991) are misidentified and belong to *H. vockerothi* (Zatwarnicki 1996).

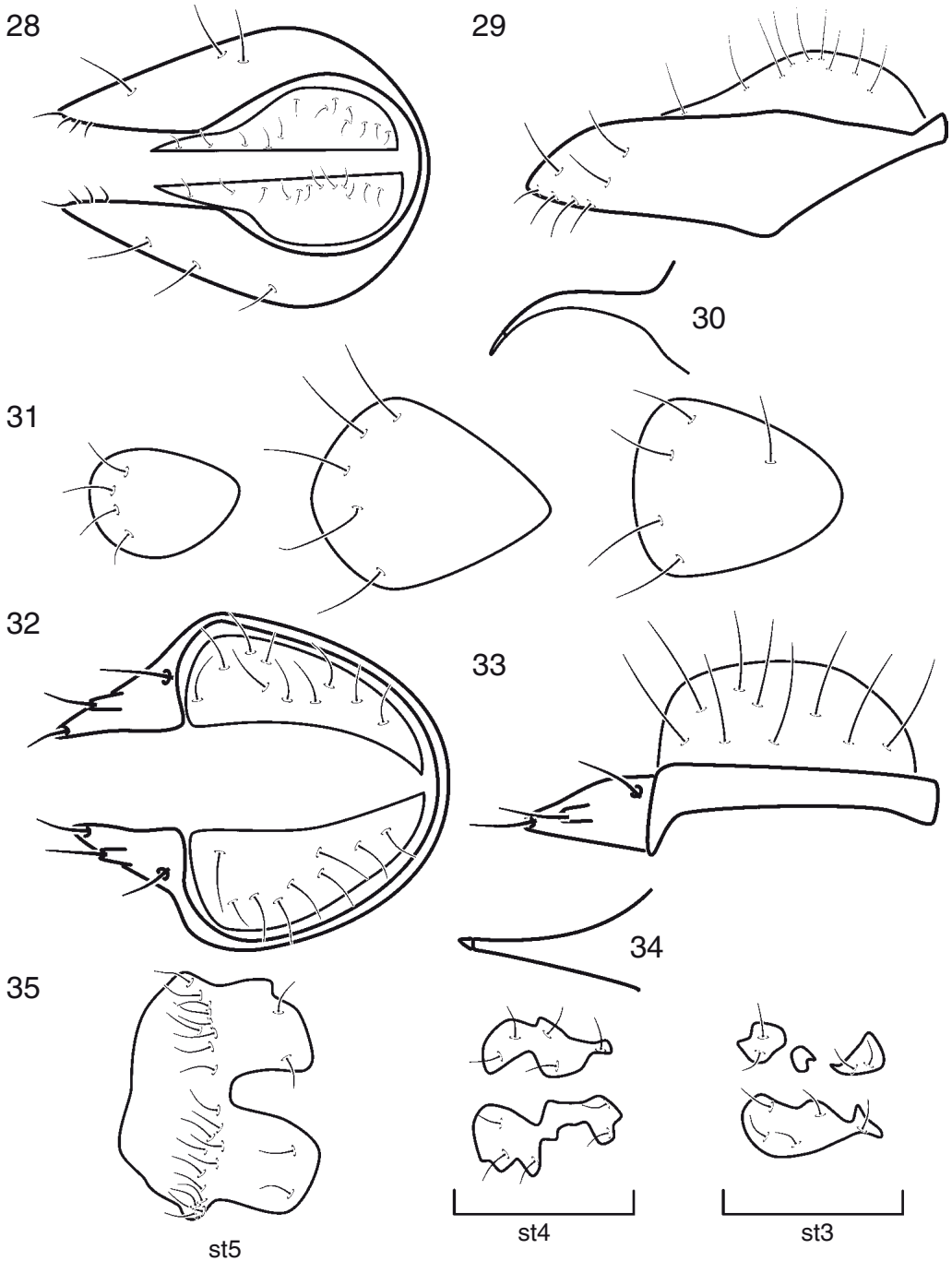
Biology. The two records are from May and August. The male holotype was collected at a wet dune valley close to the sea.

Hyadina pollinosa Oldenberg, 1923

Hyadina pollinosa Oldenberg 1923: 314–315; type-locality: “Sülldorf” [Germany]; HT ♀ [SDEI, Mathis & Zatwarnicki 1995].

Unpublished material: FRANCE: 1♂, 1.viii.2019, salt lake 2.5 km w Gruissan [43.102° N 3.059° E], leg. et det. Stuke.

Diagnosis. Due to the lack of any velvet black at scutellum (as Fig. 5) only to be confused with *H. minima*. *Hyadina pollinosa* is easily recognised by



Figs 28-35. Postabdomen of *Hyadina pollinosa* Oldenberg and *H. rufipes* (Meigen). 28. Epandrium and cerci of *H. pollinosa* Oldenberg, dorsal view; 29. epandrium and cerci of *H. pollinosa* Oldenberg, lateral view; 30. tip of postgonite of *H. pollinosa* Oldenberg, lateral view; 31. sternites 3 (right) - 5 (left) of *H. pollinosa* Oldenberg, ventral view. 32. epandrium and cerci of *H. rufipes* (Meigen), dorsal view; 33. epandrium and cerci of *H. rufipes* (Meigen), lateral view; 34. tip of postgonite of *H. rufipes* (Meigen), lateral view; 35. sternites 3 (right) - 5 (left) of *H. rufipes* (Meigen), ventral view. **st3**, sternite 3; **st4**, sternite 4; **st5**, sternite 5.

the much longer R_{2+3} (Fig. 10) with costal index $I \approx 1$. Terminalia as Figs 28–30.

Distribution. *Hyadina pollinosa* is a rare species with scattered records only. It has been recorded from the coast of the Dead Sea in Israel (Mathis & Zatwarnicki 2004a), the Mediterranean Sea with records from Italy (Canzoneri & Meneghini 1987, Canzoneri & Vienna 1988b, 2000, Bertoli et al. 1992, Raffone 2009) France (Dainat & Dainat 1973, Martinez 2002, this work) and Mallorca (Canzoneri & Vienna 1988a, Canzoneri & Rallo 1996, Ebejer et al. 2006) and along the North Sea coast in Suffolk, and Pool Harbour, Dorset in South England (Gibbs 2005; pers. comm.). Additionally, it has been recorded from few inland salt places in Germany (Oldenberg 1923, Stuke 2023) and from inland places without salt habitats in Slovakia (Zatwarnicki 1996), Fès, Morocco (Vitte 1991), Park HaYarden, Israel (Mathis & Zatwarnicki 2004a), and Volano, Italy (Canzoneri & Meneghini 1983).

Biology. *Hyadina pollinosa* is a halophilous species and has been recorded mainly from coastal and inland wetlands that are under the influence of salt water. However, there are records mainly from its southern distribution where it can be found at freshwater wetlands. Adults are recorded from March to October. Dainat & Dainat (1973) reported *H. pollinosa* to be infested with the Laboulbeniales *Stigmatomyces spiralis* Thaxter, 1901.

Hyadina rufipes (Meigen, 1830)

Ephydra rufipes Meigen 1830: 126; locus typicus not given ["von Hrn. von Winthem"]; LT ♀, des. by Cresson (1930) [NMW, Cresson 1930].

Ephydra nitida Macquart 1835: 539–540; locus typicus not given [presumably France]; no information available about type material [MNHN, Mathis & Zatwarnicki 1995], synonymy by Mathis & Zatwarnicki (1995).

Notiphila (Philygria) guttata Fallén b. *brevicornis* Stenhammar 1844: 240–241; type-locality: "Ostrogothia" [Sweden]; ST ♂♀ [MZLU & UZIU, Mathis & Zatwarnicki 1995], synonymy by Schiner (1864).

Diagnosis. *Hyadina rufipes* is an easily recognised species with inner and outer vertical setae developed, basal flagellomere orange ventrally and scutellum with velvet black markings at lateral edges (as Fig. 7). Terminalia as Figs 32–34.

Distribution. *Hyadina rufipes* is quite common and widely distributed over Europe with records from the Canary Islands (Becker 1908 as *nitida*) to the Republic of Mordovia, Russia (MacGowan et al. 2021). Records from Morocco (Vitte 1991 as *nitida*)

and southern Portugal (Stuke et al. 2023) indicate that there is no southern distribution border within Europe. However, *H. rufipes* is not recorded from Spain so far (Zatwarnicki 2002), only once recorded from Portugal and not recorded in Italy south of Veneto (Canzoneri & Vienna 2000). Most northern records of *H. rufipes* are from Finland at 68°N (GBIF 2023b). Outside from Europe *H. rufipes* is reported from Morocco (Vitte 1991 as *nitida*) and Russia Far East (Krivosheina 1986) only.

Biology. *Hyadina rufipes* can be found in all kinds of wetlands including salt influenced places, densely vegetated or bare margins of rivers or lakes, wet meadows, forests, or fens. Reasons for its occurrence or none occurrences at specific places are unknown and might be caused by specific bacteria in microhabitats we do not understand so far. Adults of *H. rufipes* occur from March to November with peaks in May and August. The species is polyvoltine and might overwinter as adult.

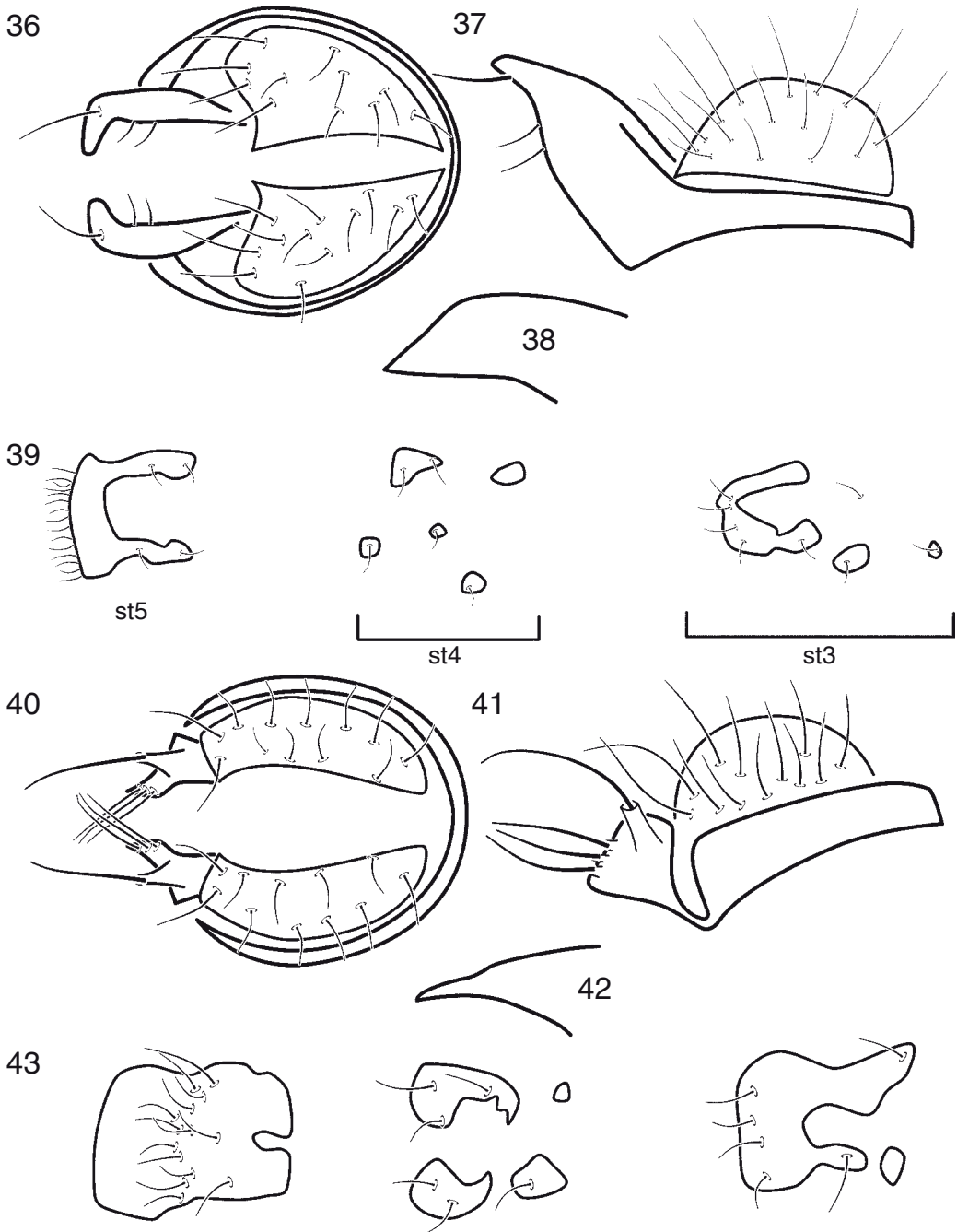
Hyadina scutellata (Haliday, 1839)

Hyadina (Hyadina) scutellata Haliday 1839: 406; type-locality: "Hollywood" [Ireland]; no information available about type material [NMID, Mathis & Zatwarnicki 1995].

Unpublished material: CROATIA: 1♂, 25.vi.2017, Đuračica 5 km s Magić Mala [45.133°N 17.596°E], leg. et coll. Stuke; 1♂, 19.vii.2018, Šarena Jezero near Knin [44.027°N 16.223°E], leg. et coll. Stuke; FINLAND: 1♂, 20.vii.2020, Northern Ostrobothnia, Iijoki n Kauppila [65.331°N 25.381°E], leg. et coll. Stuke; GEORGIA: 1♀, 30.vi.2019, Debeda River n Kirach-Mughanlo [41.340°N 45.051°E], leg. et coll. Stuke.

Diagnosis. This species is easily recognised by the completely velvet black scutellum (Fig. 6). It might be confused only with similar *Nostima picta* (Fallén, 1813) that also has a completely velvet black scutellum. However, *N. picta* has an arista with long rays (short in *H. scutellata*), obvious sublateral grey striped on the scutum (no sublateral stripes in *H. scutellata*), 2 obvious dorsocentrale seta (1 dorsocentral seta in *H. scutellata*), a densely dusted frons (shining to subshining in *H. scutellata*) and obvious long ommatrichia (inconspicuous ommatrichia in *H. scutellata*). Terminalia as Figs 36–38.

Distribution. *Hyadina scutellata* is widely distributed but records are rare and scattered. Surprisingly there are no records from France nor the Iberian Peninsula and the records from Ireland (Haliday 1839) and Britain (Drake 2007) mark the western distribution. Eastwards *H. scutellata* reaches to Talmenka at 83°E (Zatwarnicki 1996). It has so far not been recorded in



Figs 36-43. Postabdomen of *Hyadina scutellata* (Haliday) and *H. vernalis* (Robineau-Desvoidy). 36. Epandrium and cerci of *H. scutellata* (Haliday), dorsal view; 37. epandrium and cerci of *H. scutellata* (Haliday), lateral view; 38. tip of postgonite of *H. scutellata* (Haliday), lateral view; 39. sternites 3 (right) – 5 (left) of *H. scutellata* (Haliday), ventral view. 40. Epandrium and cerci of *H. vernalis* (Robineau-Desvoidy), dorsal view; 41. epandrium and cerci of *H. vernalis* (Robineau-Desvoidy), lateral view; 42. tip of postgonite of *H. vernalis* (Robineau-Desvoidy), lateral view; 43. sternites 3 (right) – 5 (left) of *H. vernalis* (Robineau-Desvoidy), ventral view. **st3**, sternite 3; **st4**, sternite 4; **st5**, sternite 5.

South Europe and the record from Georgia is the most southern location at 41°N. There are no records from Norway nor Sweden and the most northern findings are from Finland at 65°N (material listed above).

Biology. *Hyadina scutellata* is a species of freshwater wetlands and has probably a preference for margins of rivers and streams. Adults are recorded from January (Papp 2001) and March to September. This species is polyvoltine and probably overwinters as adult. At least in Germany this species has become rare with the last known record from 1994 (Zatwarnicki & Hollmann-Schirmacher 1997).

Hyadina vernalis (Robineau-Desvoidy, 1830)

Hydrina vernalis Robineau-Desvoidy 1830: 795; type-locality: locus typicus not given [presumably France]; no information available about type material [missing from coll. Robineau-Desvoidy, Mathis & Zatwarnicki 1995].

Hyadina humeralis auct. nec. Becker, 1896.

Unpublished material: CROATIA: 2 ♀♀, 25.vi.2017, Đuračica 5 km s Magić Mala [45.133°N 17.596°E], leg. et coll. Stuke; 1 ♀, 24.vi.2017, fishponds 1.5 km ne Stražanac [45.635°N 17.097°E], leg. et coll. Stuke; 1 ♀, 24.vi.2017, fishponds Ripnjaci [45.521°N 16.936°E], leg. et coll. Stuke; 1 ♀, 27.vi.2017, floodplain Danube 1 km se Tikveš [45.668°N 18.853°E], leg. et coll. Stuke; 1 ♂, 28.vi.2017, floodplain Drava n Kopačevo [45.608°N 18.789°E], leg. et coll. Stuke; 1 ♀, 23.vi.2017, floodplain Sava s Suvoj [45.372°N 16.687°E], leg. et coll. Stuke; FINLAND: 1 ♀, 9.viii.2022, Jätärin s Kuusamo [65.956°N 29.168°E], leg. et coll. Stuke; GEORGIA: 1 ♀, 8.vii.2019, Kura River n Akhalsheni [42.005°N 43.723°E], leg. et coll. Stuke; 1 ♂ 1 ♀, 3.vii.2019, Snostskali River 0.6 km se Achkhoti [42.618°N 44.624°E], leg. et coll. Stuke.

Diagnosis. *Hyadina vernalis* belongs to the group that is characterised by (i) only inner vertical seta developed and (ii) scutellum velvet black laterally (Fig. 7). It is the only species of this group without white patches before and behind dm-cu. However, these white patches can easily be overlooked in other species and therefore other characters should be considered, especially that tergite 5 is all over covered with microtrichia and additionally longer setulae (Fig. 15). Terminalia as Figs 40–42.

Distribution. *Hyadina vernalis* is a quite common species and widely distributed in Europe. It is recently recorded from Portugal (Stuke et al. 2023 as *H. humeralis* auct.), occurs in Calabria, Italy (Canzoneri & Vienna 2000 as *H. humeralis* auct.) and Georgia (material listed above). In Finland it has been found up to 66°N (material listed above). Lack of records in larger areas like Spain, parts of the Balkan or

western Scandinavia are very probably due to the absence of collecting activities. The only record of *H. vernalis* outside of Europe is from the Kuril Islands (“Kunaschir, Sernawodsk”, Dahl 1968 as *H. humeralis* auct.) and should be checked carefully.

Biology. *Hyadina vernalis* inhabits different kinds of wetlands including wet meadows, salty places, margins of rivers, ditches, streams or lakes. Adults of *H. vernalis* were found all year round, the species is very probably polyvoltine and might overwinter as adult. The Laboulbeniales *Stigmatomyces spiralis* Thaxter, 1901 is reported at *H. vernalis* (Rossi 1993 as *H. humeralis* auct.).

Hyadina vockerothi Clausen, 1984

Hyadina vockerothi Clausen 1984: 83–86; type-locality: “Cranberry I., Lockeport, Nova Scotia” [Canada]; HT ♂ [CNC, Clausen 1984].

Diagnosis. This species is easily characterised by the very short R₂₊₃ (Fig. 13) and the unique colouration of the face with velvet black patches at the gena (Fig. 3). Terminalia are illustrated in Clausen (1984).

Distribution. So far there are European records from Czech Republic (Zatwarnicki 1996), Denmark (Zatwarnicki 1991 misidentified as *nigricornis*), Germany (Stuke 2023), Hungary (Zatwarnicki 1991 misidentified as *nigricornis*) and Sweden (Zatwarnicki 1991 misidentified as *nigricornis*). Beside the European records this Holarctic species is reported from Nova Scotia and Ontario (Clausen 1984).

Biology. *Hyadina vockerothi* occurs in a brachypterous form and the Nearctic type material has been caught in “mouse run among *Carex*” (Clausen 1984). Adults have been recorded in April, June and July in a damp birch wood and at a densely vegetated lake shore.

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