RESEARCH

The Nemestrinidae in Egypt and Saudi Arabia (Brachycera: Diptera)

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Abstract

Background: The Nemestrinidae are a widespread group of moderate to large-sized rather stout flies. All known larvae of these flies are internal parasitoids of nymphs and adults of grasshoppers and larvae of scarabaeid beetles and have the potential to be used as biocontrol agents.

Results: All known Egyptian and Saudi Arabian nemestrinid taxa are systematically catalogued in the present study. A total number of 13 species classified in only 2 genera, Nemestrinus (subfamily Nemestrininae) and Trichopsidea (subfamily Falleniinae), were investigated. Twelve of these species are represented in Egypt, out of which 5 species are represented in Saudi Arabia as well. Two of the treated species, Nemestrinus ater (Olivier) and N. rufipes (Olivier), are newly recorded herein from Saudi Arabia. Only one species, Trichopsis costata (Loew), was recorded exclusively from Saudi Arabia. An updated classification, taxonomic data, world and local distributions with collection dates and coloured photographs of some species were provided. Hope that the results of this study will provide the basis for systematic studies and fauna analyses of future works on Nemestrinidae. It seems likely that further species will be discovered with more research involving a variety of collecting methods.

Conclusion: Thirteen nemestrinid species belonging to 2 genera and 2 subfamilies were represented in both Egypt and Saudi Arabia. Two of these species are newly recorded herein from Saudi Arabia.

Keywords: Nemestrinidae, Tangle-veined flies, Catalogue, Distribution, Collection dates, New records

Background

The Nemestrinidae (tangle-veined flies) are a widespread family of moderate to large-sized rather stout and compact flies. This family is represented by about 300 species and 26 genera worldwide (Pape et al. 2011), including more than 80 species from the Palearctic Region (Richter 1988) and more than 50 species from the Afrotropical Region (Barraclough 2017).

Nemestrinid adults are mostly fast fliers, often found hovering around flowers where they feed on nectar, making characteristic humming sound. They are important pollinators of numerous flowering plants (Barraclough 2017). These adults can be easily distinguished by their wings which are typically longer than body, with veins appearing tangled, with a composite diagonal vein commencing from vein R1 and traversing diagonally to outer wing margin, and with characteristic apical veins running parallel to the hind margin of the wing and terminating anterior to its apex (Marshall et al. 2017). All known larvae of these flies are internal parasitoids of nymphs and adults of grasshoppers and larvae of scarabaeid beetles (Richter 1997). This makes the nemestrinid flies have the potentiality to be used as biological control agents of locusts and grasshoppers (Barraclough 2017).

The family Nemestrinidae is divided into 5 subfamilies (Papavero and Bernardi 2009). Only 2 of these subfamilies, Falleniinae and Nemestrininae, are represented in Egypt and Saudi Arabia by 13 species in 2 genera, Nemestrinus and Trichopsidea as treated in the present study.
(Table 1). No previous studies on Nemestrinidae were carried out in Saudi Arabia; however, Steyskal and El-Bialy (1967) published a list of Egyptian Diptera including Nemestrinidae, and El-Hashash et al. (2021) studied one genus, *Nemestrinus*, taxonomically in Egypt. Moreover, some species were described from Egypt in some other miscellaneous studies as Olivier (1810), Wiedemann (1828), Macquart (1840) and Efflatoun (1925).

Egypt and Saudi Arabia are two neighbouring Arabian countries situated at the junction of the Afrotropical and Palaearctic biogeographic regions. The faunas in both countries are mainly Palaearctic, except for the south-eastern corner of Egypt (Gebel Elba) (El-Hawagry et al. 2018) and the south-western district of Saudi Arabia, south to the Tropic of Cancer (El-Hawagry et al. 2017), which are mainly Afrotropical.

The present study is one in a series of studies on different families of Diptera aiming to catalogue the entire order in both Egypt and Saudi Arabia.

**Methods**

Previous studies concerning the Nemestrinid flies in Egypt and Saudi Arabia, in addition to material deposited in Egyptian and Saudi Arabian museum or collected by the authors, were the main sources for the present study. Different collecting methods were used, included sweeping nets, Malaise traps, pitfall traps and light traps; however, majority of specimens were collected by the sweeping nets and only two specimens of *Trichopsidea costata* were collected by pitfall trap and light trap, as one specimen by each.

The classification of Papavero and Bernardi (2009) is considered in the present study, in which the extant genera of Nemestrinidae are classified in 5 subfamilies: Atriadopinae, Cyclopsideinae, Falleniinae, Hirmoneurinae and Nemestrininae. The classification of species within genera follows Richter (1988).

Taxonomic information as type species, type localities and synonymies was mainly obtained from Richter (1988). However, world and local distributions, and collection dates of species were obtained from different relevant literature, in addition to local museums and/or collected specimens. These sources are listed in square brackets at the end of each section.

In the sections of localities and dates of collection, the 8 known Egyptian ecological zones (Coastal Strip (CS), Eastern Desert (ED), Fayoum, Gebel Elba (GE), Lower Nile Valley & Delta (LNVD), Sinai, Upper Nile Valley (UNV) and Western Desert (WD)) were adopted in the present study. However, there are no evident ecological zones in Saudi Arabia, so the administrative divisions (also known as regions or provinces) were used instead, namely, Al-Baha, Al-Jawf, Al-Madinah, Al-Qaseem, Asir, Eastern Province, Hail, Jazan, Makkah, Najran, Northern Frontier, Riyadh and Tabuk.

Localities within each Egyptian ecological zone or Saudi Arabian administrative region are alphabetically arranged and written after a colon following each zone or region and then followed, between parentheses, by the collection dates. Coordinates of nemestrinid localities in Egypt and Saudi Arabia are listed (Table 2).

**Results**

**Subfamily NEMESTRININAE**

**Genus NEMESTRINUS Latreille, 1802**

*N. abdominalis* Olivier (1810)  
*N. aegyptiacus* (Wiedemann, 1828)  
*N. ater* (Olivier, 1810)  
*N. caucasicus* (Fischer, 1806)  
*N. exalbidus* Lichtwardt (1907)  
*N. fasciatus* (Olivier, 1810)  
*N. fascifrons* (Bigot, 1888)  
*N. pallipes* (Olivier, 1810)  
*N. persicus* Lichtwardt, 1909  
*N. reticulatus* Latreille, 1802  
*N. ruficornis* (Macquart, 1840)  
*N. rufipes* (Olivier, 1810)  

**Subfamily FALLENIINAE**

**Genus TRICHOPSIDEA Westwood, 1839**

*T. costata* (Loew, 1858)  

* = recorded
| Country          | Locality       | Governorate | Ecological zone or Region | Latitude (N) | Longitude (E) |
|------------------|----------------|-------------|---------------------------|--------------|--------------|
| Egypt            | Abu-Kir        | Alexandria  | CS                        | 31.22429     | 29.94664     |
|                  | Abu-Rawash     | Giza        | LNVD                      | 30.0438      | 31.0929      |
|                  | Abu-Sueir      | Ismailia    | ED                        | 30.5766      | 32.1076      |
|                  | Alexandria     | Alexandria  | CS                        | 31.2129      | 29.9726      |
|                  | Assiout        | Assiut      | UNV                       | 27.15516     | 31.12661     |
|                  | Bacos          | Alexandria  | CS                        | 31.23869     | 29.96692     |
|                  | Beni Sweif      | Beni Swef   | LNVD                      | 29.07788     | 31.10713     |
|                  | Burg            | Alexandria  | CS                        | 30.9081      | 31.4564      |
|                  | Cairo           | Cairo       | LNVD                      | 30.08610     | 31.28560     |
|                  | Cairo-Suez Road | Suez        | ED                        | 30.0849      | 32.0542      |
|                  | Cleopatra       | Alexandria  | CS                        | 31.22022     | 29.93487     |
|                  | Dekheila        | Alexandria  | CS                        | 31.12098     | 29.81563     |
|                  | Ein Moussa      | South Sinai | Sinai                     | 29.8667      | 32.6500      |
|                  | El-Gebel El-Asfar | Qalyoubia  | LNVD                      | 30.201416    | 31.356162    |
|                  | El-Mallah       | Al-Sharkia  | ED                        | 30.8167      | 32.1000      |
|                  | El-Quseir       | Red Sea     | ED                        | 26.1050      | 34.2782      |
|                  | Ezbet El-Halo   | Dakahlia    | LNVD                      | 30.895835    | 31.5839      |
|                  | Ezbet El-Nakhil | Qalyoubia   | LNVD                      | 31.1111      | 32.1625      |
|                  | Fayoum          | Fayoum      | Fayoum                    | 29.32061     | 30.8180      |
|                  | Gebel El-Halal  | Assiut      | UNV                       | 26.8919      | 31.3040      |
|                  | Geneifa         | Suez        | ED                        | 30.1516      | 32.4290      |
|                  | Giza            | Giza        | LNVD                      | 30.01350     | 31.21127     |
|                  | Girga           | Sohag       | UNV                       | 26.34013     | 31.88724     |
|                  | Helwan          | Cairo       | LNVD                      | 29.8500      | 31.3333      |
|                  | Ismailia        | Ismailia    | ED                        | 30.59428     | 32.26262     |
|                  | Kaf Hakeim      | Giza        | LNVD                      | 30.0808      | 31.1164      |
|                  | Kerdassa        | Giza        | LNVD                      | 30.0297      | 31.1061      |
|                  | Maadi           | Cairo       | LNVD                      | 29.95772     | 31.25054     |
|                  | Mansouriah      | Giza        | LNVD                      | 30.1236      | 31.0725      |
|                  | Marg            | Qalyoubia   | LNVD                      | 31.0667      | 30.2167      |
|                  | Mariout         | Alexandria  | CS                        | 31.0172      | 29.7600      |
|                  | Max             | Alexandria  | CS                        | 31.1636      | 29.8625      |
|                  | Mersa Matrouh   | Matrouh     | CS                        | 29.5696      | 26.4194      |
|                  | Mitla           | North Sinai | Sinai                     | 30.0114      | 32.8917      |
|                  | Mout            | Al-Wadi Al-Gadid | WD                | 25.49509    | 28.97690     |
|                  | Pyramids        | Giza        | LNVD                      | 29.9816      | 31.1337      |
|                  | Serapium        | Ismailia    | ED                        | 30.48635     | 32.23090     |
|                  | Shalatein       | Red Sea     | GE                        | 23.12094     | 35.58262     |
|                  | Shubra          | Qalyoubia   | LNVD                      | 30.1012      | 31.2483      |
|                  | Siala           | Fayoum      | Fayoum                    | 29.35498     | 30.96830     |
|                  | Suez            | Suez        | ED                        | 29.95278     | 32.56582     |
|                  | Turah           | Cairo       | LNVD                      | 29.94670     | 31.27280     |
|                  | W. Dar El-Maskhara | Cairo   | ED                        | 29.78331     | 31.41671     |
|                  | W. Digla        | Cairo       | ED                        | 29.95781     | 31.33481     |
|                  | W. El-Natroun   | Al-Beheira  | WD                        | 30.38141     | 30.34411     |
**Table 2 (continued)**

| Country         | Local  | Governorate | Ecological zone or Region | Latitude (N) | Longitude (E) |
|-----------------|--------|-------------|---------------------------|--------------|--------------|
| W. Garawi       | Cairo  | ED          |                           | 29.78332     | 31.31671     |
| W. Gharaqid     | Cairo  | ED          |                           | 28.95502     | 31.4822      |
| W. Hoff         | Cairo  | ED          |                           | 29.8821      | 31.31101     |
| W. Morrah       | Cairo  | ED          |                           | 22.35001     | 33.75002     |
| W. Rishrash     | Giza   | ED          |                           | 29.46422     | 31.3672      |
| W. Um Elek      | Cairo  | ED          |                           | 29.8833      | 31.5167      |
| W. Zohplega     | Cairo  | ED          |                           | 26.1333      | 33.7500      |
| Saudi Arabia    |        |             |                           |              |              |
| Dhe Ayn         | Al-Mekhwa | Al-Baha   |                           | 19.929904     | 41.442162    |
| Jabal Shada     | Al-Mekhwa | Al-Baha   |                           | 19.8388      | 41.3101      |
| Jeddah          | Jeddah | Makkah      |                           | 21.59220     | 39.26310     |
| Uruq Bani Ma’arid | Wadi Al Dawasir | Riyadh   |                           | 19.2901      | 45.1721      |
| Raydah          | Abha   | Asir        |                           | 18.20525     | 42.41011     |
| Tabouk University | Tabouk | Tabouk      |                           | 28.309838    | 36.472881    |
| W. Gharagid     | Cairo  | ED          |                           | 29.8821      | 31.31101     |
| W. Hoff         | Cairo  | ED          |                           | 22.35001     | 33.75002     |
| W. Morrah       | Cairo  | ED          |                           | 29.46422     | 31.3672      |
| W. Rishrash     | Giza   | ED          |                           | 26.1333      | 33.7500      |
| W. Um Elek      | Cairo  | ED          |                           | 29.8833      | 31.5167      |
| W. Zohplega     | Cairo  | ED          |                           | 26.1333      | 33.7500      |
| W. Garawi       | Cairo  | ED          |                           | 29.78332     | 31.31671     |
| W. Gharaqid     | Cairo  | ED          |                           | 28.95502     | 31.4822      |
| W. Hoff         | Cairo  | ED          |                           | 29.8821      | 31.31101     |
| W. Morrah       | Cairo  | ED          |                           | 22.35001     | 33.75002     |
| W. Rishrash     | Giza   | ED          |                           | 29.46422     | 31.3672      |
| W. Um Elek      | Cairo  | ED          |                           | 26.1333      | 33.7500      |

**Nemestrinus abdominalis Olivier (1810)**

*Nemestrina abdominalis* Olivier, 1810: 94. Type locality: Egypt.

*Nemestrina osiris* Wiedemann, 1828: 561. Type locality: Egypt.

Distribution: AF: Ethiopia, Sudan. PA: Algeria, Egypt, Israel, Tunisia. [Sources: Lichtwardt (1909), Paramonov (1945), Richter (1988)].

Local distribution and dates of collection: Unknown. [Sources: original descriptions (Olivier (1810) and Wiedemann (1828) and Sack (1933)].

**Nemestrinus aegyptiacus (Wiedemann, 1828) (Fig. 1)**

*Nemestrina aegyptiacus* Wiedemann, 1828: 249. Type locality: Egypt.

*Nemestrina tripolitana* Lichtwardt, 1907: 443. Type locality: Libya (Tripoli).

*Nemestrina jullieni* Efflatoun, 1925: 357. Type locality: Egypt (Wadi Hoff, east of Helouan; Wadi Um-Elek, branch of Wadi Hoff; Wadi Abu-Handal).

Distribution: PA: Algeria, Egypt, Italy (Sicily), Libya, Morocco, Saudi Arabia, Spain, Tunisia. [Sources: Lichtwardt (1909), Paramonov (1945), Richter (1988)].

Local distribution and dates of collection: EGYPT: CS: El-Burg, Cleopatra (February to July); ED: Abu-Sueir, El-Quseir, Ismailia, Serapium, Wadi Abu-Handal, Wadi Dar El-Maskhara, Wadi Digla, Wadi Garawi, Wadi Hoff, Wadi Morrah, Wadi Rishrash, Wadi Silly, Wadi Um-Assad, Wadi Um-Elek, Wadi Zohplega (February to October); Fayoum: locality and date unknown; LNVD: Abu-Rawash, Burgash, Cairo, Ezbat El-Nakhil, Helwan, Kafr Hakim, Kerdassa, Mansouriah (April to October); Sinai: Ein Moussa, Mitla (March to July); UNV: Assiout, Gerga (March and April); WD: Wadi El-Natroun (March). [Sources: Lichtwardt (1909), Efflatoun (1925), El-Hashash et al. (2021), museum material in EFC, ESEC and PPDD and collected material]. SAUDI ARABIA: Makkah Al-Mukarramah: Jeddah (date unknown); Riyadh: Uruq Bani Ma’arid (March). [Sources: Lichtwardt (1909) and collected material].

Material examined: EGYPT: 1 male, Wadi Um Mitla, 16.3.1999, sweeping net, El-Hawagry leg.; MSHC. 1 male, Helwan, 20.3.1934, Farag leg.; 1 male, Helwan, 23.4.1935, Farag leg.; 1 male, Kerdassa, 2.4.1924, R.M. leg.; 1 female, Wadi Garawi, 31.3.1930, Farag leg.; 1 female, Wadi Garawi, 25.3.1932, Farag leg.; 1 male, Wadi Hoff, 28.2.1927, Farag leg.; 1 female, Wadi Rishrash, 29.3.1935. H.C.E & M.T. leg.; 1 female, Wadi
Silly, Helwan, 19.3.1926, Farag leg.; 1 female, Wadi Um Elek, 21.3.1924, Efflatoun leg.; EFC. 1 female, Wadi Garawi, 25.III.1932, Farag leg.; EFC. SAUDI ARABIA: 1 female, Wadi Um Elek, 21.3.1924, Efflatoun leg.; EFC. SAUDI ARABIA: 1 female, Wadi Garawi, 25.III.1932, Farag leg.; EFC.

Nemestrina ater (Olivier, 1810) (Fig. 2)
Nemestrina ater Olivier, 1810: 94. Type locality: Egypt.
Nemestrina nigra Wiedemann, 1828: 560. Type locality: Egypt.

Distribution: PA: Algeria, Egypt, Israel, Saudi Arabia, Spain, Tunisia. [Sources: Lichtwardt (1909), Paramonov (1945), Richter (1988) and present study]

Local distribution and dates of collection: EGYPT: CS: Abu-Kir, Alexandria, Bacos, El-Burg, Dekeila, Mariout, Mersa Matrouh (February to October); ED: Cairo, Suez Road, Geneifa, Serapium, Suez, Wadi Garawi, Wadi Hoff, Wadi Silly (March to May); LNVD: Abu-Rawash, El-Geblel El-Asfar, Ezbet El-Nakhla, Kafar Hakim, Kerdassa, Mansouriah, Pyramids (January to October); Sinai: Wadi Abu-Gaifa (April); WD: Wadi El-Natroun (April). [Sources: Lichtwardt (1909), El-Hashash et al. (2021) and museum material in EFC, ESEC and PPDD]. SAUDI ARABIA: Tabouk: Tabouk (August). [Source: collected material]

Note: This species was recorded herein for the first time from Saudi Arabia.

Material examined: EGYPT: 1 female, Abu-Rawash, 24.2.1926, R.M. leg.; 1 female, Wadi Garawi, 22.3.1930, Farag leg.; 1 female, Wadi Garawi, 31.3.1930, Farag leg.; 1 male, Kafar Hakim, Kerdassa, Mansouriah, Pyramids (January to October); Sinai: Wadi Abu-Gaifa (April); WD: Wadi El-Natroun (April). [Sources: Lichtwardt (1909), El-Hashash et al. (2021) and museum material in EFC, ESEC and PPDD]. SAUDI ARABIA: Tabouk University, 28.8.2012, sweeping net, Al-Sherif leg.; MSHC.

Nemestrina caucasicus (Fischer, 1806)
Rhynchocephalus caucasicus Fischer, 1806: 220. Type locality: Caucasia.

Rhyynchocephalus adamsii Fischer, 1812: 188. Unjustified new name for R. caucasicus Fischer.
Nemestrina albofasciata Wiedemann, 1828: 251. Type locality: Unknown.
Nemestrina anthophorina Potschinsky, 1881: 136. Type locality: Turkey.

Distribution: PA: Armenia, Azerbaijan, Bulgaria, Egypt, Kazakhstan, Iran, Moldova, Romania, Russia, Tunisia, Turkey, Ukraine. [Sources: Lichtwardt (1909), Sack (1933), Steyskal and El-Bialy (1967), Richter (1988)]

Local distribution and dates of collection: EGYPT: Unknown. [Sources: Steyskal and El-Bialy (1967)]

Nemestrinus exalbidus Lichtwardt (1907)
Nemestrina exalbida Lichtwardt, 1907: 441. Type locality: Israel or Palestine (Jerusalem).

Distribution: AF: Egypt [as “GE”]. PA: Egypt, Iran, Israel? Saudi Arabia [as “Arabien”]. [Sources: Lichtwardt (1909), Sack (1933), Paramonov (1945), Richter (1988)]

Local distribution and dates of collection: EGYPT: ED: Ogret El-Sheikh, Wadi Dar El-Maskhara, Wadi Hoff, Wadi Rishrash, Wadi Zohleiga (March and April); GE: Shalateen (March); LNVD: Abu-Rawash, Helwan, Kafar Hakim, Kerdassa, Mansouriah, Shubra (April to October); Sinai: locality and date unknown. [Sources: Lichtwardt (1909), El-Hashash et al. (2021) and museum material in EFC, ESEC and PPDD]. SAUDI ARABIA:?. [Source: Sack (1933)]

Note: Sack (1933) recorded this species from the Arabian Peninsula [as “Arabien”], however, he did not specifically mention the country from which he recorded the species. So, this record in Saudi Arabia is doubtful, especially Richter (1988) did not catalogue the species as recorded from any Arabian country.

Material examined: EGYPT: 1 female, Abu-Rawash, 16.3.1927, R.M. leg.; 1 female, Wadi Garawi, 22.3.1930, Farag leg.; 1 male, Wadi Garawi, 31.3.1930, Farag leg.; 1 male, Kafar Hakim, Kerdassa, Mansouriah, Pyramids (January to October); Sinai: Wadi Abu-Gaifa (April); WD: Wadi El-Natroun (April). [Sources: Lichtwardt (1909), El-Hashash et al. (2021) and museum material in EFC, ESEC and PPDD]. ? SAUDI ARABIA:?. [Source: Sack (1933)]

Nemestrina fasciatus (Olivier, 1810)
Nemestrina fasciatus Olivier, 1810: 94. Type locality: "ad maris Caspium Littora".

Distribution: PA: Algeria, Egypt, Israel, Morocco, Syria. [Sources: Lichtwardt (1909), Richter (1988)]

Local distribution and dates of collection: EGYPT: CS: Burg El-Abab, Mariout, Max (April and June); ED: Abu-Sueir (May); LNVD: Mansouriah (June). [Sources: El-Hashash et al. (2021) and museum material in EFC, ESEC and PPDD]
Material examined: EGYPT: 1 female, Burg El-Arab, 6.5.1926, Tewfik leg.; EFC.

*Nemestrina fascifrons* (Bigot, 1888)
*Nemestrina fascifrons* Bigot, 1888: 8. Type locality: Tunisia (Kerkennah Islands).

Distribution: PA: Egypt, Israel, Tunisia. [Source: Richter (1988)]

Local distribution and dates of collection: EGYPT: ED: Wadi Digla, Wadi Garawi, Wadi Hoff (March to August); LNVD: Kafr Hakim, Kerdassa, Mansouriah, Turah (February and October). [Sources: Museum material in ESEC].

Note. Egyptian records of this species were taken from an old list of species preserved in ESEC. However, these records seem to be doubtful and we could not check them. The collection in ESEC was closed at the present time for unknown reasons and material was thought to be abandoned there.

*Nemestrina pallipes* (Olivier, 1810)
*Nemestrina pallipes* Olivier, 1810: 94. Type locality: "Java" [According to Bequaert (1932: 22), type locality is Egypt as the species was described from Egyptian material].

*Nemestrina javana* Macquart, 1840: 17. Type locality: "Java" [According to Bequaert (1932: 22), type locality was Egypt as the species was also described from Egyptian material].

Distribution: PA: Egypt. [Source: Bequaert (1932), Richter (1988)].

Local distribution and dates of collection: EGYPT: Unknown. [Source: Bequaert (1932), Richter (1988)].

*Nemestrina persicus* Lichtwardt, 1909
*Trichopsidea persicus* Lichtwardt, 1909: 119. Type locality: Iran [as "Persien"].

Distribution: PA: Egypt, Iran, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan. [Sources: Steyskal and El-Bialy (1967), Richter (1988)].

Local distribution and dates of collection: EGYPT: Unknown. [Sources: Sack (1933), Steyskal and El-Bialy (1967)].

*Nemestrina reticulatus* Latreille, 1802
*Trichopsidea reticulatus* Latreille, 1802: 437. Type locality: Not given ["Insulis Archipelagi, Egypt, Syria, Levant", according to Latreille (1805: 319)].

*Rhynchocephalus latreillei* Fischer, 1812: 195. Unjustified new name for *R. reticulatus* Latreille.

*Nemestrina cincta* Macquart, 1840: 16. Type locality: Arabia.

*Nemestrina kindermannii* Bischof, 1905: 172. Type locality: Turkey (Illy-Dagh, 1300 m near Kasieri).

Distribution: PA: Armenia, Azerbaijan, Egypt, Greece (Naxos), Saudi Arabia, Syria, Turkey. [Sources: Latreille (1805), Lichtwardt (1909), Sack (1933), Richter (1988)].

Local distribution and dates of collection: EGYPT: Unknown. [Source: Sack (1933), Steyskal and El-Bialy (1967), Richter (1988)]. SAUDI ARABIA: Unknown. [Source: Original description (Macquart 1840)].

*Nemestrina rufipes* (Olivier, 1810) (Fig. 3)
*Trichopsidea rufipes* Olivier, 1810: 94. Type locality: Egypt.

Distribution: PA: Egypt. *Nemestrina lateralis* Wiedemann, 1828: 560. Type locality: Egypt.

Distribution: AF: Saudi Arabia [as “South-western part”]. PA: Algeria, Egypt, Morocco, Qatar, Syria, United Arab Emirates. [Sources: Lichtwardt (1909), Abdu and Shaumar (1985), Richter (1988), Judas (2016), present study].

Local distribution and dates of collection: EGYPT: CS: Mersa Matrouh (January to April); ED: El-Mallah, Wadies south-east of Cairo (March to August); Fayoum: Siala (March); LNVD: Abu-Rawash, Beni Sweif, Cairo, Ezbet El-Nahl, Giza, Helwan, Kerdassa, Maadi, Marg (March to June); UNV: Assiut, Gebel El-Halal (March and April); WD: Mout (Dakhla Oasis) (March). [Sources: Lichtwardt (1909), El-Hashash et al. (2021) and museum material in EFC, ESEC and PPDD]. SAUDI ARABIA: Al-Baha: Dhi Ayn (April). [Source: collected material].

Note. This species was recorded herein for the first time from Saudi Arabia and the Afrotropical Region, considering the south-western district of Saudi Arabia as affiliated to the Afrotropical Region.

Material examined: Material examined: EGYPT: 1 male, Ezbet El-Nahl, 25.4.1924, Efflatoun leg.; 1 male, 1 female, Helwan, 3.4.1934, Farag leg.; 4 females, Helwan, 8.4.1932, Farag leg.; 1 male, Kerdassa, 11.4.1926, R.M. leg.; 1 female, Wadi Garawi, 31.3.1930, Farag leg.; EFC. SAUDI ARABIA: 1 female, Dhi Ayn, 11.IV.2012, sweeping net, El-Hawagry leg., MSHC.

Subfamily FALLENIIINAE

*Genus TRICHOPSIDEA* Westwood, 1839
*Trichopsidea* Westwood, 1839: 151. Type species: *Trichopsidea oestracea* Westwood, 1839, by monotypy.
Symmictus Loew, 1858: 368. Type species: Symmictus costatus Loew, 1858, by monotypy.

Dicrotrypana Bigot, 1879: 86. Type species: Dicrotrypana flavopilosa Bigot, 1879 (= Symmictus costatus Loew), by monotypy.

Trichopsidea costata (Loew, 1858) (Fig. 4)
Symmictus costata Loew, 1858: 368. Type locality: South Africa (Cape).

Dicrotrypana flavopilosa Bigot, 1879: lxvii. Type locality: "Europa merid.?”

Symmictus costatus ssp. frischi Teschner, 1965: 366. Type locality: France (Crau).

Distribution: AF: Botswana, Ethiopia, Kenya, Mozambique, Namibia, Saudi Arabia [as “South-western part”], Somalia, South Africa. PA: Algeria, Armenia, France, Spain. [Sources: Greathead (1958), Richter (1988), Naranchuk (2007), El-Hawagry et al. (2017)]

Local distribution and dates of collection: SAUDI ARABIA: Al-Baha: Jabal Shada al-Ala Nature Reserve (December); Asir: Raydah Nature Reserve August. [Sources: El-Hawagry et al. (2016), El-Hawagry et al. (2017) and collected material]

Material examined: SAUDI ARABIA: 1 male, Al-Baha, Shada, 10.XII.2014, light trap, Al-Dhafer et al. leg., KSMA; 1 female, Asir, Raydah, 26.VIII.2014, pitfall trap, Al-Dhafer et al. leg., KSMA.

Discussion
Only 5 species of Nemestrinidae were treated in the present study as recorded from Saudi Arabia. The number of species is still low and does not represent the real fauna of the family in this large country. However, this low diversity of species should be interpreted cautiously, since the family, as many other dipteronous families, seems to lack sampling efforts in Saudi Arabia and extensive faunistic and systematic studies are required. On the other hand, comprehensive surveys by late Efllatoun Bey and his co-workers and their followers started in Egypt more than 100 years ago (El-Hawagry et al. 2020). These surveys resulted in considerable number of nemestrinid flies pinned and preserved in the Egyptian insect collections.

El-Hashash et al. (2021) synonymized Nemestrinus abdominalis Olivier (1810) and Nemestrinus fascifrons (Bigot 1888) with Nemestrinus ater (Olivier, 1810). However, they did not check the types of these 3 species, and they almost based on original descriptions and/or some specimens preserved in EFC. They assumed that these specimens were identified by late Efllatoun Bey as N. fascifrons and N. ater. They stated that all specimens were of one sexually dimorphic species as males were identified as N. fascifrons and females as N. ater. Consequently, they synonymized N. fascifrons with N. ater based on this assumed Efllatoun’s identifications. However, these specimens are not types and there were no labels in the box or under any specimen to indicate who identified them. So, these identifications are doubtful and may be wrong. In like manner, there are no specimens of N. abdominalis preserved in any Egyptian insect museum to be checked. Consequently, we cannot adopt these synonymies without checking the types which are not available for us. Our viewpoint agrees with that of Sack (1933) and Paramonov (1945) who keyed the 3 species and clearly differentiated between them using identifiable features.

Lichtwardt (1909) and Bequaert (1938) synonymized Nemestrinus ruficornis (Macquart, 1840) with Nemestrinus rufipes (Olivier, 1810). However, Sack (1933), Paramonov (1945) and Richter (1988) considered it as a separate valid species. El-Hashash et al. (2021) adopted the first opinion and considered the 2 species as synonyms without checking the type material or any other material of N. ruficornis and based only on the original
descriptions. Types of this species were not available to validate its classification. Consequently, we cannot adopt this synonymy as well.

Hope the results of this study may provide the basis for systematic studies and fauna analyses of future works on Nemestrinidae. It seems likely that further species will be discovered with more research involving a variety of collecting methods.

Conclusions
In the present study, the family Nemestrinidae was catalogued in both Egypt and Saudi Arabia. The study revealed that 13 nemestrinid species belonging to 2 genera, Nemestrinus and Trichopsidea, and 2 subfamilies, Nemestrininae and Falleniinae, were represented in the two countries. Two of these species, Nemestrinus ater (Olivier) and N. rufipes (Olivier), are newly recorded from Saudi Arabia.

Abbreviations
AF: Afrotropical; CS: Coastal Strip; ED: Eastern Desert; EFC: Efflatoun Bey’s collection; Department of Entomology, Faculty of Science, Cairo University, Egypt; ESEC: Entomological Society of Egypt, Collection, Cairo, Egypt; GE: Gebel Elba; KSAMA: King Saud University Museum of Arthropods, Riyadh, Saudi Arabia; LNVD: Lower Nile Valley and Delta; MSHC: Magdi El-Hawagry’s personal collection, Cairo University, Egypt; OR: Oriental; PA: Palearctic; PPDD: Plant Protection Research Institute Collection, Ministry of Agriculture, Dokki, Giza, Egypt; UNV: Upper Nile Valley; WD: Western Desert.

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Authors’ contributions
ME collected and identified flies and drafted the manuscript. AA participated in identifying the flies and drafting the manuscript. AS participated in identifying the flies. MA collected and photographed some flies. HA participated in collecting and identifying some flies. All authors participated in the study design and coordination and interpreted the data. All authors have read and approved the manuscript.

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Availability of data and materials
Data supporting the conclusions of this article are presented in the main manuscript.

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Competing interests
The authors declare that they have no competing interests.

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