

Clarified and new data for three closely related species
of the genus *Ephydra* Fallén, 1810 (Diptera: Ephydriidae):
E. flavipes Macquart, 1844, *E. murina* Wirth, 1975
and *E. pseudomurina* Krivosheina, 1983

Уточненные и новые данные для трех близких видов рода
Ephydra Fallén, 1810 (Diptera: Ephydriidae): *E. flavipes* Macquart,
1844, *E. murina* Wirth, 1975 и *E. pseudomurina* Krivosheina, 1983

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КЛЮЧЕВЫЕ СЛОВА: Diptera, Ephydriidae, *Ephydra*, *E. murina*, *E. flavipes*, *E. pseudomurina*, морфология, распространение.

ABSTRACT. As a result of the study of the type specimens of *Ephydra murina* Wirth, 1975, new data were obtained that facilitated the correct identification of three closely related species: *E. murina*, *E. flavipes* (Macquart, 1844) and *E. pseudomurina* Krivosheina, 1983. Two new synonyms have been proposed: *Ephydra pseudomurina* Krivosheina, 1983 = *Ephydra shalatinensis* El-Moursy, Negm, El-Hawagry et Ebrahim, 2006, **syn.n.** and *Ephydra pseudomurina* Krivosheina, 1983 = *Ephydra hejingensis* Hu et Yang, 2001, **syn.n.** The distribution of the studied species in the Palearctic and Oriental Regions was clarified. The species *E. flavipes* was recorded for the first time in Azerbaijan and Tajikistan; *E. murina* was first recorded for Tajikistan and Uzbekistan; *E. pseudomurina* is recorded for the first time in Israel. Two species, *E. flavipes* and *E. pseudomurina*, were recorded for the first time for the Oriental Region (India).

РЕЗЮМЕ. В результате исследования типовых экземпляров *Ephydra murina* Wirth, 1975, получены новые данные, позволяющие правильно идентифицировать три близких вида: *E. murina*,

E. flavipes (Macquart, 1844) и *E. pseudomurina* Krivosheina, 1983. Установлены два новых синонима: *Ephydra pseudomurina* Krivosheina, 1983 = *Ephydra shalatinensis* El-Moursy, Negm, El-Hawagry et Ebrahim, 2006, **syn.n.** и *Ephydra pseudomurina* Krivosheina, 1983 = *Ephydra hejingensis* Hu et Yang, 2001, **syn.n.** Уточнено распространение изученных видов на территории Палеарктики и Ориентальной области. Вид *E. flavipes* впервые отмечен на территории Азербайджана и Таджикистана; *E. murina* впервые отмечен для Таджикистана и Узбекистана; *E. pseudomurina* впервые регистрируется в Израиле. Два вида: *E. flavipes* и *E. pseudomurina* впервые отмечены для Ориентальной области (Индия).

Introduction

For many years the genus *Ephydra* Fallén, 1810 was an all-inclusive taxon that during the era of Meigen, Stenhammar and Zetterstedt included all Ephydriidae species with a large mouth opening and with setae

and hairs scattered over the face. Loew [1860] restricted the genus to species with a hidden clypeus, straight claws and the lack of pulvilli. These features are still the main diagnostic characters of the genus. The earliest described species was *Ephydra riparia* Fallén, 1813; and it was designated as the type species of the genus by Curtis [1832].

Worldwide, the genus *Ephydra* currently includes 35 species [Mathis, Zatwarnicki, 1995; El-Moursy *et al.*, 2006]. The distribution of these species across zoogeographic regions is uneven, however, with 20 species recorded from the Palaearctic Region, 12 species from the Nearctic Region, four species known from the Afrotropical Region, one species from the Oriental Region, three species from the Neotropical Region, and one species from the Australasian–Oceanian Region. Most of the species are found in a single zoogeographic region; six species, however, are known from two or more regions: *Ephydra riparia* is the only Holarctic species; *E. macellaria* Egger, 1862 and *E. flavipes* (Macquart, 1844) are known from the Palaearctic and Afrotropical Regions; *E. japonica* Miyagi, 1966 occurs in the Palaearctic and Oriental Regions; *E. packardii* Wirth, 1971 is found in the Nearctic and Neotropical Regions; and *E. millbrae* Jones, 1906 has been reported from the Nearctic, Neotropical and Australasian–Oceanian Regions [Mathis, Zatwarnicki, 1995].

The genus *Ephydra* is currently divided into two subgenera: *Halephydra* Wirth, 1971 with only one species, *E. gracilis* Packard, 1871, that occurs in Australasian–Oceanian, Nearctic and Neotropical Regions, and the subgenus *Ephydra*, which differs from *Halephydra* mainly by having developed cruciate interfrontal setae and a subshining general coloration [Mathis, Marioni, 2016]. Wirth [1975] and subsequent authors also distinguished three species groups within the subgenus *Ephydra*: *bivittata*, with only one Palaearctic species *E. bivittata* Loew, 1860. The *glauca* and *riparia* species groups each have several species.

Wirth's revision [Wirth, 1975] of the Old-World species of *Ephydra* is a thorough study in which all then known congeners were described, including three new species. *Ephydra murina* Wirth, 1975 from *flavipes* group was among these new species. Wirth was the first author to demonstrate that accurate species determinations of *Ephydra* specimens usually required study of structures of the male genitalia and he provided detailed figures of external and internal genital structures. Wirth's key to the Old-World species of the "riparia group" [Wirth, 1975] is based primarily on structures of the male terminalia. Wirth's revision of *Ephydra* was sufficiently comprehensive that for many years, no new species were discovered. In 1983 one more new species, *E. pseudomurina* Krivosheina, was described from Uzbekistan. This new species was reared from larvae living in a hypersaline puddle near a cotton field [Krivosheina, 1983]. This species, however, has been overlooked by most authors, leading to some misidentifications and inaccurate distributional data. Two more species from this group have been described: *E. hejingensis* Hu et Yang,

2001, from China [Hu, Yang, 2001], and *E. shalatinensis* El-Moursy, Negm, El-Hawagry et Ebrahim, 2006, from Egypt [El-Moursy *et al.*, 2006]. We soon also discovered that the male terminalia of these three species, *flavipes*, *murina* and *pseudomurina*, are very similar morphologically.

The most visible structure of the terminalia are the surstyli. Their shape is sometimes adequate to identify dry specimens without dissection. Some of the more easily identified species are: *E. scholtzi* Becker, 1896, *E. glauca* Meigen, 1830, *E. riparia* Fallén, 1813, *E. afghanica* Dahl, 1961. These and some other species have very uniquely shaped surstyli in posterior (dorsal) view, and if these structures are extended, their shape facilitates identification. There are several other species that have very similarly shaped surstyli. They are *E. flavipes*, *E. murina* and *E. pseudomurina*. The surstyli of *E. flavipes* are almost triangular in dorsal view, tapering evenly from the wide base to a narrow apex. *Ephydra pseudomurina* has evenly broad surstyli from the base with at most slight narrowing toward the apex. The surstyli of *E. murina* are broad basally and thereafter are irregularly tapered to the apex with a relatively long narrow section. We also noted that the surstyli, if slightly rotated, change shape. For a long time we wondered if *E. murina* and *E. pseudomurina* were conspecific but have managed to divide specimens in our collections into two groups. We studied specimens collected by Zimin with the same labels that were cited for paratype specimens of *E. murina* [Wirth, 1975] but couldn't make final conclusions because we discovered that two species can inhabit the same biotopes and these looked like *E. pseudomurina*. We then discovered a series of specimens from mountainous territories of Tadjikistan and found that they completely corresponded to the picture given by Wirth [1975]. This discovery led us to conclude that we needed to see the original preparations made by Wirth from mountainous Iraq to make final conclusions [Krivosheina, Ozerov, 2021]. During a visit to the Smithsonian Institution in 2023, Mathis compared our photos of *flavipes*, *pseudomurina* and presumably *murina* (specimens from Tadjikistan) with the slide preparations of *E. murina* that Wirth made and used for describing this species (Figs 8–11). From these observations, we now understand and can determine the species and the correct names of specimens in our collection. Thus, the objective of this paper is to discuss the morphology and distribution of these three species: *E. flavipes* (Macquart, 1844), *E. murina* Wirth, 1975 and *E. pseudomurina* Krivosheina, 1983. Terminology follows Mathis & Marioni [2016] and Wirth [1975], including "sternal plate" (= sternite 6 in Beschowski [2009] or =genital plate in Mathis *et al.* [2017]).

The following abbreviations of the collections were used:
 ZMUM — Zoological Museum, Moscow Lomonosov State University, Moscow, Russia;
 ZISP — Zoological Institute RAS, St.-Petersburg, Russia;
 USNM — National Museum of Natural History, Washington, USA.

Results

Ephydra flavipes (Macquart, 1844)

Figs 1–7.

Coenia flavipes Macquart 1844: 412 [Brazil & Chile (probably an error); LT ♂ (designated by Mathis, 1978: 105)].

Ephydra flavipes. — Mathis, 1978: 105 [generic combination]. — Mathis, Zatwarnicki, 2003: 642–643 [review, Aldabra]. — Beschovski,

Zatwarnicki, 2004: 41 [review; Bulgaria]. — Dawah, Abdullah, 2006: 389 [fauna, Saudi Arabia]. — Stuke, 2012: 203 [fauna of Jordan]; Stuke, 2013: 195 [list, Greece]. — Mathis *et al.*, 2017: 739–741 [fauna, United Arab Emirates].

Ephydra opaca Loew, 1856: 55 [Egypt, Asyût; ST ♂♀]. — Mathis, Zatwarnicki, 1995: 241 [synonymy].

Ephydra helwanensis Steyskal, 1968: 110 [Egypt, Helwan; HT ♂]. — Wirth, 1975: 32–35 [revision]. — Mathis, 1978: 105 [synonymy].

MATERIAL EXAMINED. 1♂, **Azerbaijan**, Geoktapa, Elizavetpol province, light trap, 2.VII.1901, R. Schmidt



Figs 1–7. *Ephydra flavipes*, male: 1 — sternal plate, dorsal view; 2 — sternal plate, lateral view; 3 — aedeagus, lateral view; 4 — gonite, lateral view; 5 — epandrium and surstyli, dorsal (posterior) view; 6 — same, lateral view; 7 — tergite 5, ventrolateral view.

Рис. 1–7. *Ephydra flavipes*, самец: 1 — стеральная пластинка, сверху; 2 — стеральная пластинка, сбоку; 3 — эдеагус, сбоку; 4 — гонит, сбоку; 5 — эпандрий и сурстели, сверху (сзади); 6 — то же, сбоку; 7 — тергит 5, вентролатерально.

(ZISP); 2 ♂♂, **India**, Jodhpur, CARZ, light trap, 1–5.II.1990, A.V. Kompantzev (ZMUM); 2 ♂♂, Rajasthan, 30.X.1989, light trap, CARZ at light, 1–5.II.1990, A.V. Kompantzev (ZMUM); 3 ♂♂, Rajasthan, Sambhar salt lake (26.92°N 75.19°E), 24.II.2011, N. Vikhrev (ZMUM); 1 ♂, **Tajikistan**, Dzilikul, Tigrovaya Balka Nature Reserve, 12.IV.1987, M.G. Krivosheina (ZMUM); 1 ♂, same place, 15–17.V.1987, N.P. Krivosheina (ZMUM); 1 ♂, **Turkey**, Dilek Milli Park, 2.XII.2006, N. Vikrev (ZMUM); **Turkmenistan**, Badkhyz, Lake Eroylanduz, 25.V.1991, A.L. Ozerov (ZMUM); 1 ♂, Sarykamys, 15.IV.1984, M.G. Krivosheina (ZMUM); 1 ♂, 140 km west of Tashauz, 20–29.IV.1984, M.G. Krivosheina (ZMUM); 8 ♂♂, 30 km north-west of Ashgabat, 22.IV.1983, N.P. Krivosheina (ZMUM); 5 ♂♂, Ashgabat, 15.XI.1983, N.P. Krivosheina (ZMUM); 1 ♂, Jebel station, 7.VI.1934, V. Popov (ZISP); 1 ♂, Imam Baba, Merv, Transcaspien district, 10.V.1912, I.V. Kozhanchikov (ZISP).

DESCRIPTION. Moderately large species, body length 4 mm. *Head* green-grey pollinose except metallic shining frontal vitta and upper face, with olive-greenish tinge and sometimes brownish low face; fronto-orbital plate grey pollinose. Head index (eye to gena height ratio) 3:1. 3 long fronto-orbital setae, anterior interfrontal usually thin and short. Postocular setae weak and short. Palpus yellow. Antenna blackish, greyish-brown dusted; arista pectinate on basal half of dorsal surface. Gena and parafacial greyish dusted.

Thorax black, grey pollinose. Scutum metallic subshining with greenish tinge. Acrostichals setulose in many irregular rows, intra-alars absent.

Legs. Femora yellow, sometimes greyish dusted; tibiae and tarsi of all legs yellow, apical 3–4 tarsomeres darkened dorsally.

Abdomen black, grey pollinose, metallic subshining with greenish tinge. Tergite 5 about 1.2 times as long as tergite 4 with very short and broad anteroventral process (Fig. 7). Male genitalia large, almost as long as combined length of tergites 4+5. Epandrium elongate in dorsal (posterior) view (Fig. 5); surstylus stout basally, broad, triangular, rounded and narrowed apically. Epandrium parallel-sided in lateral view (Fig. 6); surstylus with smooth margin. Aedeagus with rounded tip in lateral view (Fig. 3). Gonite stout at base in lateral view, bifurcate apically, of complex shape, giving different images if slightly rotated (Fig. 4). Sternal plate dorsally with apically expanded central process and moderately wide lateral processes (Fig. 1); sternal plate laterally with curved central process (Fig. 2).

NOTES. This species was first described in the genus *Coenia* [Macquart, 1844] and the type locality is unknown [Mathis, Zatwarnicki, 1995]. It was recorded from many countries under the names “*macellaria*”, “*attica*” and “*riparia*” until Wirth [1975] further investigated these reports and discovered that many represented misidentifications. Wirth [1975] described this species as “resembling *riparia* but the body much more heavily pollinose above, only slightly shining and with more of a greyish tinge on the sides”.

Owing to the triangular shaped surstyli and short and broad anteroventral process of tergite 5 the determination of *E. flavipes* proved to be less difficult than the determination of the other two species. Thus, we have confidence in the reports published by other specialists, as well as in the combined data used for the distribution of this species.

DISTRIBUTION. **Afrotropical:** Chad, Seychelles (Al-dabra), Sudan, United Arab Emirates. **Palaeartic:** Albania, Algeria, Azerbaijan (**first report**), Bulgaria, Canary Islands, Cyprus, Egypt, France, Greece, Iran, Iraq, Israel, Italy, Jordan, Libya, Malta, Morocco, Pakistan, Saudi Arabia, Spain,

Tajikistan (**first report**), Tunisia, Turkey, Turkmenistan, Uzbekistan, former Yugoslavia [Mathis, Zatwarnicki, 1995; Beschowski, Zatwarnicki, 2004; El-Moursy *et al.*, 2006; Stuke, 2011; Krivosheina, Ozerov, 2021]. **Oriental:** India (**first report**).

Ephydra murina Wirth, 1975

Figs 8–18.

Ephydra (Ephydra) murina Wirth, 1975: 35 [Iraq, Namaniya, HT ♂].

Ephydra murina (in part) [Beschowski, Zatwarnicki, 2004: 41 [review; Bulgaria, in part].

MATERIAL EXAMINED. *Type material.* 1 holotype ♂, 1 paratype ♂ (dissected), 1 paratype ♀, 18 paratypes ♀♀, **Iraq**, Namaniya, 5.I.1963, K.T. Khalaf (USNM, Type no. 70439); 12 paratype ♂♂, 8 paratype ♀♀, **Romania**, Szovata, Sciki coll.; 2 Paratype ♀♀, Ukraine, Odessa env., 8.V.1926, L. Zimin (USNM). *Additional material.* 3 ♂♂, **Russia**, Astrakhan' Oblast, salt lake Baskunchak (48.193°N, 46.813°E), 2–4.V.2010, K. Tomkovich (ZMUM); 3 ♂♂, **Tajikistan**, Tigrovaya Balka Nature Reserve, 15–17.V.1987, N.P. Krivosheina (ZMUM); 1 ♂, **Uzbekistan**, Termez, Amu-Darja river, S. Buhara, 22.05.1912, A.N. Kirichenko (ZISP).

DESCRIPTION. Moderately large species, body length 4 mm.

Head grey pollinose except metallic shining frontal vitta and upper face; fronto-orbital plate grey pollinose. Head index (eye to gena height ratio) 2.3:1. 3 long fronto-orbital setae, anterior interfrontal usually thin and short. Postocular setae weak and short. Palpus yellow grey dusted, in some specimens seem to be grey. Antenna blackish, grey-brown dusted; arista pectinate on basal half of dorsal surface. Gena and parafacial greyish dusted.

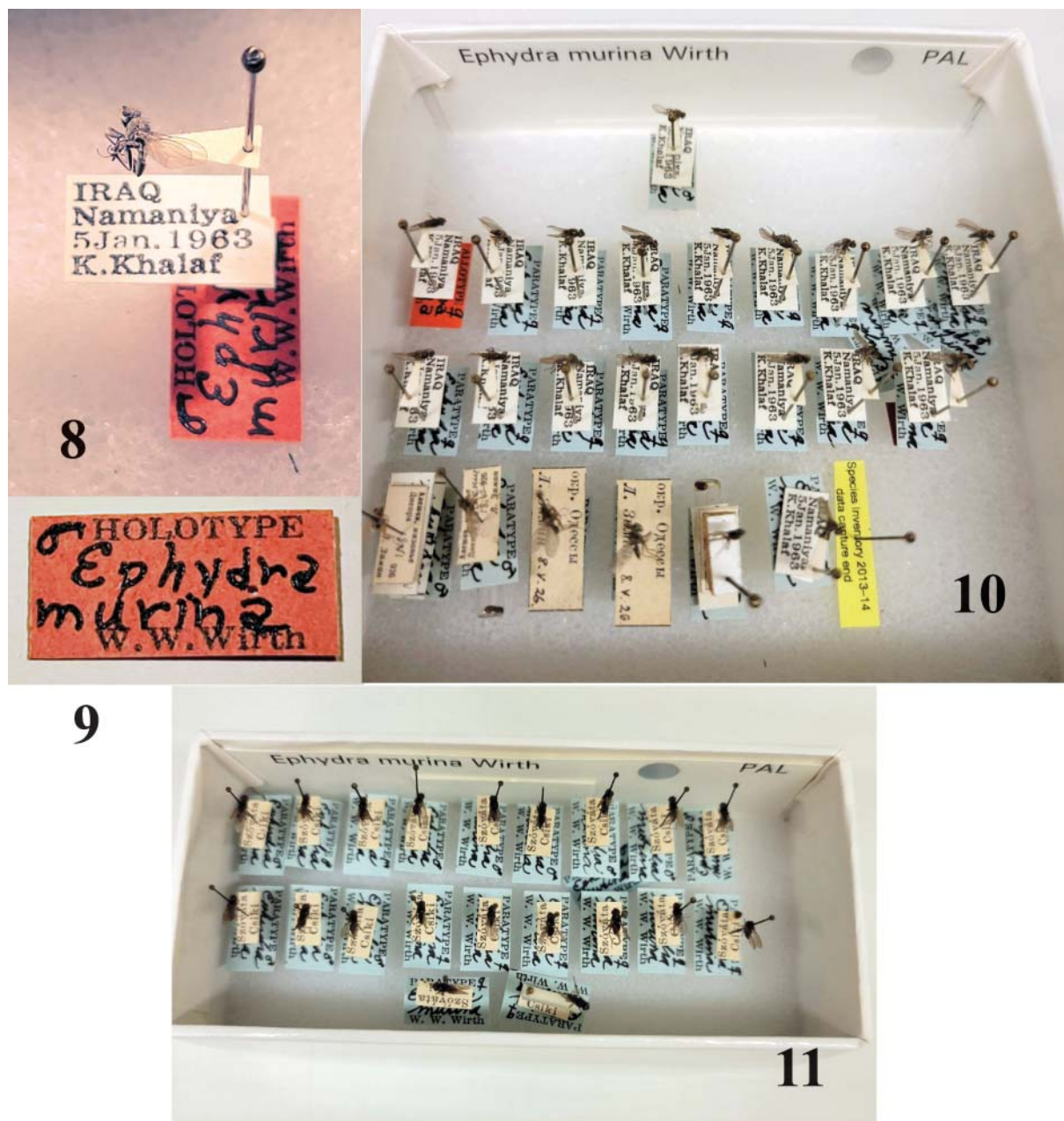
Thorax dark olive- grey pollinose. Scutum metallic subshining with green-brown tinge. Acrostichals setulose in many irregular rows, intra-alars absent.

Legs. Femora yellow, darkened dorsally; tibiae yellow, darkened dorsally, tarsi of all legs yellow, darkened dorsally.

Abdomen dark, grey pollinose, metallic subshining with greenish tinge. Tergite 5 about 1.7 times as long as tergite 4 with relatively long anteroventral process (Fig. 18). Male genitalia large, almost as long as combined length of tergites 4+5. Epandrium elongate in dorsal (posterior) view (Fig. 16); surstylus moderately wide, elongate, narrowing and rounded apically. Epandrium parallel-sided in lateral view (Fig. 17); surstylus with smooth margin. Aedeagus with rounded tip in lateral view (Fig. 14). Gonite stout at base in lateral view, bifurcate apically, of complex shape, giving different images if slightly rotated (Fig. 15). Sternal plate dorsally with not expanded central process and with significantly expanded lateral processes (Fig. 12). Sternal plate laterally with almost straight central process (Fig. 13).

NOTE. Wirth [1975] mentioned dark colored legs in the Holotype and specimens from Iraq and darkened legs in the paratypes from Romania. We consider this character to be one of the primary features for preliminary determination (legs yellow with dorsally darkened tarsi in *flavipes* and yellow with dorsally darkened apexes of tibia and tarsi in *pseudomurina*). For accurate determinations, however, examination of structures of the terminalia is recommended.

DISTRIBUTION. **Palaeartic:** Bulgaria, Iraq, Iran, Romania, Ukraine, Russia (South European Territory), Turkey [Wirth, 1975; Krivosheina, 2010], Tajikistan (**first report**), Uzbekistan (**first report**).



Figs 8–11. *Ephydra murina*: 8 — holotype male, lateral view; 9 — label of the holotype; 10, 11 — general view of boxes with the type specimens.
Рис. 8–11. *Ephydra murina*: 8 — голотип (самец), вид сбоку; 9 — этикетка голотипа; 10, 11 — общий вид коробок с экземплярами из типовой серии.

Ephydra pseudomurina Krivosheina, 1983

Figs 19–25.

Ephydra pseudomurina Krivosheina, 1983: 368 [Uzbekistan. Syrdarinskaja obl., Mekhnatavskij rajon, sovkhoz Jangier; HT ♂]. — Krivosheina, 2010: 666 [record, Russia]. — Krivosheina, Ozerov, 2021: 354–355 [Russian fauna].

Ephydra murina Wirth, 1975 — partly misidentified — Beschovski, 2009: 301-302 [fig. 119, record, Bulgaria].

Ephydra murina Wirth, 1975 — Stuke, 2011; BStuke, Bahrmann, 2013 [record, Germany].

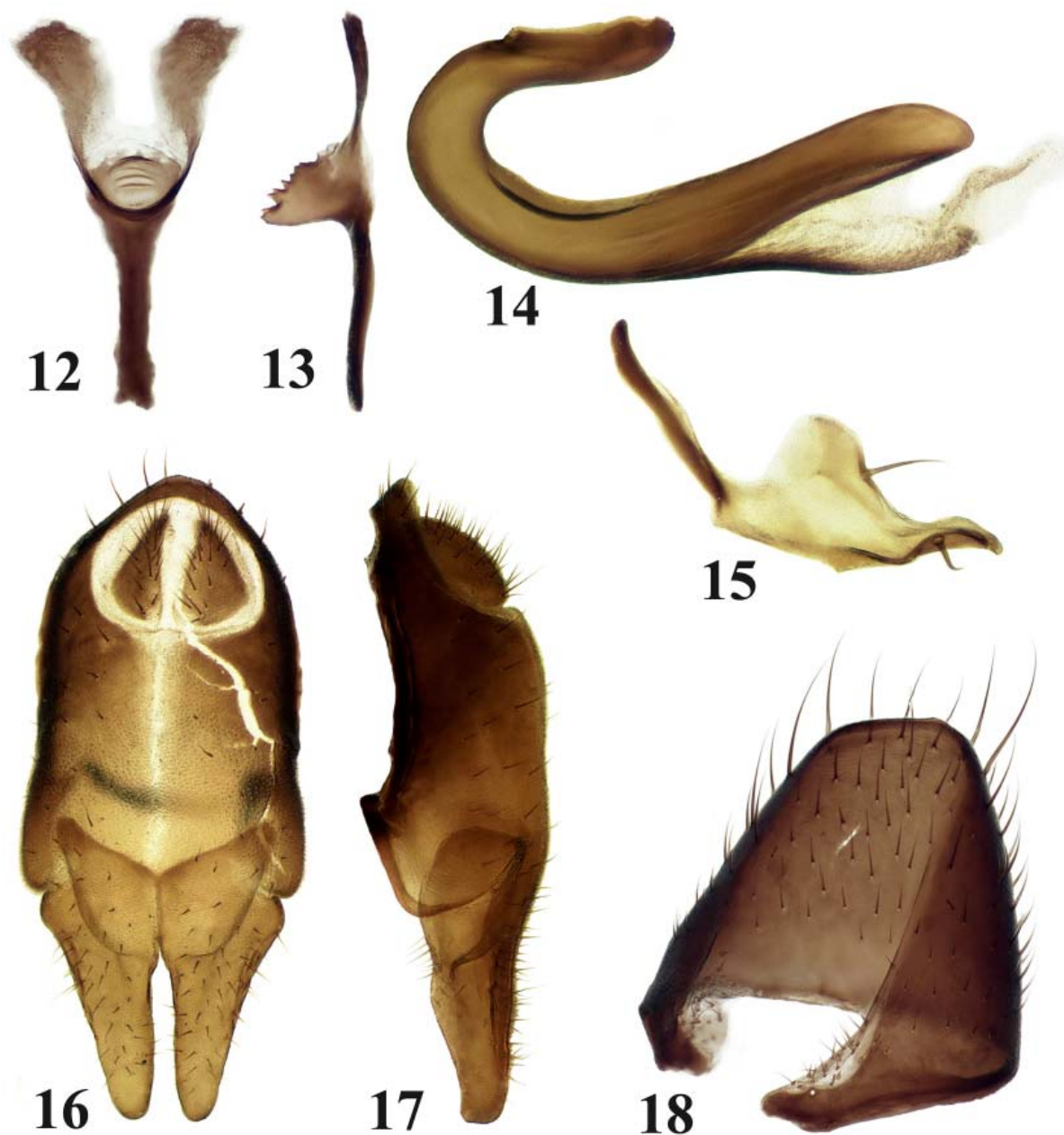
Ephydra hejingensis Hu, Yang, 2001: 533 [China. Xinjiang Uygur: Hejing; HT ♂] — *syn.n.*

Ephydra shalatinensis El-Moursy, Negm, El-Hawagry, Ebrahim, 2006: 80 [Egypt: South Eastern desert: Shalatin; HT ♂] — *syn.n.*

MATERIAL EXAMINED. Type material. 1 holotype ♂, 5 paratypes ♂♂, **Uzbekistan**: Syrdarinskaja oblast, Mekhnatavskij rajon, sovkhoz Jangier [ca 40.2769°N 68.8166°E], 24.V.1980 (M. Krivosheina) (ZMUM). **Additional material.** 1 ♂, **Azerbaijan**: Avrora [=Hirkan, 38.67°N 48.799°E], 19.V.1981, N. Krivosheina (ZMUM); 2 ♂♂, **Georgia**: Tiflis [=Tbilisi, 41.71°N 44.791°E], 1903, K. Satunin (ZISP); 2 ♂♂, **India**: Rajastan, Sambhar salt lake, 26.92°N 75.19°E, 24.II.2011 (N.Vikhrev) (ZMUM); 4 ♂♂, **Israel**: Eilat env., 29.57°N, 34.97°E, 24.X.2011 (N.Vikhrev) (ZMUM); (1 ♂, **Kazakhstan**: Golodnaya step', 7.VII.1959, P. Lehr (ZISP);

Russia: 9 ♂♂, Astrakhan' Oblast: salt lake Baskunchak (48.193°N 46.813°E), 17.06.2003, A. Ovchinnikov (ZISP); 3 ♂♂, same place, 2–4.V.2010, K. Tomkovich (ZMUM); 1 ♂, Kharabali (47.393°N, 47.248°E), salt lake, 4.VI.2009, P. Mel'nik ZMUM); 2 ♂♂, 5 ♀♀, Crimea: Kerch env. (45.2°N 36.1°E), 26.IV.2014, N. Vikhrev (ZMUM); 1 ♂, Dzhankoy (45.71°N 34.4°E), 19.V.1963, K. Gorodkov (ZISP); 1 ♂, Koktybel' (44.964°N 35.241°E), 1–8.IX.2007, K. Tomkovich (ZMUM); 1 ♂, Lake Koyanskoe (45.025°N 36.111°E), reared, 2008, A. Przhiboro (ZISP); 1 ♂, Krasnodar Krai: Ubinskaya

(44.74°N 38.54°E), 8.VI.1971, V. Kovalev (ZMUM); 1 ♂, Rostov Oblast: Gigant vill. (46.507°N 41.34°E), on the light, 17–22.VI.2009, A. Koval (ZMUM); 2 ♂♂, Aleshki (46.62°N 32.719°E), 18.VI.1926, L. Zimin (ZISP); **Tajikistan:** 3 ♂♂, Nature Reserve Tigrovaya balka, 15.IV.1986, 15–17.V.1987, N. Krivosheina (ZMUM); **Turkmenistan:** 2 ♂♂, Ashgabat (37.934°N 58.387°E), 15.XI.1983, N. Krivosheina (ZMUM); 2 ♂♂, Repetek (38.563°N 63.178°E), 27.XII.1965, K. Gorodkov (ZISP); 1 ♂, same place, 25.I.1966, V. Zaitzev (ZISP); 1 ♂, Lake Sarygamysh (ca. 42.052°N 57.697°E), 19–26.



Figs 12–18. *Ephydra murina*, male: 12 — sternal plate, dorsal view; 13 — sternal plate, lateral view; 14 — aedeagus, lateral view; 15 — gonite, lateral view; 16 — epandrium and surstyli, dorsal (posterior) view; 17 — same, lateral view; 18 — tergite 5, ventrolateral view.

Рис. 12–18. *Ephydra murina*, самец: 12 — стеральная пластинка, сверху; 13 — стеральная пластинка, сбоку; 14 — эдеагус, сбоку; 15 — гонит, сбоку; 16 — эпандрий и сурстили, сверху (сзади); 17 — то же, сбоку; 18 — тергит 5, вентролатерально.

IV.1984, M. Krivosheina (ZMUM); **Ukraine**: 7 ♂♂, Odessa, Kuyal'nitskiy liman (ca. 46.565°N 30.717°E), 16.IX.1938, B. Rohdendorf (ZMUM); 2 ♂♂, same place, 21.VI.1926, L. Zimin (ZISP); 2 ♂♂, Odessa env. (ca. 46.466°N 30.719°E), salt puddle near oil tank, 8.V.1926, L. Zimin (ZMUM); **Uzbekistan**: 17 ♂♂, 20 ♀♀, Mekhnatabadskiy Distr., Yangier (40.276°N 68.816°E), 12.V.–10.VI.1980, M. Krivosheina (ZMUM); 1 ♂, Khiva (41.394°N 60.381°E), 22.III.1927, L. Zimin; 1 ♂, Aral Sea, Syr-Dar'inskaya Distr., 30.V.1928, N. Olenev, V. Popov (ZISP).

DESCRIPTION. Body length 4 mm.

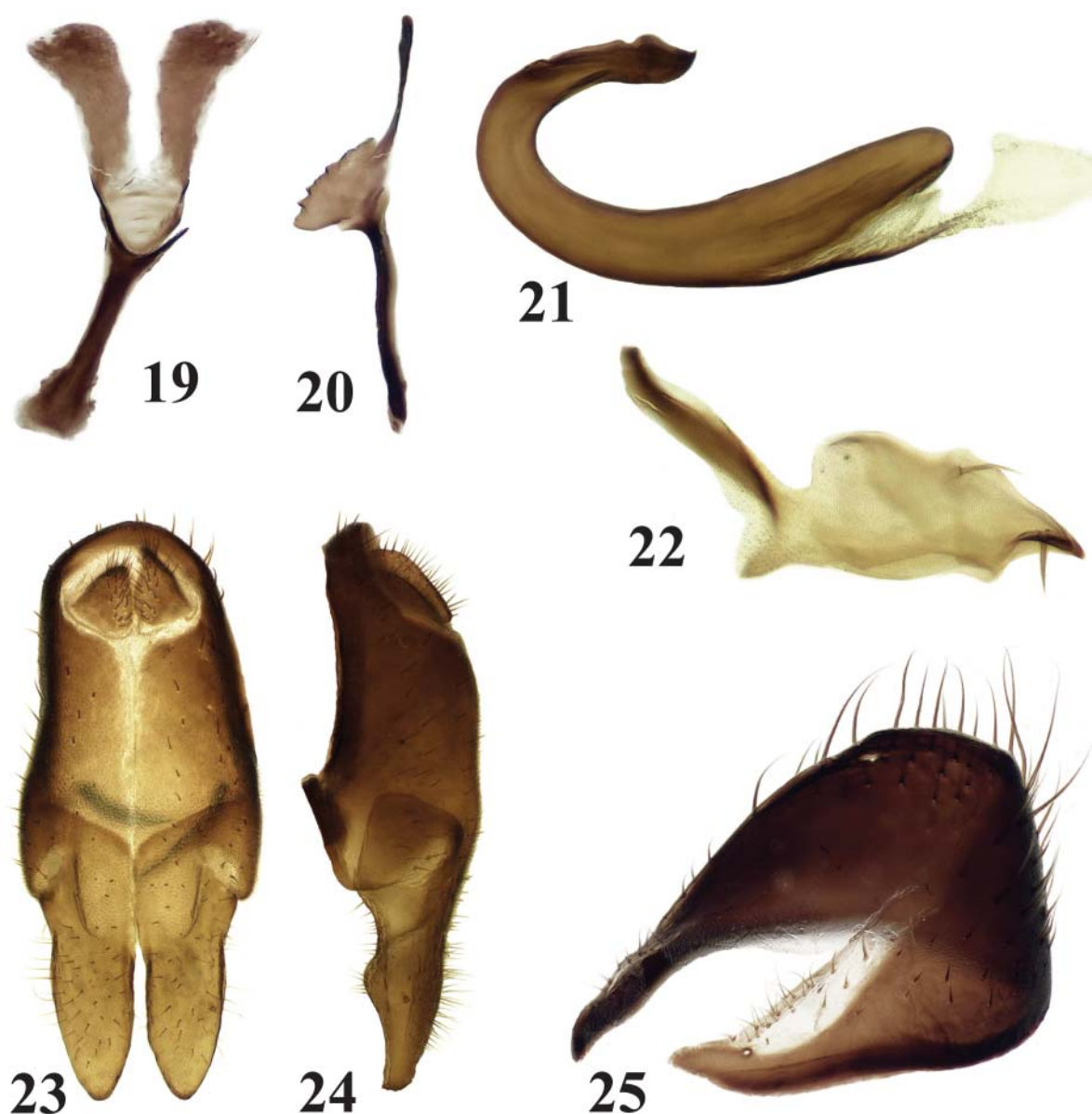
Head golden-grey pollinose except metallic shining frontal vitta and upper face, with bluish-greenish tinge; fronto-orbital plate golden pollinose. Head index (eye to gena height ratio)

2.3–2.5:1. 3–4 long fronto-orbital setae, anterior interfrontal setae well developed, usually thick, but thinner and 1/3 as long as ocellar. Postocular setae weak and short. Palpus yellow. Antenna blackish, greyish dusted; arista pectinate on basal half of dorsal surface. Gena and parafacial greyish dusted.

Thorax black, grey pollinose. Scutum metallic subshining with greenish tinge. Acrostichals setulose in many irregular rows, intra-alars absent.

Legs. Femora yellow, sometimes greyish dusted; tibiae yellow with the most apices dorsally darkened, tarsi of all legs yellow, darkened dorsally.

Abdomen black, grey pollinose, metallic subshining with greenish tinge. Tergite 5 about 1.7–2.0 times as long as tergite 4 with relatively long anteroventral process (Fig. 25). Male geni-



Figs 19–25. *Ephydra pseudomurina*, male: 19 — sternal plate, dorsal view; 20 — sternal plate, lateral view; 21 — aedeagus, lateral view; 22 — gonite, lateral view; 23 — epandrium and surstyli, dorsal (posterior) view; 24 — same, lateral; view; 25 — tergite 5, ventrolateral view.

Рис. 19–25. *Ephydra pseudomurina*, самец: 19 — стеральная пластинка, сверху; 20 — стеральная пластинка, сбоку; 21 — эдеагус, сбоку; 22 — гонит, сбоку; 23 — эпандрий и сурстили, сверху (сзади); 24 — то же, сбоку; 25 — тергит 5, вентролатерально.

talia large, as long as combined length of tergites 4+5. Epandrium elongate in dorsal (posterior) view (Fig. 23); surstylus broad, rounded apically. Epandrium parallel-sided in lateral view (Fig. 24); surstylus with oval median protuberance in lateral view. Aedeagus with rounded tip in lateral view (Fig. 21). Gonite stout at base in lateral view, bifurcate apically, of complex shape, giving different images if slightly rotated (Fig. 22). Sternal plate dorsally with apically expanded central process and with significantly expanded lateral processes (Fig. 23). Sternal plate laterally with almost straight central process (Fig. 24).

NOTES. Wirth [1975] placed three species [*E. stuckenbergi* Wirth, 1975, *E. flavipes* (as *helwanensis* Steyskal, 1968) and *E. murina*] in a separate group in his key, based on the yellow color of the legs, and the shape of the surstyli, which were usually tapered apically and more or less triangular. *Ephydra stuckenbergi* is distinguished from the other two species in part due to its distribution in the Afrotropical Region, and the following morphological characters: short surstyli, pointed apex of aedeagus, and weakly developed central and lateral processes of sternal plate. The other two species plus *E. pseudomurina* are very similar morphologically and are thus very difficult to identify. All of them are grey pollinose, with yellow legs and sometimes occur in the same biotops. One of the most visible characters, a developed interfrontal seta, is characteristic of *E. pseudomurina* and a narrow gena is characteristic of *E. flavipes*. Femora and tibia can be darkened in *E. murina* from mountainous territories, however some specimens have yellow legs.

We suggest *E. shalatinensis* as a synonym of *E. pseudomurina* based on comparing our material with figures 23–31 by El-Moussy *et al.* [2006]: surstylus in lateral view is not a straight dorsal line, gonites of the same shape as in *E. pseudomurina*, and lateral view of aedeagus. The long facial seta, which is present on the face of *E. shalatinensis* on Fig. 24 is also present in some specimens of *E. pseudomurina* from Israel.

We suggest *E. hejingsensis* as a synonym of *E. pseudomurina* based on comparing our material with figures 9–11 by Hu & Yang [2001]. The shape of surstylus dorsally, the shape of sternal plate are the same; ventrolateral process of male tergite 5 long.

We also made corrections to the distribution of *E. pseudomurina* (not *E. murina*) in Germany as a result of comparing German specimens with our figures that Jens-Hermann Stuke kindly made for us (J.-H. Stuke, personal communication).

DISTRIBUTION. Palaearctic: Azerbaijan, Bulgaria, Israel (**first report**), China, Egypt, Germany, Georgia, Kazakhstan, Russia (European part, Ural), Tajikistan, Turkmenistan, Ukraine, Uzbekistan [Krivosheina, 1983, 1986, 2010; Mathis & Zatwarnicki, 1995; Krivosheina, Ozerov, 2021; Shayhutdinova, Krivosheina, 2020]. **Oriental:** India (**first report**).

KEY TO PALAEARCTIC SPECIES OF THE *EPHYDRA FLAVIPES* SPECIES GROUP

1. Gena low, head index (eye to gena height ratio) 3:1. Legs always yellow, only apical tarsomeres darkened dorsally. Palpus yellow. Male tergite 5 with very short and stout anteroventral process (Fig. 7). Surstyli posteriorly triangular, broad basally and evenly narrowing apically (Fig. 5). Sternal plate dorsally with apically expanded central process and moderately wide lateral processes (Fig. 1), central process apically curved in lateral view (Fig. 2).....
.....*E. flavipes* Macquart
- Gena high, head index (eye to gena height ratio) 2.3–2.5:1
2. Legs usually with darkened femora and tibia besides darkened apical tarsomeres. Palpus sometimes appearing grey due to thick grey pollen. Male tergite 5 with long and nar-

row anteroventral process (Fig. 18). Surstyli posteriorly moderately wide, elongate, narrowing and rounded apically (Fig. 16). Surstyli in lateral view without oval median protuberance (Fig. 17). Sternal plate dorsally with apically not expanded central process and with significantly expanded lateral processes (Fig. 12), central process apically not curved in lateral view (Fig. 13)

-*E. murina* Wirth
- Legs yellow with apices of tibia and tarsi mostly darkened dorsally. Male tergite 5 with long and narrow anteroventral process (Fig. 25). Surstyli posteriorly broad from base to apex, rounded and a little narrowed apically (Fig. 23). Surstyli in lateral view with oval median protuberance (Fig. 24). Sternal plate dorsally with expanded central process and with significantly expanded lateral processes (Fig. 19), central process apically not curved in lateral view (Fig. 20)

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Literature

- Beschovski V.L. 2009. [Shore flies (Insecta: Diptera: Ephydriidae, Tethininae, Canacidae)] // Fauna of Bulgaria. Vol.28. Sofia: Academic Press :Prof. Marin Drinov.: 440 p. [In Bulgarian]
- Beschovski V.L., Zatwarnicki T. 2004. Faunistic review of the subfamily Ephydriinae in Bulgaria (Insecta: Diptera, Ephydriidae) with some data from other Palaearctic countries // Acta Zoologica Bulgarica. Vol.56. No.1. P.31–55.
- Curtis J. 1832. British entomology; being illustrations and descriptions of the genera of insects found in Great Britain and Ireland: containing coloured figures from nature of the most rare and beautiful species, and in many instances of the plants upon which they are found. Vol.9. 50 plates. London: E. Ellis and Company, Simpkin and Marshall, J.B. Bailliere.
- Dawah H.A., Abdullah M.A. 2006. The Ephydriidae (Diptera: Brachydeutera: Muscomorpha) of south-western Saudi Arabia // Fauna of Arabia. Vol.21. P.383–394.
- El-Moursy A.A., Negm F.H., El-Hawagry M.S., Ayman M.E. 2006. Review of the subfamily Ephydriinae (Ephydriidae, Diptera) from Egypt, with a description of a new species // Bulletin of the Entomological Society of Egypt. Vol.83. P.71–97.
- Hu X., Jang D. 2001. New species and new records of the genus *Ephydra* Fallén (Diptera, Ephydriidae) from China // Studia dipterologica. Bd.8. H.2. S.529–537.
- Krivosheina M.G. 1983. [A new species of the fly genus *Ephydra* Fall. (Diptera, Ephydriidae) from Uzbekistan] // Entomologicheskoe obozrenie. Vol.62. No.2. P.367–370 [in Russian].
- Krivosheina M.G. 1986. [To the biology of the shore-flies (Diptera, Ephydriidae) of anthropogenic landscapes of the desert zone] // Nauchnye doklady vyssheï shkoly. Biologicheskije nauki. No.5. P.40–43 [in Russian].
- Krivosheina M.G. 2010. Shore-flies (Diptera, Ephydriidae) of Lake Baskunchak // Euroasian Entomological Journal. Vol.9. No.4. P.666–667.
- Krivosheina M.G., Ozerov A.L. 2021. A review of the shore-fly genus *Ephydra* Fallén, 1810 (Diptera: Ephydriidae) of Russia // Russian Entomological Journal. Vol.30. No.3. P.345–360. doi: 10.15298/ruentj.30.3.15
- Loew H. 1856. Neue Beiträge zur Kenntniss der Dipteren. Vierter Beitrag // Programm der Königlichen Realschule zu Meseritz 1. S.1–57.

- Loew H. 1860. Neue Beiträge zur Kenntniss der Dipteren. Siebenter Beitrag. Die Europaeischen Ephydrinidae und die bisher in Schlesien beobachteten Arten derselben // Programm der Königlichen Realschule zu Meseritz. 46 S.
- Macquart M.J. 1844. Diptères exotiques nouveaux ou peu connus // Mémoires de la Société royale des Sciences, de l'Agriculture et des Arts de Lille. (1840). P.162–460. 36 plates.
- Mathis W.N. 1978. New synonymy in Ephyridae (Diptera) // Entomological News. Vol.89. No.2–3. P.105–106.
- Mathis W.N., Marioni L. 2016. Revision of Ephydrini Zetterstedt (Diptera: Ephyridae) from the Americas south of the United States // Zootaxa. Vol.4116. No.1. P.1–110. doi: 10.11646/zootaxa.4116.1.1
- Mathis W.N., Zetwornicki T. 1995. World Catalog of Shore Flies (Diptera: Ephyridae) // Memoires of Entomology, International. Vol.4. P.1–423.
- Mathis W.N., Zetwornicki T. 2003. Shore flies of the Republic of Seychelles (Diptera: Ephyridae) // Annales Zoologici. Vol.53. No.4. P.585–650.
- Mathis W.N., Zetwornicki T., Stuke J.-H., Deeming J.C. 2017. Order Diptera, family Ephyridae. A conspectus on shore-flies from the United Arab Emirates // Arthropod fauna of the UAE. Vol.6. P.636–761.
- Shayhtudinova A.A., Krivosheina M.G. 2020. Invertebrates of hypergaline reservoirs of the Orenburg Region (Russia) // Russian Entomological Journal. Vol.20. No.3. P.337–342.
- Steyskal G.C. 1968. Notes and descriptions of Egyptian Acalyptrate Diptera (Ephyridae, Milichiidae, Otitidae) // Bulletin. Société Entomologique d'Egypte. Vol.50. P.109–125.
- Stuke J.-H. 2011. Eine kritische Liste der aus Deutschland nachgewiesenen Ephyridae mit der Beschreibung einer neuen Art (Diptera) // Entomologische Zeitschrift. Bd.121. S.115–126.
- Stuke J.-H. 2012. Funde von Ephyridae (Diptera) aus Jordanien, mit der Beschreibung von fünf neuen Arten // Studia Dipterologica. Bd.18(2011). H.1/2. S.197–224.
- Stuke J.-H. 2013. Funde Neue Funde von Ephyriden (Diptera) aus Griechenland, mit der Beschreibung einer neuen Art // Studia dipterologica. Bd.20. H.2. S.189–213.
- Stuke J.-H., Bährman R. 2013. Die Uferfliegen Sachsen-Anhalts (Diptera: Ephyridae) // Entomologische Zeitschrift. Stuttgart. Bd.123. H.3. S.115–127.
- Wirth W.W. 1975. A revision of the brine flies of the genus *Ephydra* of the Old World (Diptera: Ephyridae) // Entomologica Scandinavica. Vol.6. No.1. P.11–44.