



New records of shore flies (Diptera, Ephydriidae) from Morocco

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ABSTRACT. Among the 45 collected and identified species, one genus (*Scoliocephalus* Becker, 1903) and nine species of shore flies (Diptera, Ephydriidae) are recorded for the first time in Morocco of which seven species are new to the North African region (*Gymnoclasiopa aulisioi* (Canzoneri, 1976), *Gymnoclasiopa flavoantennata* (Strobl, 1900), *Hydrellia fascitibia* (von Roser, 1840), *Philotelma rossii* (Canzoneri & Meneghini, 1979), *Scatophila mesogramma* (Loew, 1862), *Scatophila quadriguttata* (Meigen, 1830) and *Scatophila signata* (Loew, 1860)). New data on the distribution of 23 other species are provided: twenty, six and two species are, respectively new for the Rif, the High Atlas, and the Middle Atlas Mountains, whereas one species is new for each of the Central Plateau and the Anti Atlas Mountains. These findings increased the number of Ephydriidae species recorded in Morocco to 126 species in 44 genera. They contribute significantly to the understanding of the biodiversity and biogeographical distribution of the Ephydriidae family in Morocco and North Africa. The Ephydriids fauna of Morocco account for 6.1% of the world's known species.

Keywords: Biodiversity, distribution, Rif Mountains, Middle Atlas, High Atlas, North Africa

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INTRODUCTION

Among the families of acalyptrate Diptera, the Ephydriidae, commonly called shore flies or brine flies, are one of the most abundant and diverse, with about 2000 species currently recognized worldwide (Mathis & Zatwarnicki, 1995, with updates). Shore flies are small to moderate-sized, 1–6 mm long, and are usually dull and dark-coloured. The species of Ephydriidae typically develop in aquatic or semi-

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aquatic conditions, feeding on bacteria, algae, yeasts, or decaying excrement and animal matter, or mining in leaves and stems (Zatwarnicki, 1992). Shore flies exhibit great structural diversity, reflected in their classification, with a total of 5 subfamilies and 20 tribes worldwide (Mathis & Zatwarnicki, 1995).

The first report of a shore fly (*Psilopa nitidula* Fallen, 1823) in Morocco was made by Becker and Stein (1913) in their paper on Moroccan Diptera. This was later followed by additional records documented by Séguy (1930, 1941a, 1941b, 1953), Dahl (1964) and Soika (1956). Then it took more than 30 years for the Ephydriidae to attract the attention of other researchers. Zatwarnicki (1987, 1988) added three more species to the Moroccan list. Comprehensive studies were conducted by Vitte (1988, 1989, 1991, 1992), who described new species and made an inventory of the Moroccan fauna, presenting additional records for Morocco and North Africa. As part of a national study on the biodiversity of the benthic fauna, Dakki (1997) conducted a further inventory of Moroccan Ephydriidae and recorded 95 species. Subsequent studies continued to add records for Morocco (Mathis & Zatwarnicki, 2002; Gatt & Ebejer, 2003; Chillasse & Dakki, 2004; Cassar et al., 2005; Pârvu et al., 2006; Koçak & Kemal, 2010; Zatwarnicki & Mathis, 2011; Zatwarnicki & Irwin, 2018; Ebejer et al., 2019). Very recently, an annotated checklist with distributions based on bibliographical data was published in the first catalogue of Moroccan Diptera. The list was compiled by Kettani et al. (2022) and counted 117 species of Ephydriidae. Our objective in this study is to enhance the knowledge of this family in Morocco and to demonstrate, through our field data, that the number of Ephydriidae species in Morocco is higher than reported in the literature.

MATERIAL AND METHODS

A total of 1358 specimens of Ephydriidae (648 males and 710 females) were collected using sweep nets and Malaise traps between 2011 and 2022. Adults were also reared in the laboratory from larvae and pupa following the technique of Afzan and Belqat (2016); the substratum harbouring the early stages of Ephridids were taken from lotic and lentic habitats and transported to the laboratory and organized on steel gauze net. In all 64 sites distributed over the Rif, the Middle Atlas, the High Atlas and Anti Atlas Mountains, and the Central Plateau were sampled. The authors BB and RA sampled the majority of the sites. Sampling sites, with coordinates and elevations, are given, and the locations of the sites are shown in Figure 1. The maps were created using the program GisArc (Geographic Information System, version 9.3). The bulk of the collected material was identified by R. Akhrif, with assistance from P. Beuk. Specimens were examined under a binocular microscope while still in ethanol. Whenever needed specimens were briefly dried to examine dust patterns that are usually poorly visible while specimens are in ethanol. The genitalia of some specimens were dissected using the procedure described by Beuk (2021). Prepared genitalia were stored in the same vials as the source specimens. The following literature was used while identifying the material: Andersson (1971), Becker (1926), Beschovski and Zatwarnicki (2000), Canzoneri and Meneghini (1983), Clausen (1977), Collin (1966), Drake (2001, 2013), Wirth (1975), Zatwarnicki (2018), Zatwarnicki and Irwin (2018). Taxa are listed according to the classification scheme of Zatwarnicki (2023). All identified specimens are preserved in 70% ethanol, and most are deposited in the collection of Diptera of the Department of Biology, Faculty of Sciences, Abdelmalek Essadi University, Tétouan. A small number of voucher specimens is deposited in the collection of the Maastricht Natural History Museum, Maastricht, the Netherlands.

RESULTS

The list of identified species is presented in Table 1. New records are marked with bold set text. The material examined is given and the distribution of the identified species is provided, together with notes on the breeding sites. A checklist summarizes the species presently known from North Africa (Table 1) and. Those species which are new records for North Africa are marked with three asterisks (***), those new for Morocco are marked with two asterisks (**) and the species which represent the first record for one or other of the Moroccan geographical regions are marked with one asterisk (*). Biogeographical distributions for recorded species are presented in Table 2.

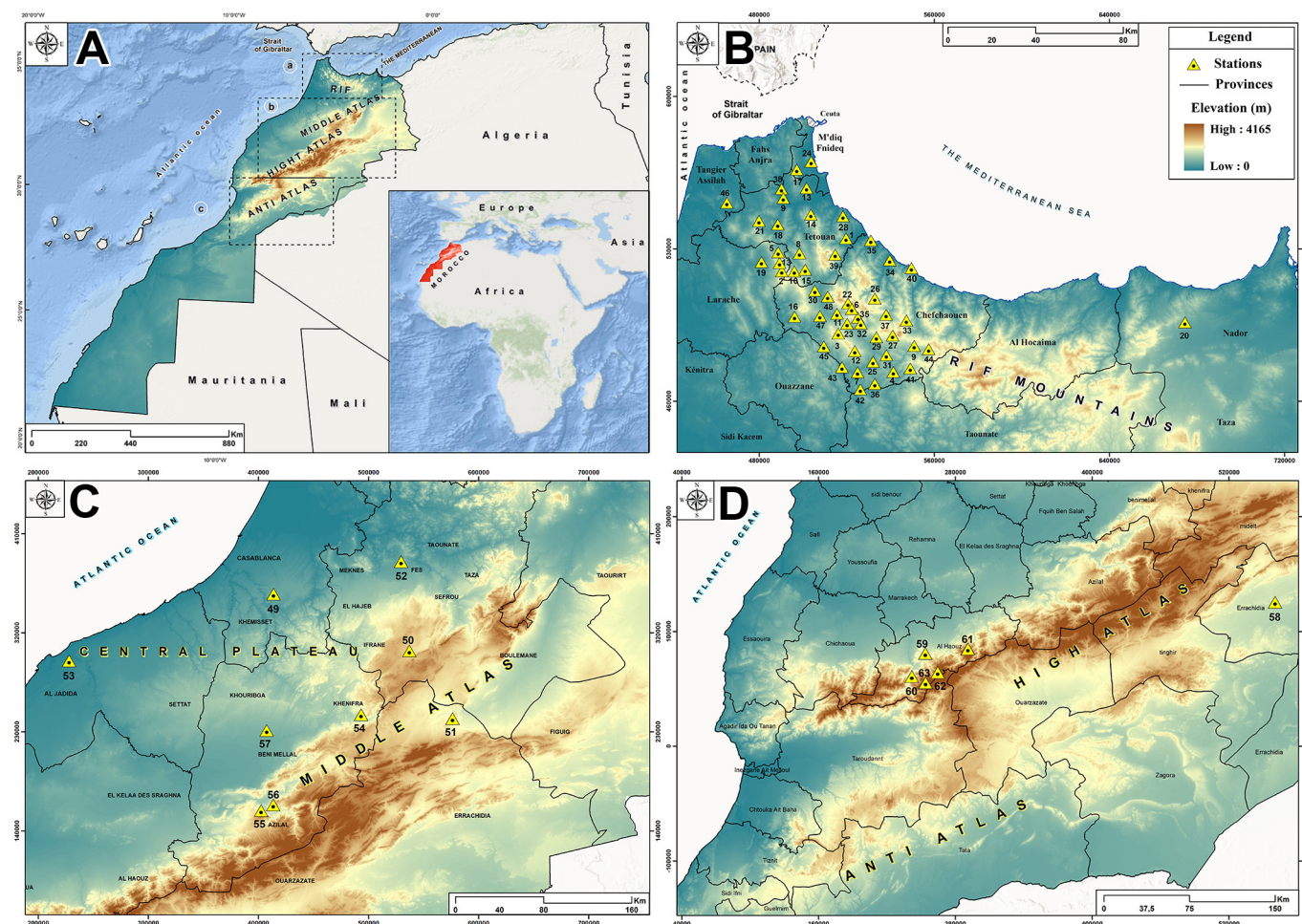


Figure 1. Map of Morocco indicating the collecting sites for shore flies in this study. **A.** Moroccan map showing sampling regions. **B.** The Rif Mountains. **C.** The Central Plateau and the Middle Atlas Mountains. **D.** The High and the Anti Atlas Mountains.

Taxonomic hierarchy

Class Insecta Linnaeus, 1758

Order Diptera Linnaeus, 1758

Suborder Brachycera Duméril, 1805

Family Ephydriidae Zetterstedt, 1837

Subfamily Ephydrinae Zetterstedt, 1837

Tribe Ephydrini Zetterstedt, 1837

Genus *Ephydra* Fallén, 1823

***Ephydra flavipes* (Macquart, 1843)**

Material examined. Morocco, Rif: 1♂, Lac Tirakaâ (35°15'84.2"N 2°92'82.6"W, 54 m), 09.V.2022–16.V.2022, reared (Fig. 2A), Akhrif leg.

Distribution in Morocco. Central Plateau: Atlantic coast (Vitte, 1991). Rif (**New record**).

General distribution. Afrotropical: Chad, Seychelles (Aldabra), Sudan, United Arab Emirates. Palaearctic: Albania, Algeria, Bulgaria, Canary Is., Croatia, Cyprus, Egypt, France, Greece, Iran, Iraq, Italy, Libya, Malta, Morocco, Pakistan, Saudi Arabia, Spain, Tunisia, Türkiye, Turkmenistan, Uzbekistan (El-Hawagry et al., 2018).

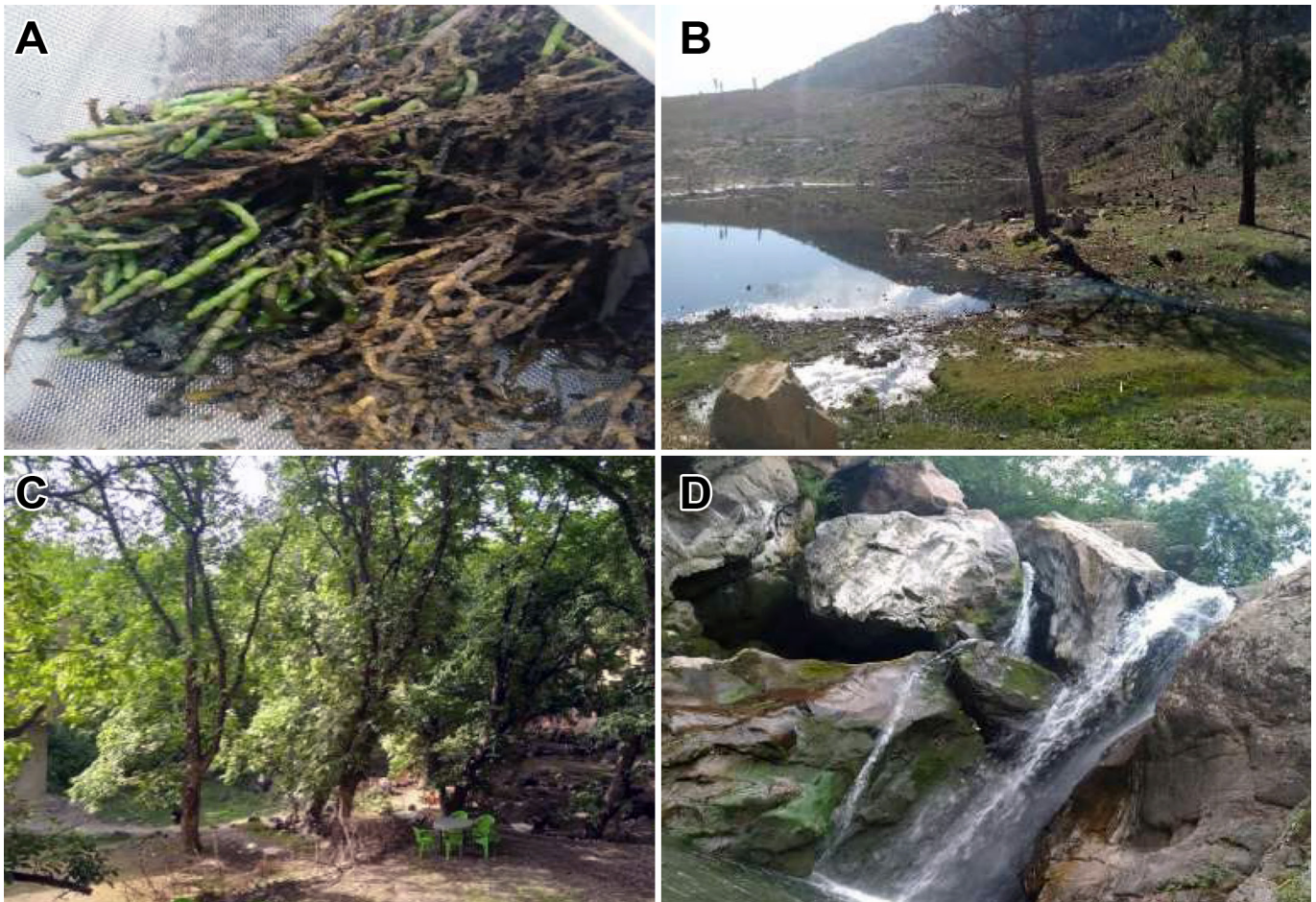


Figure 2. The representative habitats of the collected Ephydrid species in Morocco, **A.** Lac Tirakaâ – *Salicornia* – *Ephydra riparia* and *Philotelma rossii*; **B.** Daya Mtahen – *Scatophila mesogramma*; **C.** Village Imlil – *Scatophila signata*; **D.** Cascade de Imlil – *Gymnoclasiopa flavoantennata*.

Ephydra riparia Fallén, 1813

Material examined. Morocco, Rif: 1♂ 1♀, Lac Tirakaâ (35°15'84.2"N 2°92'82.6"W, 54 m), 9.V.2022–16.V.2022, reared (Fig. 2A), Akhrif leg.

General distribution. Nearctic: Canada. Palaearctic: Afghanistan, Austria, Azores, Belgium, Bulgaria, Canary Islands, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Madeira Islands, Mongolia (Mathis & Zatwarnicki, 1995), Morocco (**New record**), Netherlands, Norway, Poland, Romania, Russia (European Territory, Siberia, Far East), Sweden, Tunisia, Ukraine (Mathis & Zatwarnicki, 1995).

Habitat. The specimens were reared at laboratory temperature. Adults emerged seven days from the collected substrate from the environment of Tirakaâ, a large lake, where the halophytic vegetation was dominated by *Salicornia* sp.

Tribe Hyadinini Phillips et al. [*in* Cresson], 1949

Genus *Hyadina* Haliday, 1837

Hyadina guttata (Fallén, 1813)

Material examined. Morocco, Rif: 1♀, Ruisset El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 24.V.2013; 1♂, Oued Ametrasse (35°05'01.4"N 5°05'13.0"W, 828 m), 18.IV.2015; 2♀, Daya Amsemlil (35°15'59.6"N 5°25'91.7"W, 1060 m), 23.IV.2016; Belqat leg., sweep net; 1♀, Aïn Mansoura (34°83'57.3"N 4°96'51.5"W, 761 m), 12.XII.2020; 1♀, Oued Djnane (Kalâa) (35°12'43.0"N 5°14'59.1"W, 819), 13.V.2022, Akhrif and Belqat leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988). Rif (**New records**).

General distribution. Palaearctic: Austria, Azores, Belgium, Canary Islands, Czech Republic, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Netherlands, Poland, Macedonia, Madeira Islands, Morocco, Romania, Russia (European Territory, Far East), Slovakia, Spain, Sweden, Switzerland (El-Hawagry et al., 2018).

Genus *Nostima* Coquillett, 1900

Nostima picta (Fallén, 1813)

Material examined. Morocco, Rif: 1♀, Oued Ametrasse (35°05'01.4"N 5°05'13.0"W, 828 m), 18.IV.2015, Belqat leg., sweep net; 1♀, Douar Bni Faghloum (34°54'19.5"N 5°86'11.0"W, 667 m), 23.V.2021; 1♂, Puit Lota (34°54'19.6"N 5°86'10.0"W, 666 m), 24.V.2021, Akhrif leg., sweep net. Middle Atlas: 1♀, Douar Zraïb (32°35'2.2"N 6°14'4.8"W, 479 m), 27.IV.2018, 1♀, 28.IV.2018, Qalmoun leg., sweep net.

Distribution in Morocco. Central Plateau (Vitte, 1991). Middle Atlas: lakes (Vitte, 1988). Rif (**New records**).

General distribution. Nearctic: Canada, United States Neotropical: Guatemala, Mexico. Palaearctic: Afghanistan, Austria, Azores, Belgium, Bulgaria, Canary Islands, Czech Republic, Egypt, Estonia, Finland, France, Germany, Great Britain, Hungary, Italy, Japan, Macedonia, Madeira Islands, Morocco, Netherlands, Poland, Romania, Russia, (European Territory, Far East), Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine (El-Hawagry et al., 2018).

Tribe Scatellini Wirth & Stone, 1956

Genus *Haloscatella* Mathis, 1979

Haloscatella dictaeta (Loew, 1860)

Material examined. Morocco, Rif: 1♂ 1♀, Aïn Mansoura (34°83'57.3"N 4°96'51.5"W, 761 m), 12.XII.2020, Akhrif leg., sweep net. Middle Atlas: 1♂, Douar Zraïb (32°35'2.2"N 6°14'4.8"W, 479 m), 27.IV.2018, Qalmoun leg., sweep net.

Distribution in Morocco. Middle Atlas: Khemisset, Oued Beth, Dayat Aoua (Vitte, 1988). Central Plateau: Moulay Bousseham (Vitte, 1991). Rif (**New records**).

General distribution. Afrotropical: South Africa (Cape Province). Palaearctic: Algeria, Austria, Belgium, Bulgaria, Canary Islands, China (NE Tibet), Czech Republic, Denmark, Egypt, Finland, France, Germany, Great Britain, Hungary, Italy, Macedonia, Morocco, Netherlands, Poland, Romania, Russia (European Territory), Sweden, Switzerland, Tunisia (Mathis & Zatwarnicki, 1995).

Genus *Linnellia* Malloch, 1925

Linnellia quadrata (Fallén, 1813)

Material examined. Morocco, Rif: 1♂, Oued Jnane Niche (35°17'01.9"N 4°51'23.3"W, 36 m), 2.XII.2011, 2♂♂, 8.I.2019; 1♂, Daya El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 11.V.013, 1♂, 22.III.2019, Belqat leg., sweep net; 1♂ 1♀, Aïn Quanquben (34°57'75.0"N 4°40'78.3"W, 1600 m), 24.V.2013, 1♀, 28.IV.2015; 2♂♂, Oued Inesmane (35°08'59.0"N 5°05'10.0"W, 1173 m), 24.V.2013; 2♂♂, Oued Ametrasse (35°05'01.4"N 5°05'13.0"W, 828 m), 18.IV.2015; 2♀♀, Aïn Takhninjoute (35°06'88.1"N 5°08'27.0"W, 1512 m), 21.IV.2015; 1♂ 1♀, Bab Hmimar (34°95'20.0"N 5°14'30.0"W, 1230 m), 10.IV.2016; 4♂♂, Daya Amsemlil (35°15'59.6"N 5°25'91.7"W, 1060 m), 23.IV.2016; 1♂, Douar Kitane (35°32'41.2"N 5°20'39.3"W, 52 m), 14.XI.2016; 7♂♂ 6♀♀, Aïn Jdida (35°19'40.0"N 5°31'10.0"W, 1157 m), 23.IV.2017; 4♂♂ 5♀♀, Haoutat LKhchef (35°15'56.0"N 5°26'14.0"W, 1019 m), 27.IV.2017; 4♂♂ 3♀♀, Tougharine (35°11'60.9"N 5°18'40.2"W, 278 m), 9.IV.2017; 1♀, Âazfa (35°40'40.0"N 5°25'21.7"W, 333 m), 20.V.2018; 1♂, Douar Hammadech (35°21'86.5"N 5°30'89.4"W, 664 m), 6.I.2019; 1♂, Oued Majjou (35°06'17.5"N 5°10'83.6"W, 800 m), 8.II.2019; 1♂, La Garganta (35°15'10.9"N 5°26'43.6"W, 1330 m), 12.I.2020; 2♂♂, Daya Mtahen (35°16'19.5"N 5°26'15.8"W, 970 m), 10.II.2020; 1♂, Maison forestière de Talassemtane (35°08'07.6"N 5°08'26.2"W, 1670 m), 16.II.2020; 1♀, Douar Errayhana (35°39'60.8"N 5°23'63.0"W, 73 m), 8.III.2020; 5♂♂ 6♀♀, Aïn Mansoura (34°83'57.3"N 4°96'51.5"W, 761 m), 12.XII.2020, 3♂♂ 5♀♀, 15.V.2021; 1♂, Douar Zaytouna (31°01'59.3"N 5°20'18.3"W, 373

m), 20.III.2021; 190♂♂ 189♀, Lma d'Isoka (35°10'27.5"N 5°08'92.4"W, 1413 m), 11.V.2022, 62♂♂ 68♀♀, 12.V.2022; 19♂♂ 33♀♀, Oued Bni M'hamed (35°65'62.8"N 5°73'69.2"W, 1306 m), 11.V.2022; 84♂♂ 82♀♀, Pont Bni M'hamed (35°93'70.3"N 5°73'69.2"W, 1314 m), 11.V.2022; 38♂♂ 26♀♀, Ruisselet Gueness (35°09'00.2"N 5°08'00.2"W, 1500 m), 11.V.2022; 10♂♂ 7♀♀, Terrain Bouhalla (35°52'09.1"N 5°91'74.4"W, 1316 m), 11.V.2022; 17♂♂ 24♀♀, Oued Abou Bnar (Pont 2) (35°65'62.6"N 5°74'57.0"W, 1360 m), 12.V.2022; 13♂♂ 112♀♀, Oued Afaska (35°09'63.1"N 5°11'94.9"W, 1235 m), 12.V.2022; 7♂♂ 2♀♀, Oued Avant Afaska (35°10'21.5"N 5°10'72.6"W, 1092 m), 12.V.2022; 3♂♂ 4♀♀, Pont Abou Bnar (35°10'54.3"N 5°86'90.0"W, 1301 m), 12.V.2022; 3♂♂ 3♀♀, Douar Azaghar (35°14'27.8"N 5°75'93.0"W, 998 m), 13.V.2022; 22♂♂ 26♀♀, Oued Azilane (Ruisselement) (35°10'26.9"N 5°12'10.4"W, 1343 m), 13.V.2022; 5♂♂ 10♀♀, Oued Djnane (Kalâa) (35°12'43.0"N 5°14'59.1"W, 819 m), 13.V.2022, Akhrif and Belqat leg., sweep net. Middle Atlas: 1♂, Hay Tazi (34°03'75.6"N 5°03'56.3"W, 500 m), 29.II.2020; 1♂, Forêt Ain Vittel (33°33'42.4"N 5°07'58.1"W, 1548 m), 1.III.2020, Belqat leg., sweep net.

Distribution in Morocco. Rif: Central (Vitte, 1991). Middle Atlas (**New records**).

General distribution. Palaearctic: Algeria, Austria, Azores, Belgium, Bulgaria, Canary Islands, Czech Republic, Estonia, Faroe Islands, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Ireland, Italy, Madeira Islands (Mathis & Zatwarnicki, 1995), Morocco (Vitte, 1991), Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Türkiye, Ukraine (Mathis & Zatwarnicki, 1995).

Genus *Philotelma* Becker, 1896

Philotelma rossii (Canzoneri & Meneghini, 1979)

Material examined. Morocco, Rif: 1♂, Oued Majjou (35°06'17.5"N 5°10'83.6"W, 800 m), 3.V.2013, Belqat leg., sweep net; 1♂, Lac Tirakaâ (35°15' 84.2"N 2°92'82.6"W, 54 m), 9.V.2022–15.V.2022, reared (Fig. 2A), Akhrif leg.

General distribution. Palaearctic: Czech Republic, Germany, Great Britain, Italy, Morocco (**New record for North Africa**), Netherlands, Sweden (Mathis et al., 2009).

Habitat. The visited site of Oued Majjou is represented by the riparian strip along the Oued Maggou watercourse. Holm oak (*Quercus rotundifolia*) and cork oak (*Quercus suber*) are the main forest species that predominate in the forest surrounding the site. The riparian vegetation is mainly composed of *Ampelodesma mauritanica*, *Cistus albidus*, *Dittrichia viscosa*, *Hedera maroccana*, and *Nerium oleander*. The second site is Lac Tirakaâ, as described above under *Ephydra riparia*.

Genus *Scatella* Robineau-Desvoidy, 1830

Scatella (*Neoscatella*) *subguttata* (Meigen, 1830)

Material examined. Morocco, Rif: 1♂, Oued Amsa (35°31'59.3"N 5°13'82.1"W, 13 m), 10.VII.2020, Akhrif leg., sweep net.

Distribution in Morocco. Central Plateau: Atlantic and Mediterranean coast, Smir lagoon (Vitte, 1991), Merja Zerga (Pârvu et al., 2006). Rif (**New record**).

General distribution. Palaearctic: Austria, Bulgaria, Denmark, Egypt, Faroe Islands, Finland, France, Germany, Great Britain, Hungary, Iceland, Ireland, Italy (El-Hawagry et al., 2018), Morocco (Vitte, 1991), Netherlands, Poland, Russia, Sweden, Tunisia (El-Hawagry et al., 2018).

Scatella (*Scatella*) *lacustris* (Meigen, 1830)

Material examined. Morocco, Rif: 1♀, Séguia Dar Chaoui (35°31'2.7"N 5°43'4.6"W, 47 m), 14.XI.2013, reared, Belqat leg.; 1♂, Daya Amsemlil (35°15'59.6"N 5°25'91.7"W, 1060 m), 23.IV.2016, 1♂, 23.III.2021; 1♀, Aïn Jdida (35°19'40.0"N 5°31'10.0"W, 1157 m), 23.IV.2017; 1♂ 2♀♀, Oued Majjou (35°06'17.5"N 5°10'83.6"W, 800 m), 8.II.2019; 1♂, Daya Mtahen (35°16'19.5"N 5°26'15.8"W, 970 m), 23.III.2021; 1♂ 1♀, Oued Souk El Kdim (35°61'80.0"N 5°51'20.0"W, 230 m), 27.III.2021, Akhrif and Belqat leg., sweep net; 25♂♂ 20♀♀, Lac Laâchaych (35°12'51.0"N 5°22'38.0"W, 643 m), 12.II.2022, reared, Belqat leg. High Atlas: 1♀, Assif Haouz (31°07'42.4"N 7°55'08.3"W, 1896 m), 17.IV.2014, Belqat leg., sweep net.

Distribution in Morocco. Anti Atlas: Ziz River (13 km N of Erfoud, 800 m) (Ebejer et al., 2019). Rif and High Atlas (**New record**).

General distribution. Afrotropical: Cape Verde Islands. Nearctic: Greenland, United States (Arizona, Illinois, Oregon). Palaearctic: Austria, Azores, Belgium, Bulgaria, Canary Islands, China, Cyprus, Czech Republic, Denmark, Egypt, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Italy, Jordan, Madeira Islands (Zatwarnicki & Irwin, 2018), Morocco (Ebejer et al., 2019), Norway, Poland (Zatwarnicki & Irwin, 2018), Russia (European part, Siberia, Far East) (MacGowan et al., 2021), Spain, Sweden, Switzerland, Tunisia, Türkiye (Zatwarnicki & Irwin, 2018), United Arab Emirates (Mathis et al., 2017), Slovakia (Zatwarnicki & Irwin, 2018).

Scatella (Scatella) lutosa (Haliday, 1833)

Material examined. Morocco, Middle Atlas: 1♀, Oued Oum Er-rabie (32°54'5.1"N 5°40'2.8"W, 821 m), 30.IX.2017, Akhrif and Belqat leg., sweep net.

Distribution in Morocco. Central Plateau: Moulay Bouselham (Vitte, 1991). Middle Atlas (**New record**).

General distribution. Palaearctic: Algeria, Austria, Belgium, Bulgaria, China, Czech Republic, Egypt, Finland, France, Germany, Great Britain, Greece, Ireland, Italy (El-Hawagry et al., 2018), Morocco (Vitte, 1991), Netherlands, Poland, Russia, Sweden, Tunisia, Turkmenistan (El-Hawagry et al., 2018).

Scatella (Scatella) obsoleta Loew, 1861

Material examined. Morocco, Rif: 1♂, Oued Majjou (35°06'17.5"N 5°10'83.6"W, 800 m), 8.II.2019, Akhrif leg., sweep net.

Distribution in Morocco. Rif: M'Diq (Vitte, 1991). Middle Atlas: lakes (Vitte, 1988).

General distribution. Nearctic: Canada, United States. Palaearctic: Bulgaria, Czech Republic, Denmark, Finland, Germany, Great Britain, Greece, Hungary, Italy, Japan, Lithuania, Morocco, Norway, Poland, Romania (Zatwarnicki & Irwin, 2018), Russia (European part, Siberia, Far East) (MacGowan et al., 2021), Spain, Sweden, Switzerland (Zatwarnicki & Irwin, 2018).

Scatella (Scatella) paludum (Meigen, 1830)

Material examined. Morocco, Rif: 1♀, Séguia Dar Chaoui (35°31'2.7"N 5°43'4.6"W, 47 m), 14.XI.2013, reared; 1♂, Aïn Jdida (35°19'40.0"N 5°31'10.0"W, 1157 m), 23.IV.2017; 1♂, Oued Majjou (35°06'17.5"N 5°10'83.6"W, 800 m), 8.II.2019; 1♂, Douar Majjou (35°06'18.6"N 5°10'93.5"W, 1321 m), 30.II.2020; 1♀, Daya Amsemlil (35°15'59.6"N 5°25'91.7"W, 1060 m), 23.III.2021; 1♂, Daya Mtahen (35°16'19.5"N 5°26'15.8"W, 970 m), 23.III.2021; 1♂, Oued Souk El Kdim (35°61'80.0"N 5°51'20.0"W, 230 m), 27.III.2021; 1♀, Oued Avant Afaska (35°10'21.5"N 5°10'72.6"W, 1092 m), 12.V.2022, sweep net, Akhrif and Belqat. High Atlas: 1♂, Douar Aghbalou (31°15'88.6"N 7°40'86.0"W, 1272 m), 17.X.2020, Akhrif leg., sweep net.

Distribution in Morocco. Central Plateau: Oued Korifla (Dahl, 1964). Middle Atlas: lakes (Vitte, 1988). Rif and High Atlas (**New records**).

General distribution. Afrotropical: Democratic Republic of the Congo, South Africa (Transvaal). Nearctic: Canada. Neotropical: Mexico, West Indies (Guadalupe). Palaearctic: Algeria, Austria, Azores, Belgium, Bulgaria, Canary Islands, Cyprus, Czech Republic, Denmark, Egypt, Faroe Islands, Finland, France, Germany, Great Britain, Hungary, Iceland, Ireland, Italy, Japan, Madeira Islands, Mallorca, Malta, Morocco, Netherlands, Norway, Poland, Romania (El-Hawagry et al., 2018), Russia (European part, Siberia, Far East) (MacGowan et al., 2021), Slovakia, Sweden, Switzerland, Ukraine (El-Hawagry et al., 2018).

Scatella (Scatella) stagnalis (Fallén, 1813)

Material examined. Morocco, Rif: 1♂, Ruisset El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 24.V.2013, Belqat leg., sweep net; 1♀, Aïn Jdida (35°19'40.0"N 5°31'10.0"W, 1157 m), 23.IV.2017; 3♂♂ 2♀♀, Pont Bni M'hamed (35°93'70.3"N 5°73'69.2"W, 1314 m), 11.V.2022; 1♂ 1♀, Oued Abou Bnar (Pont 2) (35°65'62.6"N 5°74'57.0"W, 1360 m), 12.V.2022, Akhrif and Belqat leg., sweep net. Middle Atlas: 1♂, Douar Zraïb (32°35'2.2"N 6°14'4.8"W, 479 m), 27.IV.2018, Akhrif and Belqat leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes of Middle Atlas (Vitte, 1988). High Atlas: Toubkal (Séguy, 1941a). Anti Atlas: Aït Melloul, Oued Souss (Dahl, 1964). Rif (**New records**).

General distribution. Afrotropical: Kenya, Rwanda, Sierra Leone, Sudan, Zaire. Australasian: French Polynesia, Hawaiian Is. Nearctic: Bermuda, Canada, Greenland, Oriental: Japan, Taiwan. Palaearctic: Afghanistan, Algeria, Austria, Azores, Belgium, Bulgaria, Canary Is., China, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Faroe Is., Finland, France, Germany, Great Britain, Hungary, Iceland, Italy, Japan, Macedonia, Madeira Is., Malta, Morocco, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Slovenia, Sweden, Türkiye, Tajikistan, Turkmenistan, Ukraine (El-Hawagry et al., 2018).

Genus *Scatophila* Becker, 1896

Scatophila caviceps (Stenhammar, 1844)

Material examined. Morocco, Rif: 1♀, Douar Errayhana (35°39'60.8"N 5°23'63.0"W, 73 m), 8.III.2020, Belqat leg., sweep net. Middle Atlas: 1♀, 22 sources (31°59'2.3"N 6°42'5.0"W, 819 m), 6.III.2019, Belqat leg., sweep net. High Atlas: 1♀, Mosquée de Imlil (31°08'14.1"N 7°55'21.5"W, 1806 m), 7.VII.2021, Akhrif leg., sweep net. 1♀, Anti Atlas: Oued Ziz (31°56'25.3"N 4°25'45.5"W, 1026 m), 9.VI.2015, Belqat leg., sweep net.

Distribution in Morocco. Central Plateau: Rabat, Temara (Vitte, 1988). Middle Atlas (Vitte, 1988). Rif, High, and Anti Atlas (**New records**).

General distribution. Palaearctic: Afghanistan, Austria, Belgium, Bulgaria, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Madeira Islands, Morocco, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland (Mathis & Zatwarnicki, 1995).

Scatophila despecta (Haliday, 1839)

Material examined. Morocco, Rif: 1♀, Forêt Belouazen (35°39'25.0"N 5°22'52.0"W, 35 m), 1.II.2022, Belqat leg., sweep net. Middle Atlas: 1♂ 1♀, Forêt Tachauit (32°41'48.5"N 4°44'48.5"W, 1485 m), 12.III.2020, Belqat leg., sweep net. High Atlas: 1♀, Douar Aghbalou (31°15'88.6"N 7°40'86.0"W, 1272 m), 17.X.2020, Akhrif leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988), Khemisset, Oued Beth (Vitte, 1991). Rif and High Atlas (**New record**).

General distribution. Nearctic: United States. Palaearctic: Algeria, Austria, Azores, Belgium, Bulgaria, Canary Islands, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Morocco, Netherlands, Norway, Poland, Romania, Russia (European Territory, Siberia), Slovakia, Sweden (Mathis & Zatwarnicki, 1995).

Scatophila farinae Becker, 1903

Material examined. Morocco, Rif: 1♂, Oued Laou (35°44'64.7"N 5°09'21.7"W, 27 m), 17.V.2016. High Atlas: 1♂, Assif Haouz (31°07'42.4"N 7°55'08.3"W, 1896 m), 17.IV.2014, Belqat leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988), Taounate (Vitte, 1991). High Atlas: Vallée de l'Ait Mizane (Zatwarnicki, 1987). Rif (**New record**).

General distribution. Palaearctic: Algeria, Canary Islands, Egypt, Italy, Morocco (El-Hawagry et al., 2018).

Scatophila mesogramma (Loew, 1862)

Material examined. Morocco, Rif: 1♂, Daya Mtahen (35°16'19.5"N 5°26'15.8"W, 970 m) (Fig. 2B), 5.V.2022, Akhrif leg., sweep net.

General distribution. Nearctic: Canada (Northwest Territories, Nova Scotia, Quebec), United States (Maryland, Massachusetts, New Jersey, Oregon, Rhode Island). Palaearctic: Belgium, Denmark, Finland, Germany, Great Britain (Zatwarnicki & Irwin, 2018), Morocco (**New record for North Africa**), Poland, Russia (European Territory, Siberia), Sweden (Zatwarnicki & Irwin, 2018).

Habitat. We collected *S. mesogramma* near Daya Mtahen (35°16.19.5"N 5°26.15.8"W, 970 m). It is a temporary pond located in Douar Mtahen, Jbel Bouhachem. The station is located in the heart of a relatively dense forest area, dominated by *Pinus pinaster* and a few *Salix pedicellata* trees, while *Ficus carica* adds a shady note. The herbaceous and shrubby layer is enriched by species such as *Pteridium aquilinum*, *Cistus monspeliensis*, *Ranunculus ficaria*, and *Rubus ulmifolius*.

Scatophila quadriguttata (Meigen, 1830)

Material examined. Morocco, Rif: 1♀, Plage Stihat (35°20'34.5"N 4°57'40.1"W, 5 m), 26.IV.2015, Belqat leg., sweep net.

General distribution. Palaearctic: Austria, Belgium, Czech Republic, Denmark, Finland, Germany, Great Britain, Hungary, Italy (Zatwarnicki & Irwin, 2018), Morocco (**New record for North Africa**), Netherlands, Poland, Russia (European Territory), Slovakia, Slovenia, Sweden (Zatwarnicki & Irwin, 2018).

Habitat. This species was collected out in the sand dunes and the beach surrounding vegetation. This beach is similar to the Mediterranean seaside boarding the village of Stehat.

Scatophila signata (Loew, 1860)

Material examined. Morocco, Rif: 1♂, Forêt Belouazen (35°39'25.0"N 5°22'52.0"W, 35 m), 1.II.2022, Akhrif and Belqat leg., sweep net. High Atlas: 1♀, Village Imlil (31°08'14.1"N 7°55'21.5"W, 1805 m) (Fig. 2C), 6.VII.2021, Akhrif leg., sweep net.

General distribution. Palaearctic: Austria, Belgium, Bulgaria, Corsica, Danish mainland, Denmark, Germany, Hungary, Italian mainland (Mathis & Zatwarnicki, 1995), Morocco (**New record for North Africa**), Netherlands, Poland, Sardinia, Sicily, Spain mainland (Mathis & Zatwarnicki, 1995).

Habitat. This species is found in diverse habitats throughout Morocco. Forêt Belouazen is a forested mountainous area with streams with a strong current, submerged vegetation, a coarse substrate, and abundant riparian vegetation. Village Imlil is characterized by the riparian strip along a watercourse within the village, where the vegetation is dominated by walnut trees (*Juglans regia*).

Scatophila unicornis Czerny, 1900

Material examined. Morocco, Rif: 1♂, Plage Stihat (35°20'34.5"N 4°57'40.1"W, 5 m), 26.IV.2015, Belqat leg., sweep net.

Distribution in Morocco. Anti Atlas: 14 km E of Rich (Errachidia, 1278 m) (Ebejer et al., 2019). Rif (**New record**).

General distribution. Nearctic: Canada (ON), United States. Palaearctic: Austria, Denmark, Great Britain, Hungary, Italy, Morocco (Ebejer et al., 2019), Poland, Spain, and Switzerland (Mathis & Zatwarnicki, 1995).

Gymnomyzinae Latreille, 1829

Tribe Discocerini Cresson, 1925

Genus *Discocerina* Macquart, 1835

Discocerina obscurella (Fallén, 1813)

Material examined. Morocco, Rif: 2♀♀, Oued Laou (35°44'64.7"N 5°09'21.7"W, 27 m), 17.V.2016; 1♂ 2♀♀, Oued Amsa (35°31'59.3"N 5°13'82.1"W, 13 m), 10.VII.2020; 2♂♂ 1♀, Aïn Sidi Brahim Ben Arrif (35°20'41.5"N 5°32'53.5"W, 882 m), 27.V.2019. Middle Atlas: 11♂♂ 3♀♀, Source Ouzoud (32°01'1.1"N 6°43'3.2"W, 661 m), 09.XII.2018; 1♂, Douar Zraïb (32°35'2.2"N 6°14'4.8"W, 479 m), 9.III.2019, Akhrif and Belqat leg., sweep net.

Distribution in Morocco. Central Plateau (Vitte, 1988). Middle Atlas: lakes of Middle Atlas (Vitte, 1988), Fès, Taounate (Vitte, 1991). Rif (**New record**).

General distribution. Afrotropical: Cape Verde Islands, Kenya, Rodriguez Islands, Zaire. Nearctic: Canada, United States. Neotropical: Argentina, Bahamas, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Mexico (VRC), Panama, Paraguay, Peru, Venezuela, West Indies (Cuba, Dominica, Jamaica, Puerto Rico, St. Thomas). Palaearctic: Austria, Algeria, Azores, Belgium, Bulgaria, Canary Islands, Croatia, Czech Republic, Estonia, Finland, France, Germany, Great Britain, Hungary, Iran, Italy, Macedonia, Morocco, Netherlands, Poland, Romania, Russia (European Territory, Siberia, Far East) (MacGowan et al., 2021), Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye, former Yugoslavia (Mathis & Zatwarnicki, 1995).

Genus *Gymnoclasiopa* Hendel, 1930

Gymnoclasiopa aulisioi (Canzoneri, 1976)

Material examined. Morocco, Rif: 1♂ 1♀, Pont Bni M'hamed (35°93'70.3"N 5°73'69.2"W, 1314 m), 11.V.2022 Akhrif leg., sweep net. Middle Atlas: 1♀, Source Ouzoud (32°01'1.1"N 6°43'3.2"W, 661 m), 09.XII.2018, Qalmoun leg., sweep net.

General distribution. Palaearctic: Belgium, Czech Republic, Germany, Greece, Italy (Hellqvist et al., 2024), Morocco (New record for North Africa), Netherlands (Hellqvist et al., 2024).

Habitat. The studied locality in the Rif Mountains is on the riverbank of a watercourse located approximately 40 m from the douar of Beni M'hamed. The riverside vegetation forms a dense and diverse strip along both banks of the Oued. Among the trees, are *Cedrus atlantica*, *Quercus ilex*, *Ficus carica* and *Prunus domestica*. Among the shrubs, we find *Salix pedicellata* and *Rosa micrantha*, while among the herbaceous plants, we observe *Mentha villosa* and *Clinopodium vulgare*. The second locality is one of the springs feeding the famous Ouzoud waterfalls in the Middle Atlas. The specimen was collected out in the vegetation cover surrounding the site. The tree species present in the region are: *Quercus ilex*, *Thuja*, *Pinus halpensis*, *Juniperus*, *Ceratonia siliqua*. Fruit trees include: *Prunus dulcis*, *Ficus carica*, *Juglans regia* and *Olea europaea*.

Gymnoclasiopa flavoantennata (Strobl, 1900)

Material examined. Morocco, High Atlas: 1♂, Cascade de Imlil (31°07'71.1"N 7°55'16.4"W, 1927 m) (Fig. 2D), 6.VII.2021, 1♂ 1♀, 7.VII.2021; 1♂, Village Imlil (31°08'14.1"N 7°55'21.5"W, 1805 m) (Fig. 2C), 6.VII.2021, Akhrif leg., sweep net.

General distribution. Palaearctic: Greece, Italy (Stuke, 2013), Morocco (New record for North Africa), Spain (Stuke, 2013).

Habitat. We captured this species near a small waterfall located at 1927 m, in the heart of a forested environment within the Atlas Mountains. The second habitat where we collected the species corresponds to that of Village Imlil, described above under *Scatophila signata*.

Tribe Gymnomyzini Latreille, 1829

Genus *Athyroglossa* Loew, 1860

Athyroglossa glabra (Meigen, 1830)

Material examined. Morocco, Rif: 1♂, Pont Bni M'hamed (35°93'70.3"N 5°73'69.2"W, 1314 m), 11.V.2022, Akhrif leg., sweep net. Middle Atlas: 1♂, Douar Zraïb (32°35'2.2"N 6°14'4.8"W, 479 m), 27.IV.2018, Qalmoun leg., sweep net.

Distribution in Morocco. Rif (Vitte, 1988). Middle Atlas: lakes of Middle Atlas (Vitte, 1988).

General distribution. Nearctic: United States (Washington). Palaearctic: Algeria, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Czech Republic, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Italy, Korea (North), Macedonia, Morocco, Netherlands, Norway, Poland, Romania, Russia (European Territory, Far East), Slovenia, Spain, Sweden, Switzerland, Ukraine, former Yugoslavia (Mathis & Zatwarnicki, 1995).

***Athyroglossa nudiuscula* Loew, 1860**

Material examined. Morocco, Rif: 1♂, Pont Bni M'hamed (35°93'70.3"N 5°73'69.2"W, 1314 m), 11.V.2022, Akhrif leg., sweep net.

Distribution in Morocco. Rif (Vitte, 1991).

General distribution. Palaearctic: Albania, Austria, Canary Islands, Czech Republic, France, Hungary, Italy, Jordan, Morocco, Romania, Russia, Spain (Mathis & Zatwarnicki, 1995).

Genus *Mosillus* Latreille, 1804***Mosillus subsultans* (Fabricius, 1794)**

Material examined. Morocco, Rif: 11♂♂ 10♀♀, Marabou Sidi Bou Hadjel (35°47'26.3"N 5°21'69.5"W, 7.5 m), 23.VIII.2021. High Atlas: 1♂, Cascade de Imlil (31°07'71.1"N 7°55'16.4"W, 1927 m), 7.VII.2021 Akhrif leg., sweep net.

Distribution in Morocco. Rif (Vitte, 1991). Middle Atlas: M'Rirt (Séguy, 1930), lakes (Vitte, 1988), Ifrane (Mathis et al., 1993). High Atlas: Imminen, Tachidirt (Séguy, 1930), Mikdane, Jebel Ayachi (Mathis et al., 1993).

General distribution. Palaearctic: Afghanistan, Austria, Azores, Belgium, Bulgaria, China, Egypt, Finland (El-Hawagry et al., 2018), Morocco (Séguy, 1930).

Tribe Hecamedini Mathis, 1991**Genus *Allotrichoma* Becker, 1896*****Allotrichoma laterale* (Loew, 1860)**

Material examined. Morocco, Rif: 2♂♂, Oued Amsa (35°31'59.3"N 5°13'82.1"W, 13 m), 10.VIII.2020; 1♂, Oued Lkbir (34°54'47.9"N 5°83'17.0"W, 684 m), 22.V.2021; 2♂♂, Douar Bni Faghouloum (34°54'19.5"N 5°86'11.0"W, 667 m), 24.V.2021, Akhrif leg., sweep net. Central Plateau: 1♂, Ferme Laghrousse (33°54'82.0"N 6°10'58.6"W, 420 m), 21.VII.2021, Akhrif leg., sweep net. Middle Atlas: 2♂♂, Source Ouzoud (32°01'1.1"N 6°43'3.2"W, 661 m), 09.VIII.2018, Qalmoun leg., sweep net. High Atlas: 2♂♂, Village Imlil (31°08'14.1"N 7°55'21.5"W, 1805 m), 6.VII.2021, Akhrif leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988). Rif, Central Plateau & High Atlas (**New records**).

General distribution. Palaearctic: Afghanistan, Algeria, Austria, Belgium, Bulgaria, Canary Islands, Cyprus, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Iran, Italy, Jordan, Malta, Morocco, Poland, Russia (European Territory), Serbia, Spain, Sweden, Switzerland, Tadjikistan, Türkiye, Turkmenistan, Uzbekistan (El-Hawagry et al., 2018).

***Allotrichoma simplex* (Loew, 1861)**

Material examined. Morocco, Middle Atlas: 1♂, Hay Tazi (34°03'75.6"N 5°03'56.3"W, 500 m), 29.II.2020, Akhrif leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988), Khemisset, Oued Sebou (Vitte, 1991).

General distribution. Nearctic: Canada (Ontario), United States (Connecticut, Delaware, District of Columbia, Illinois, Indiana, Iowa, Maryland, Massachusetts, Michigan, Minnesota, New Jersey, New York, Ohio, Texas, Vermont, Virginia, West Virginia). Palaearctic: Austria, Bulgaria, China (Tibet), Czech Republic, France, Hungary, Italy, Morocco, Poland, Spain, Russia (European Territory), Switzerland, former Yugoslavia (Mathis & Zatwarnicki, 2012).

Tribe Ochtherini Dahl, 1959**Genus *Ochthera* Latreille, 1802*****Ochthera schembrii* Rondani, 1847**

Material examined. Morocco, Rif: 1♂, Aïn Sidi Brahim Ben Arrif (35°20'41.5"N 5°32'53.5"W, 882 m), 27.V.2019; 2♀, Oued Amsa (35°31'59.3"N 5°13'82.1"W, 13 m), 10.VIII.2020, Akhrif and Belqat leg., sweep net.

Distribution in Morocco. Rif (Vitte, 1991). Middle Atlas: lakes (Vitte, 1988). Central Plateau: Vitte, 1991.

General distribution. Afrotropical: United Arab Emirates Palaeartic: Algeria, Azores, Bulgaria, Canary Islands, Egypt, Great Britain, Greece, Iran, Italy, Malta, Morocco, Spain, Türkiye, Turkmenistan (El-Hawagry et al., 2018).

Hydrelliinae Robineau-Desvoidy, 1830

Tribe Discomyzini Acloque, 1897

Genus *Actocetor* Becker, 1903

***Actocetor indicus* (Wiedemann, 1824)**

Material examined. Morocco, Rif: 1♀, Oued Amsa (35°31'59.3"N 5°13'82.1"W, 13 m), 10.VII.2021; 1♂2♀♀, Marabou Sidi Bou Hadjel (35°47'26.3"N 5°21'69.5"W, 7.5 m), 23.VIII.2021, Akhrif and Belqat leg., sweep net.

Distribution in Morocco. Rif: Béni Aross (Séguy, 1953).

General distribution. Afrotropical: Angola, Botswana, Cameroon, Cape Verde Islands, Democratic Republic of Congo, Eritrea, Ethiopia, Gambia, Ivory Coast, Kenya, Namibia, Nigeria, Oman, Rwanda, Senegal, Seychelles, Sierra Leone, Sokotra Island, South Africa, Sudan, Tanzania, Uganda, United Arab Emirates, Zimbabwe. Oriental: India, Malaysia, Sri Lanka. Palaeartic: Canary Islands, Egypt (El-Hawagry et al., 2018), Morocco (Séguy, 1953), Saudi Arabia (El-Hawagry et al., 2018).

Tribe Hydrelliini Robineau-Desvoidy, 1830

Genus *Hydrellia* Robineau-Desvoidy, 1830

***Hydrellia albiceps* (Meigen, 1824)**

Material examined. Morocco, Rif: 2♂♂ 1♀, Daya Amsemlil (35°15'59.6"N 5°25'91.7"W, 1060 m), 23.IV.2016, Belqat leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988), Ifrane (Zatwarnicki, 1988). High Atlas: Vallée de l'Aït Mizane (Zatwarnicki, 1988). Rif (**New record**).

General distribution. Afrotropical: South Africa (Eastern Cape) (Zatwarnicki, 2022). Palaeartic: Austria, Germany (Mathis & Zatwarnicki, 1995), Morocco (Zatwarnicki, 1988).

***Hydrellia argyrogenis* Becker, 1896**

Material examined. Morocco, Rif: 1♀, Oued Amsa (35°31'59.3"N 5°13'82.1"W, 13 m), 10.VIII.2020, Akhrif leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988). Central Plateau: Atlantic coast and Plains (Vitte, 1991). Rif (**New record**).

General distribution. Palaeartic: Austria, Canary Islands, China, Czech Republic, Great Britain, Hungary, Iran, Italy, Morocco, Netherlands, Pakistan, Spain, and Tunisia (Mathis & Zatwarnicki, 1995).

***Hydrellia fascitibia* (von Roser, 1840)**

Material examined. Morocco, Middle Atlas: 1♂, Aïn Mhioula (33°12'4.6"N 8°11'5.7"W, 12 m), 30.VIII.2019, Qalmoun leg., sweep net.

General distribution. Nearctic: Canada, United States. Palaeartic: Austria, Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Italy (Dek et al., 2023), Morocco (**New record for North Africa**), Poland, Romania, Sardinia, Spain, Sweden, Switzerland, United Kingdom (Dek et al., 2023).

Habitat. *H. fascitibia* was found for the first time near a spring surrounded by an area fed by spring water in the Middle Atlas. The dominant vegetation consists of wheat crops and several fruit trees.

Hydrellia griseola (Fallén, 1813)

Material examined. Morocco, Rif: 1♂, Oued Ametrasse (35°05'01.4"N 5°05'13.0"W, 828 m), 18.IV.2015, Belqat leg., sweep net; 2♂♂, Douar Errayhana (35°39'60.8"N 5°23'63.0"W, 73 m), 08.III.2020; 2♂♂, Pont Bni M'hamed (35°93'70.3"N 5°73'69.2"W, 1314 m), 11.V.2022; 1♂, Oued Avant Afaska (35°10'21.5"N 5°10'72.6"W, 1092 m), 12.V.2022. Middle Atlas: 1♂, Hay Tazi (34°03'75.6"N 5°03'56.3"W, 500 m), 29.II.2020. High Atlas: 1♂, Village Imlil (31°08'14.1"N 7°55'21.5"W, 1805 m), 6.VII.2021, Akhrif leg., sweep net.

Distribution in Morocco. Rif: Oued Laou cited in Kettani et al. (2022). Middle Atlas: lakes (Vitte, 1988). High Atlas (New record).

General distribution. Afrotropical: Oman. Australasian: Australia (Queensland). Nearctic: Widespread in Bermuda, Canada, and the United States. Neotropical: Colombia. Oriental: Nepal, Philippines, Taiwan. Palaearctic: Afghanistan, Algeria, Austria, Azores, Belgium, Canary Islands, China (Hefei, Xining, NE Tibet), Cyprus, Czech Republic, Denmark, Egypt, Estonia, Faroe Islands, Finland, France, Germany, Great Britain, Greece, Hungary, Iceland, Italy, Japan (Hokkaido, Honshu), Macedonia, Madeira Islands, Malta, Morocco, Netherlands, Norway, Poland, Romania, Russia (European Territory), Slovakia, Spain, Sweden, Switzerland, Tunisia, Ukraine, former Yugoslavia (El-Hawagry et al., 2018).

Hydrellia subalbiceps Collin, 1966

Material examined. Morocco, Rif: 1♂, Ruisset El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 24.V.2013, Belqat leg., sweep net; 1♂, Aïn Sidi Brahim Ben Arrif (35°20'41.5"N 5°32'53.5"W, 882 m), 27.V.2019; 1♂, Aïn Mansoura (34°83'57.3"N 4°96'51.5"W, 761 m), 12.XII.2020, Akhrif leg., sweep net.

Distribution in Morocco. Rif: Ketama (Vitte, 1991). Middle Atlas: lakes (Vitte, 1988).

General distribution. Palaearctic: Algeria, France, Ireland, Italy, Morocco, Poland, Sardinia, Sicily, Spain, Sweden, United Kingdom (Dek et al., 2023).

Tribe Notiphilini Bigot, 1853

Genus *Notiphila* Fallén, 1810

Notiphila cogani Canzoneri & Meneghini, 1979

Material examined. Morocco, Rif: 1♂, Oued Laou (35°44'64.7"N 5°09'21.7"W, 27 m), 17.V.2016, Belqat leg., sweep net, sweep net.

Distribution in Morocco. Rif: Aïn Jdioui cited in Kettani et al. (2022). Middle Atlas: lakes (Vitte, 1988).

General distribution. Palaearctic: Algeria, Italy, Morocco (Mathis & Zatwarnicki, 1995).

Notiphila riparia Meigen, 1830

Material examined. Morocco, Rif: 1♂, Plage Stihat (35°20'34.5"N 4°57'40.1"W, 5 m), 26.IV.2015, Belqat leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes and reedbeds (Vitte, 1988). Anti Atlas: Aït Melloul (Souss) (Krivosheina, 1998). Rif (New record).

General distribution. Palaearctic: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Iran, Italy, Macedonia, Morocco, Netherlands, Poland, Romania, Russia (European Territory), Slovakia, Sweden, Switzerland, Ukraine, former Yugoslavia (Mathis & Zatwarnicki, 1995).

Tribe Psilopini Cresson, 1925

Genus *Diasemocera* Bezzi, 1895

Diasemocera biskrae (Becker, 1907)

Material examined. Morocco, Rif: 2♀♀, Lac Tirakaâ (35°15' 84.2"N 2°92'82.6"W, 54 m), 22.XII.2022–27.XII.2022, reared (Fig. 2A), Akhrif leg.

Distribution in Morocco. Rif: M'Diq (Vitte, 1991).

General distribution. Palaearctic: Algeria, Italy, Malta (Zatwarnicki, 2018), Morocco (Vitte, 1991), United Arab Emirates (Zatwarnicki, 2018).

***Diasemocera leucostoma* (Meigen, 1830)**

Material examined. Morocco, Rif: 1♀, Plage Stihat (35°20'34.5"N 4°57'40.1"W, 5 m), 26.IV.2015, Belqat leg., sweep net; 1♀, Lac Tirakaâ (35°15' 84.2"N 2°92'82.6"W, 54 m), 22.XII.2022–27.XII.2022, reared (Fig. 2A), Akhrif leg.

Distribution in Morocco. Anti Atlas: Agadir (Séguy, 1941b). Rif (**New records**).

General distribution. Austria, Balearic Islands, Belgium, Bulgaria, Canada, Corsica, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Italy (Zatwarnicki, 2018), Morocco (Séguy, 1941b), Netherlands, Norway, Poland, Romania, Russia, Slovenia, Spain, Sweden, United States (Zatwarnicki, 2018).

***Diasemocera nana* (Loew, 1860)**

Material examined. Morocco, Rif: 1♂ 1♀, Lac Tirakaâ (35°15' 84.2"N 2°92'82.6"W, 54 m), 22.XII.2022–27.XII.2022, reared (Fig. 2A), Akhrif leg.

Distribution in Morocco. Rif, Central Plateau: Atlantic coast (Vitte, 1991).

General distribution. Afrotropical: Cape Verde Islands, ?Senegal. Palaearctic: Algeria, Bulgaria, Canary Islands, China (NE Tibet), Czech Republic, Egypt, France, Germany, Great Britain, Hungary (Zatwarnicki, 2018), Morocco (Vitte, 1991), Netherlands, Poland, Romania, Spain, Senegal, Türkiye (Zatwarnicki, 2018).

Genus *Scoliocephalus* Becker, 1903

***Scoliocephalus pallidiseta* Becker, 1903**

Material examined. Morocco, Rif: 1♂, Oued Tassikeste (35°23'64.9"N 5°13'90.0"W, 240 m), 5.I.2013, Belqat leg., sweep net.

General distribution. Afrotropical: United Arab Emirates. Palaearctic: Canary Islands, Egypt, Libya (El-Hawagry et al., 2018), Morocco (**New record**), Spain (El-Hawagry et al., 2018).

Habitat. The first Moroccan record of the genus is from the riverbank of Oued Tassikeste. This is a temporary tributary of Oued Laou, which hosts remarkably diverse vegetation. Trees and shrubs in the area include *Pistacia lentiscus*, *Rubus ulmifolius*, *Olea europaea*, and *Nerium oleander*. The species *Mentha villosa* and *Pteridium aquilinum* enhance the ecosystem with their varied presence and adaptation to local conditions. Additionally, *Cannabis sativa* is cultivated intensively in the area.

Genus *Psilopa* Fallén, 1823

***Psilopa compta* (Meigen, 1830)**

Material examined. Morocco, Rif: 1♀, Aïn Sidi Brahim Ben Arrif (35°20'41.5"N 5°32'53.5"W, 882 m), 27.V.2019, Akhrif leg., sweep net.

Distribution in Morocco. Middle Atlas: lakes (Vitte, 1988). Rif (**New record**).

General distribution. Afrotropical: Belgium, Gambia, Kenya, Senegal. Palaearctic: Afghanistan, Algeria, Austria, Botswana, Bulgaria, Canary Islands, China, Cyprus, Czech Republic, Egypt, Estonia, Finland, Gambia, Great Britain, Greece, Hungary, Italy, Macedonia, Mallorca, Malta, Morocco, Netherlands, Poland, Romania, Russia, Sweden (El-Hawagry et al., 2018).

***Psilopa nilotica* (Becker, 1903)**

Material examined. Morocco, Rif: 1♂, Ruisset El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 24.V.2013, Belqat leg., sweep net.

Table 1. Ephydriidae species found during the present survey (in alphabetical order) and their known distribution in North African countries. ×***: new species for North Africa; ×**: new species for Morocco; ×*: new species for Moroccan geographical regions. New records are marked with bold set text.

Species	Morocco	Algeria	Tunisia	Libya	Egypt
<i>Allotrichoma laterale</i> (Loew, 1860)	×*				×
<i>Allotrichoma simplex</i> (Loew, 1861)	×				
<i>Actocetor indicus</i> (Wiedemann, 1824)	×				×
<i>Athyroglossa glabra</i> (Meigen, 1830)	×				
<i>Athyroglossa nudiuscula</i> Loew, 1860	×				
<i>Diasemocera biskrae</i> (Becker, 1907)	×	×			
<i>Diasemocera leucostoma</i> (Meigen, 1830)	×*				
<i>Diasemocera nana</i> (Loew, 1860)	×	×		×	
<i>Discocerina obscurella</i> (Fallén, 1813)	×*				
<i>Ephydra flavipes</i> (Macquart, 1843)	×*	×	×	×	×
<i>Ephydra riparia</i> Fallén, 1813	×**		×		
<i>Gymnoclasiopa aulisioi</i> (Canzoneri, 1976)	×***				
<i>Gymnoclasiopa flavoantennata</i> (Strobl, 1900)	×***				
<i>Haloscatella dictaeta</i> (Loew, 1860)	×*	×	×		×
<i>Hyadina guttata</i> (Fallén, 1813)	×*				×
<i>Hydrellia argyrogenis</i> Becker, 1896	×*		×		
<i>Hydrellia fascitibia</i> (von Roser, 1840)	×***				
<i>Hydrellia griseola</i> (Fallén, 1813)	×*	×	×		×
<i>Hydrellia maura</i> Meigen, 1838	×*	×			×
<i>Hydrellia subalbiceps</i> Collin, 1966	×	×	×		
<i>Limmellia quadrata</i> (Fallén, 1813)	×*	×			
<i>Mosillus subsultans</i> (Fabricius, 1794)	×				×
<i>Nostima picta</i> (Fallén, 1813)	×*				×
<i>Notiphila cogani</i> Canzoneri & Meneghini, 1979	×	×	×		
<i>Notiphila riparia</i> Meigen, 1830	×*				
<i>Ochthera schembrii</i> Rondani, 1847	×	×			×
<i>Philotelma rossii</i> (Canzoneri & Meneghini, 1979)	×***				
<i>Psilopa compta</i> (Meigen, 1830)	×*	×			
<i>Psilopa nilotica</i> (Becker, 1903)	×*	×	×		×
<i>Psilopa nitidula</i> (Fallén, 1813)	×	×			×
<i>Psilopa obscuripes</i> Loew, 1860	×				
<i>Scatella</i> (<i>Scatella</i>) <i>lacustris</i> (Meigen, 1830)	×*		×		×
<i>Scatella</i> (<i>Scatella</i>) <i>lutosa</i> (Haliday, 1833)	×*	×	×		×
<i>Scatella</i> (<i>Scatella</i>) <i>obsoleta</i> Loew, 1861	×				
<i>Scatella</i> (<i>Scatella</i>) <i>paludum</i> (Meigen, 1830)	×*	×			
<i>Scatella</i> (<i>Scatella</i>) <i>stagnalis</i> (Fallén, 1813)	×*	×			×
<i>Scatella</i> (<i>Neoscatella</i>) <i>subguttata</i> (Meigen, 1830)	×*		×		×
<i>Scatophila caviceps</i> (Stenhammar, 1844)	×*				
<i>Scatophila despecta</i> (Haliday, 1839)	×*	×			
<i>Scatophila farinae</i> Becker, 1903	×*	×			×
<i>Scatophila mesogramma</i> (Loew, 1862)	×***				
<i>Scatophila quadriguttata</i> (Meigen, 1830)	×***				
<i>Scatophila unicornis</i> Czerny, 1900	×*				
<i>Scatophila signata</i> (Loew, 1860)	×***				
<i>Scoliocephalus pallidisetis</i> Becker, 1903	×**			×	×

Table 2. Ephydriidae species found during the present survey (in alphabetical order) and their known biogeographical distributions. New records are marked with bold set text.

Species	Afrotropical	Australasian		Nearctic	Neotropical	Oriental	Palearctic
<i>Allotrichoma laterale</i> (Loew, 1860)				×			×
<i>Allotrichoma simplex</i> (Loew, 1861)				×			×
<i>Actocetor indicus</i> (Wiedemann, 1824)	×					×	×
<i>Athyroglossa glabra</i> (Meigen, 1830)				×			×
<i>Athyroglossa nudiuscula</i> Loew, 1860							×
<i>Diasemocera biskrae</i> (Becker, 1907)	×						×
<i>Diasemocera leucostoma</i> (Meigen, 1830)				×			×
<i>Diasemocera nana</i> (Loew, 1860)	×						×
<i>Discocerina obscurella</i> (Fallén, 1813)	×			×	×		×
<i>Ephydra flavipes</i> (Macquart, 1843)	×						×
<i>Ephydra riparia</i> Fallén, 1813				×			×
<i>Gymnoclasiopa aulisioi</i> (Canzoneri, 1976)							×
<i>Gymnoclasiopa flavoantennata</i> (Strobl, 1900)							×
<i>Haloscattella dichæta</i> (Loew, 1860)	×						×
<i>Hyadina guttata</i> (Fallén, 1813)							×
<i>Hydrellia argyrogonis</i> Becker, 1896							×
<i>Hydrellia fascitibia</i> (von Roser, 1840)				×			×
<i>Hydrellia griseola</i> (Fallén, 1813)	×	×		×	×	×	×
<i>Hydrellia maura</i> Meigen, 1838	×						×
<i>Hydrellia subalbiceps</i> Collin, 1966							×
<i>Limnelliella quadrata</i> (Fallén, 1813)							×
<i>Mosillus subsultans</i> (Fabricius, 1794)							×
<i>Nostima picta</i> (Fallén, 1813)				×	×		×
<i>Notiphila cogani</i> Canzoneri & Meneghini, 1979							×
<i>Notiphila riparia</i> Meigen, 1830							×
<i>Ochthera schembrii</i> Rondani, 1847	×						×
<i>Philotelma rossi</i> (Canzoneri & Meneghini, 1979)							×
<i>Psilopa compta</i> (Meigen, 1830)	×						×
<i>Psilopa nilotica</i> (Becker, 1903)	×						×
<i>Psilopa nitidula</i> (Fallén, 1813)	×						×
<i>Psilopa obscuripes</i> Loew, 1860							×
<i>Scatella</i> (<i>Scatella</i>) <i>lacustris</i> (Meigen, 1830)	×			×			×
<i>Scatella</i> (<i>Scatella</i>) <i>lutosa</i> (Haliday, 1833)							×
<i>Scatella</i> (<i>Scatella</i>) <i>obsoleta</i> Loew, 1861				×			×
<i>Scatella</i> (<i>Scatella</i>) <i>paludum</i> (Meigen, 1830)	×			×			×
<i>Scatella</i> (<i>Scatella</i>) <i>stagnalis</i> (Fallén, 1813)	×	×		×		×	×
<i>Scatella</i> (<i>Neoscatella</i>) <i>subguttata</i> (Meigen, 1830)							×
<i>Scatophila caviceps</i> (Stenhammar, 1844)							×
<i>Scatophila despecta</i> (Haliday, 1839)				×			×
<i>Scatophila farinae</i> Becker, 1903							×
<i>Scatophila mesogramma</i> (Loew, 1862)				×			×
<i>Scatophila quadriguttata</i> (Meigen, 1830)							×
<i>Scatophila unicornis</i> Czerny, 1900				×			×
<i>Scatophila signata</i> (Loew, 1860)							×
<i>Scoliocephalus pallidiseta</i> Becker, 1903	×						×

Distribution in Morocco. Anti Atlas: Ziz River (10 km S of Errachidia, 1008 m), 1 km N of Tarda (Errachidia, 1023 m), Merzouga (714 m), 2 km N Erfoud (818 m) (Ebejer et al., 2019). Rif (**New record**).

General distribution. Afrotropical: Ethiopia, Oman, Sudan, United Arab Emirates. Palaearctic: Afghanistan, Algeria, Egypt, Iran, Italy (El-Hawagry et al., 2018), Morocco (Ebejer et al., 2019), Saudi Arabia, Tunisia (El-Hawagry et al., 2018).

Psilopa nitidula (Fallén, 1813)

Material examined. Morocco, Rif: 1♀, Ruisselet El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 24.V.2013; 1♂, Douar Azaghar (35°14'27.8"N 0 5°75'93.0"W, 998 m), 13.V.2022, Belqat leg., sweep net.

Distribution in Morocco. Rif: Tanger (Becker & Stein 1913; Zatwarnicki, 1991). Tétouan (Zatwarnicki, 1991). Middle Atlas: lakes (Vitte, 1988), Ifrane (Vitte, 1991; Zatwarnicki, 1991). High Atlas: Toubkal (Séguy, 1941a).

General distribution. Afrotropical: Botswana, Gambia, Kenya. Palaearctic: Algeria, Austria, Belgium, Bulgaria, Canary Islands, “Caucasus”, China (NE Tibet), Cyprus, Czech Republic, Egypt, Estonia, Finland, France, Germany, Great Britain, Hungary, Italy, Macedonia, Malta, Morocco, Netherlands, Poland, Portugal, Romania, Russia (European Territory), Slovakia, Slovenia, Spain, Sweden, Switzerland, former Yugoslavia, Ukraine (El-Hawagry et al., 2018).

Psilopa obscuripes Loew, 1860

Material examined. Morocco, Rif: 2♂♂ 3♀♀, Ruisselet El Anassar (35°00'78.8"N 4°57'41.9"W, 1183 m), 24.V.2013, Belqat leg., sweep net; 1♀, Oued Lkbir (34°54'47.9"N 5°83'17.0"W, 684 m), 22.V.2021, Akhrif leg., sweep net.

Distribution in Morocco. Rif: Oued Azla (near bridge, 80 m). Central Plateau: Larache (5 m), Lower Loukous saltmarsh (2 m). Middle Atlas: Khénifra (28 km S of Timahdit, 2100 m). (Ebejer et al., 2019).

General distribution. Palaearctic: Austria, Bulgaria, Canada (Quebec), Canary Islands, France, Germany, Greece, Jordan, Madeira Islands, Morocco, Spain, Türkiye, United States (Mathis & Zatwarnicki, 1995).

DISCUSSION

This paper is a contribution relating specifically to the Shore fly fauna of Morocco. A total of 45 species of Ephydriidae were collected and identified, for which we provide all new data. Seven species, *Gymnoclasiopa aulisioides* (Canzoneri, 1976), *Gymnoclasiopa flavoantennata* (Strobl, 1900), *Hydrellia fascitibia* (von Roser, 1840), *Philotelma rossii* (Canzoneri & Meneghini, 1979), *Scatophila mesogramma* (Loew, 1862), *Scatophila quadriguttata* (Meigen, 1830) and *Scatophila signata* (Loew, 1860) are new records for North Africa and Morocco. One genus, *Scoliocephalus* Becker, 1903 and two species, *Ephydra riparia* Fallén, 1813 and *Scoliocephalus pallidisetis* Becker, 1903 are new records for Morocco. 20 species are new for the Rif mountains, 2 for the Middle Atlas, 1 species for the Central Plateau, 6 species for the High Atlas and 1 species for the Anti Atlas. Before the present work, the Moroccan fauna of the Ephydriidae comprised 117 species in 43 genera Kettani et al. (2022). Our findings increased this to 126 species in 44 genera. The world fauna of the shore flies to date consists of 2000 species, the Ephydriids fauna of Morocco, includes 6,1% of the world's species. The Moroccan fauna is mostly Palaearctic in origin, as exemplified by the 45 species recorded in this study (Table 2). A considerable number of species have a much wider distribution with 16 species present in the Afrotropical regions and 16 others species in the Nearctic regions. Three regions exhibit limited distributions of our studied species with only 3 species reported in the Oriental regions: *Actocetor indicus* (Wiedemann, 1824), *Hydrellia griseola* (Fallén, 1813), and *Scatella* (*Scatella*) *stagnalis* (Fallén, 1813); 3 species in the Neotropical regions: *Discocerina obscurella* (Fallén, 1813), *Hydrellia griseola* (Fallén, 1813) and *Nostima picta* (Fallén, 1813); and 2 species in Australian/Oceanian regions: *Hydrellia griseola* (Fallén, 1813) and *Scatella* (*Scatella*) *stagnalis* (Fallén, 1813).

From a general perspective, *Scatella* (*Scatella*) *stagnalis* (Fallén, 1813) has a broad global distribution, being reported in the Afrotropical, Australasian/Oceanian, Nearctic, Oriental, and Palaearctic regions,

covering a total of 57 countries. It is followed by *Discocerina obscurella* (Fallén, 1813) which was recorded in 49 countries with reports from the Afrotropical, Nearctic, Neotropical and Palaearctic regions. *Hydrellia griseola* (Fallén, 1813) has been reported across all continental regions except Antarctica, with a total of 47 countries. In North Africa, *Gymnoclasiopa flavoantennata* (Strobl, 1900) represents a new species for this region, with its first record outside Europe. This species, and *Notiphila cogani* Canzoneri & Meneghini, 1979, appear to have a more restricted distribution compared to other ones since both were only reported to date in three countries. Similarly, *Hydrellia subalbiceps* Collin, 1966 was recorded in only four countries, two of which are in North Africa. More than 45 species have been reported from North African countries but have not yet been recorded in Morocco. These include *Athyroglossa africana* (Wirth, 1955), *Psilopa nana* Loew, 1860, and *Risa longirostris* Becker, 1907, among others. Some of these species are widely distributed, such as *Chlorichaeta tuberculosa* Becker, 1922, *Oedenops isis* Becker, 1903 and *Paralimna bicolor* (Macquart, 1851). Many of these species are expected to occur in Morocco and may be discovered in future studies. Despite the geographical cover of our sampling, our study did not reveal any endemic species but allowed the collection of *Philotelma rossii* (Canzoneri & Meneghini, 1979), a species known to be rare. Indeed, we only came across two specimens across the 64 surveyed stations, marking its first record in North Africa. This is in agreement with the data of the literature which attests to a very limited distribution (reported in only six Palaearctic countries) with a low number of specimens. Morocco exhibits significant diversity in Ephydriidae species. Our study revealed that *Limnellia quadrata* (Fallén, 1813) is the most widespread and common species in Morocco, due to its broad distribution and high abundance. It is followed by *Scatella* (*Scatella*) *lacustris* (Meigen, 1830) and *Allotrichoma laterale* (Loew, 1860).

In terms of habitats, the Moroccan Ephydriidae fauna mainly occupy wetland areas. We documented a wide presence of species in various types of aquatic habitats, primarily rivers, springs, lakes, wells, streams, waterfalls, and beaches. Less frequently, some species were observed in forests, villages, and gardens, always near flowing or stagnant water. These observations are consistent with the habitats frequented by these species outside Morocco.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution to the paper as follows: The late Paul Beuk had a significant role in conducting this research, but he passed away before the publication of the article. We honor his memory and his valuable role in this work and are very saddened by his death; R. Akhrif: Collected specimens in the field, performed taxonomic identifications, wrote and revised the manuscript; B. Belqat: Contributed to the writing of the manuscript, the collecting of some material, the reviewing and editing the manuscript, supervised the work; K. Aattouch, K. Bouzrarf and M. Beni-Eich: collected specimens in the field. The authors read and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the collection of Diptera of the Department of Biology, Faculty of Sciences, Abdelmalek Essadi University, Tétouan, and in the collection of the Maastricht Natural History Museum, Maastricht, the Netherlands, and are available from the curator, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study only included plants and arthropod material, and all required ethical guidelines for the treatment and use of animals were strictly adhered to in accordance with international, national, and institutional regulations. No human participants were involved in any studies conducted by the authors for this article.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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گزارش های جدید مگس های ساحلی (Diptera, Ephydriidae) از مراکش

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چکیده: در میان ۴۵ گونه جمع آوری و شناسایی شده، یک جنس (*Scoliocephalus* Becker, 1903) و ۹ گونه از مگس های ساحلی (Diptera, Ephydriidae) برای اولین بار در مراکش ثبت شده اند که در بین آنها هفت گونه شامل *Gymnoclasiopa flavoantennata* (Strobl, 1900)، *Gymnoclasiopa aulisioi* (Canzoneri, 1976)، *Scatophila Philotelma rossii* (Canzoneri Meneghini, 1979)، *Hydrellia fascitibia* (von Roser, 1840)، *Scatophila signata* (Loew, 1860) و *Scatophila quadriguttata* (Meigen, 1830)، *mesogramma* (Loew, 1862) برای منطقه شمال آفریقا نیز جدید هستند. اطلاعات جدید در مورد انتشار ۲۳ گونه دیگر ارائه شد. به ترتیب ۲۰، ۶ و ۲ گونه برای رشته کوه ریف، رشته کوه های اطلس بالا و رشته کوه های اطلس میانه جدید هستند، در حالی که یک گونه برای هر یک از فلات مرکزی و رشته کوه های آنتی اطلس جدید است. این یافته ها تعداد گونه های Ephydriidae ثبت شده در مراکش را به ۱۲۶ گونه در ۴۴ جنس افزایش می دهد. این داده ها به طور قابل توجهی به درک تنوع زیستی و توزیع بیوگرافیایی خانواده Ephydriidae در مراکش و شمال آفریقا کمک می کند. فون مگس های Ephydriids در مراکش ۶.۱٪ از گونه های شناخته شده جهان را شامل می شود.

واژگان کلیدی: تنوع زیستی، انتشار، کوهستان ریف، میانه اطلس، اطلس بالا، شمال آفریقا