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A review of the plume moth fauna (Lepidoptera: Pterophoridae) of Israel

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ABSTRACT

Available information on the Israeli plume moths is rather scarce and outdated. Prior to our investigation, 41 species were recorded from the country. The material from the Steinhardt Museum of Natural History in Tel Aviv yielded another four species: *Agdistis bellissima* Arenberger, 1975; *Marasmarcha ehrenbergiana* (Zeller, 1841); *Pterophorus pentadactyla* (Linnaeus, 1758); and *Wheeleria sobeidae* (Arenberger, 1981). Five species are endemics or sub-endemics of Israel: *Hellinsia aegyptiacus* (Rebel, 1914); *Hellinsia scholastica* (Meyrick, 1924); *Agdistis pygmaea* Amsel, 1955; *Agdistis nigra* Amsel, 1955; *Capperia fletcheri* Adamczewski, 1951. The diversity of ecologies in Israel suggests that the plume moth fauna of the country may substantially increase through a targeted collection effort.

KEYWORDS: Biodiversity, Pterophoridae, Israel, Mediterranean, Middle East, fauna, plume moths.

INTRODUCTION

Israel is situated at the eastern part of the Mediterranean Basin along the Levant Rift System (Picard 1943; Mart *et al*. 2005). The alternating geographical and climatic zones of Israel support a rich fauna and flora of a diverse origin, often comprised of species at their furthest points of geographical distribution (e.g. Bodenheimer 1930, 1932, 1935; Furth 1975; Benyamini 1988; Tchernov & Yom-Tov 1988).

Israel is located within the 20 °C isotherm (Beaumont *et al*. 1988), but the annual average temperature fluctuates from 17 °C in the hills to 25 °C in the Jordan Valley (Ashbel 1951). Normally, the temperature drops abruptly in November and reaches a minimum in January or February. In spring, the temperature rises gradually to peak in summer around 40 °C (Ashbel 1951). The bulk of the annual rainfall (70 %) occurs between November and February, with little rain in spring and a pronounced drought from June to August. The annual rainfall decreases from 1500 mm on Mt

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Hermon in the north to 15 mm near the golf of Eilat in the south (Ashbel 1951). The plants of Israel belong to five phytogeographic regions (Zohary 1966, 1973), the Mediterranean, Irano-Turanian, Saharo-Arabian, Tragacant and the Ethiopian penetration zone.

Areas receiving more than 350 mm rainfall annually belong to the Mediterranean, or temperate, Zone (Zohary 1962). Areas with less than 200–300 mm winter rainfall, which supports only steppes and grasslands, are referred to the Irano-Turanian Zone. The Saharo-Arabian eremic zone is a true desert with less than 200 mm winter rainfall. The Rift Valley with even less precipitation provides harbours numerous tropical pockets near springs (Zohary & Orshan 1949). These oases are penetrated by the Ethiopian fauna and flora. On the peak of Mt Hermon (above 1900 m), typical Tragacanth vegetation is found, which tolerates very low temperatures and snow in winter and hot droughts in summer.

Information on the Israeli plume moths is very scarce and outdated. Zeller (1867) mentioned three plume moth species from the Jordan Valley, viz. *Platyptilia* sp., *Stangeia siceliota* and *Stenoptilia arida*. Freiherrn von Kalchberg (1897) listed five species from around Haifa: *Agdistis meridionalis*, *Agdistis tamaricis*, *Amblyptilia acanthadactyla*, *Stenoptilia bipunctidactyla* and *Wheeleria obsoleta*. Meyrick (1924) described *Pterophorus scholasticus* [presently *Hellinsia scholastica*]. Bodenheimer (1937) enumerated 38 species of Pterophoridae in his *Prodromus faunae palaestinae*, including those that fell into synonymy since then, but he indicated neither their provenance nor seasons when they had been collected or observed, so his compilation is of a limited value. A major contribution was made by Amsel (1935*a–c*, 1954, 1955), who identified more than two dozens of plume moth species in the Israeli fauna, described some of them as new and published his observations on host plant association of some species. Halperin and Sauter (1992) also added a couple of host plant records for two plume moth species in Israel. Gielis (2003) was the last who summarised all available information on distribution and host plants for the Pterophoridae of the World fauna, but he regrettably overlooked some old records from Israel, an oversight inevitable for a work of such a scale. Below we rectify these omissions.

MATERIALS AND METHODS

The paper is based on the collection of the Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies, Tel Aviv University, Israel. Identification of species has been done based on external features and genitalia, using recent publications (Arenberger 1995, 2002, 2005).

Details of genitalia are essential for the identification of Pterophoridae. The abdomen is normally boiled in a 10–15 % solution of potassium hydroxide until it becomes semi-transparent. It is then thoroughly rinsed, soaked in 100 % ethanol, and transferred in a drop of Euparal for permanent preparation and further identification. If structures of the genitalia are not well sclerotized, they are stained with Chlorazol

Black for better contrast. A permanent preparation desiccates for at least two weeks before it can be studied.

List of collecting localities

1. Mt Hermon [Har Hermon], 1800 m, 33°18'37"N 35°46'46"E.
2. Northern Hula Valley, Snir [Senir], 33.2403°N 35.6770°E.
3. Western Galilee, Kabri, 33°01'15.2"N 35°08'56.4"E.
4. Upper Galilee, Hulioth [Sede Nehemya, Huliyyot], 33°11'13"N 35°37'21"E.
5. Sea of Galilee area, Beit Zera [Bet Zera'], 32°41'20.03"N 35°34'24.23"E.
6. Sea of Galilee area, Deganya, 32°42'29"N 35°34'29"E.
7. Carmel, Nahal Oren, 32°42'33.94"N 34°58'52.17"E.
8. Lower Jordan Valley, Wadi Fari'a [Nahal Tirza spill], 32°16'44"N 35°16'48"E.
9. Central Coastal Plain, Tel Aviv, Holon, 32°01'N 34°46'E.
10. Central Coastal Plain, Rehovot, 31.8928°N 34.8113°E.
11. Central Coastal Plain, Yesodot, 31.8158°N 34.8656°E.
12. Foothills of Judean Mountains, Latrun, 31°50'08"N 34°58'49"E.
13. Foothills of Judean Mountains, Kfar Shmuel [Kefar Shemu'el], 31°53'22"N 34°55'54"E.
14. Foothills of Judean Mountains, Abu Gosh, 31°48'N 35°07'E.
15. Foothills of Judean Mountains, Kiryat Anavim, 31°48'38"N 35°07'00"E.
16. Judean Mountains, Even Sapir [Even Sappir], 31°45'46.8"N 35°08'04.6"E.
17. Judean Desert, Nabi Musa, 31.7864°N 35.4316°E.
18. Northern Negev, Phoenix Farm, 31°04'33.92"N 34°41'9.92"E.
19. Dead Sea area, Ein Gedi ['En Gedi] Nature Reserve, 31°27'00"N 35°23'00"E.
20. Northern Arava Valley, Hazeva Field School, 30°43'N 35°15'E.
21. Northern Arava Valley, Nahal Idan [Nahal 'Iddan], 30°48'20"N 35°18'01"E.
22. Northern Arava Valley, Shezaf Natural Reserve, 30°43'N 36°16'E.

RESULTS

The genera and species below belong to several subfamilies, but are listed alphabetically for the sake of convenience. Asterisked species are new records for Israel.

1. *Adaina microdactyla* (Hübner, [1813])

Distribution: Europe, Turkey, Israel, Iran, Georgia, Nepal, China, Japan, Vietnam, Indonesia, Bhutan, Philippines, Taiwan, New Guinea, Solomon Islands (Amsel 1935*a*, *b*; Gielis 2003).

2. *Agdistis adactyla* (Hübner, [1823])

Distribution: Broadly Palaearctic (Gielis 2003); in Israel recorded by Amsel (1935*a*).

Fig. 1: *Agdistis bellissima* Arenberger, ♂, Northern Arava Valley, Hazeva Field School. (Photo S. Reshetnikov)

Agdistis arabica Amsel, 1958

Material examined: 1♂ Nahal Idan, 13.iii.1999, Li, Müller; 1♂ Northern Negev, Phoenix Farm, i.2019, V. Kravchenko.

Distribution: Tunisia, Egypt, Israel, Sudan, Yemen, Saudi Arabia, Oman, Bahrain, Iran, Pakistan, Somalia (Gielis 2003).

3. *Agdistis bellissima* Arenberger, 1975*

(Fig. 1)

Material examined: 1♂ Nahal Shezaf, 25.iv.1997, I. Yarom; 1♂ Nahal Shezaf, 23.x.1997, A. Maklakov; Hazeva Field School: 11 ex. 1–26.vii.1997, 1♂ 1.viii.1997, 26 ex. 3–30.x.1997, A. Maklakov, S. Plotkin, 1 ex. 20.iv.1998, 1♀ 23.v.1998, E. Ashkenazi.

Distribution: Egypt, Jordan, Tunisia, Morocco, Saudi Arabia, Yemen (Gielis 2003). New to Israel.

4. *Agdistis frankeniae* Zeller, 1847

Material examined: 1♂ Nahal Idan, 13.iii.1999, Li, Müller.

Distribution: Europe, Middle East (incl. Israel), the Caucasus, European Russia, Iran, Kazakhstan (Amsel 1955, as *A. bahrlutia*; Gielis 2003).

5. *Agdistis halodelta* Meyrick, 1925

Material examined: 2♂ Nabi Musa, 23.ii.1999, Li, Müller.

Distribution: Tunisia, Egypt, Israel (Amsel 1955, as *A. lippensi*; Gielis 2003).

6. *Agdistis heydeni* Zeller, 1852

Material examined: 1♀ Hulioth, 17.v.1968, [collector unknown]; 2♂ Carmel, iii.2003, Nahal Oren, G. Müller; 1♂ Even Sapir, vi.2003, G. Müller, V. Kravchenko.

Distribution: France, Spain, Portugal, Morocco, Algeria, Tunisia, Libya, Canary Islands, Poland, Italy, Corsica, Sardinia, Sicily, Hungary, Albania, Bulgaria, Greece, Crete, Cyprus, Turkey, Israel, Syria, Lebanon (Gielis 2003).

7. *Agdistis meridionalis* (Zeller, 1847)

Distribution: Great Britain, France, Spain, Portugal, Morocco, Algeria, Tunisia, Canary Islands, Italy, Corsica, Sardinia, Sicily, Malta, Croatia, Albania, Romania, Greece, Cyprus, Turkey (Gielis 2003). In Israel, the species had been recorded by Freiherrn von Kalchberg (1897) from Haifa, but was omitted in the World catalogue (Gielis 2003).

8. *Agdistis nigra* Amsel, 1955

Material examined: 1♂ Kfar Shmuel, 29.iv.1967, 1♂ 1.v.1968, 1♂ 7.v.1968, 1♀ 10.v.1968, 2♀ 16.v.1968, 1♂ 17.v.1968; 1♀ Hulioth, 23.vi.1968, Z. Shoham.

Distribution: Amsel (1955) described this species from Waldheim [Allonei Abba], SE of Haifa, Israel. Gielis (2003) also reported it from Cyprus.

9. *Agdistis paralia* Zeller, 1847

Distribution: France, Spain, Morocco, Algeria, Tunisia, Sardinia, Sicily, Malta, Greece, Israel, Turkmenistan (Amsel 1935*b*; Gielis 2003). In Israel, Amsel (1935*a*) recorded this species from Kasr el Jahud [Qasr al-Yahud], north of the Dead Sea.

10. *Agdistis pygmaea* Amsel, 1955

Distribution: The species was described by Amsel (1954) from Tel Aviv dunes, Israel.

11. *Agdistis satanas* Millière, 1875

Distribution: South Europe, North Africa, Turkey (Gielis 2003). In Israel, Amsel (1935*a*) recorded this species from Waldheim [Allonei Abba], SE of Haifa.

12. *Agdistis tamaricis* (Zeller, 1847)

Material examined: 1♀ Damia, 29.vi.1971, J. Kugler; Hazeva Field School: 1♂ 1.viii.1997, Maklakov, 1♂ 18.xi.1997, 1♂ 2.v.1998, 1♂ 4.v.1998, 1♂ 18.v.1998, 1♂ 22.v.1998, E. Ashkenazi; 1♀ Shezaf, 3.v.1999, I. Yarom.

Distribution: Europe, Middle East (incl. Israel), Middle Asia up to Pakistan, China, Taiwan (Gielis 2003). Amsel (1935*a*) collected caterpillars of this species in large amounts from tamarisk at the Allenby Bridge.

Fig. 2: *Amblyptilia acanthadactyla* (Hubner), ♂, Northern Hula Valley, Snir. (Photo S. Reshetnikov)

Agdistis sp.

Material examined: 1♀ Ne'ot HaKikkar, 26.iv.2000, A. Tsairi.

Note: Female of this species could not be identified.

13. *Amblyptilia acanthadactyla* (Hübner, [1813])

(Fig. 2)

Material examined: 1♂ Hulioth, 3.vii.1972, D. Gerling; 1♂ Snir, 22.iv.1988, G. Müller.

Distribution: All over Europe Gielis (2003). In Israel, the species had been recorded by Freiherrn von Kalchberg (1897) from Haifa, but was omitted by Gielis (2003).

14. *Capperia fletcheri* Adamczewski, 1951

Distribution: Turkey, Israel (Gielis 2003).

15. *Capperia maratonica* Adamczewski, 1951

Distribution: Southern Europe, Turkey, Israel, Armenia, Ukraine, Crimea, Caucasus, Turkmenistan (Gielis 2003).

16. *Capperia marginella* (Zeller, 1847)

Distribution: Gielis (2003) provided Sicily, Greece and Cyprus, but missed indication of this species from Jeriho and Kiryat Anavim (Israel) by Amsel (1935*a*), who mentioned that the species was rare.

17. *Capperia washbourni* Adamczewski, 1951

Material examined: 1♂ Kfar Shmuel, 19.iv.1968, 1♀ 29.iv.1968, 1♂ Latrun, 1.v.1968, D. Gerling.

Distribution: Greece, Turkey, Israel, Syria, Iran, Afghanistan, Turkmenistan (Gielis 2003).

18. *Crombrugghia tristis* (Zeller, 1839)

Distribution: Europe, Turkey, Israel, Syria, Caucasus, Iran, Central Asia, SW Siberia, China (Amsel 1935*a*; Gielis 2003).

19. *Emmelina monodactyla* (Linnaeus, 1758)

Material examined: 1♀ Sde Nehemia, 27.iv.196(?), [no collector]; Hulioth, 1♂ 18.v.1967, 2♂ 18.ii.1968, 1 ex., 20.iv, 1968, 1♀ 13. xii.1968, Z. Shoham; 1♀ 5.iii.1968, S. Bleszynski; 1♂ Kiryat Anavim, 3.v.1968; 4 ex., Kfar Shmuel, 1♂ 15.v.1968; 1♀ Latrun, 7.iv.1968, 1♀ 25.iv.1968, A. Freidberg; 2♂ 1♀ Kabri, 20.x.1971; 1♀ Yesodot, 1.iv.1971; 1 ex., Bet-Zera, 13.iv.1971; 1♂ 1♀ Wadi Far'ia, 16–17.iii.1971, D. Gerling; 1♀ Ein Gedi, 15.iv.1987, A. Freidberg 1♀ Ne'ot Ha-Kikkar, 26.iv.2000, A. Tsairi; 1♀ Nahal Tavor, 23.iv.1988, G. Müller; 1♀ Rehovot, 2.iii.1994, A. Freidberg.

Distribution: Practically cosmopolitan (Gielis 2003; pers. obs.).

Host plants: In Israel, Amsel (1935*a*) collected this species on *Convolvulus arvensis* L. (Convolvulaceae), which is a known host plant for *E. monodactyla* among many others of several families (Gielis 2003).

20. *Hellinsia aegyptiacus* (Rebel, 1914)

Distribution: The species was described from Egypt (Rebel 1914), and subsequently recorded reared from *Ambrosia maritima* L. (Asteraceae) on Tel Aviv dunes by Amsel (1935*a*), who also noticed a very short period of its pupal stage.

21. *Hellinsia carphodactyla* (Hübner, [1813])

Distribution: All Europe except Scandinavia according to Gielis (2003), who overlooked the Israeli record of this species by Amsel (1935*a*).

23. *Hellinsia inulae* (Zeller, 1852)

Material examined: Latrun, 1♂ 1.iv.1968, 1♀ 17.iv.1968, 4 ex., 25.iv.1968, 1♂ 1.v.1968; Kfar Shmuel, 2♀ 9.iv.1968, 1♂ 12.iv.1968, 1♂ 19.iv.1968; 3♂ Senir, 10.iv.1987, A. Freidberg.

Distribution: South and East Europe, European Russia, North Africa, Middle East (incl. Israel), Uzbekistan (Gielis 2003); Siberia (pers. obs.).

24. *Hellinsia scholastica* (Meyrick, 1924)

Distribution: The species was described by Meyrick (1924: 94) from Wadi Kelt [Wadi Qelt, or Nahal Perat], a gulch that stretches from Jerusalem to Jeriho.

Fig. 3: *Lantanophaga pusillidactylus* (Walker), Southern Coastal Plain, Bat Yam. (Photo A. Weinstein)

25. *Lantanophaga pusillidactylus* (Walker, 1864)

(Fig. 3)

Observation record: One adult in a private garden, Bat Yam, 25.vi.2019, A. Weinstein.

Distribution: Everywhere in tropics and subtropics; Israel (Gielis 2003).

26. *Marasmarcha ehrenbergiana* (Zeller, 1841)*

(Fig. 4)

Material examined: 2♂ Hulioth, 24.v.1968, Z. Shoham.

Distribution: Turkey, Syria, Iran, Lebanon (Gielis 2003). New record for Israel.

27. *Megalorhipida leucodactyla* (Fabricius, 1794)

(Fig. 5)

Material examined: 3♂ Ein Gedi, 15.iv.1987, A. Freidberg; 1♀ Hazeva Field School, 19.iv.1998, E. Ashkenazi; 2 ex., indoors Steinhardt Museum of Natural History, Tel Aviv, 17.xi.2020, A. Weinstein.

Observation records: One adult, 1 larva and 1 pupa were observed and photographed on *Commicarpus plumbagineus* Standl. (Nyctaginaceae) near the wall of the Zoological Gardens of Tel Aviv University on 17.xi.2020 by A. Weinstein.

Distribution: Widespread throughout tropical and subtropical regions (Gielis 2003); Israel (Amsel 1935*a*, *c*, as *Megalorhipida palaestinensis* Amsel, 1935).

Host plants: Amsel (1935*a*: 258) noted that in Israel the moths were not uncommon around *Boerhavia* sp. (Nyctaginaceae) in the evening. The species develops on a

Fig. 4: *Marasmarcha ehrenbergiana* (Zeller), ♂, Upper Galilee, Huliot. (Photo S. Reshetnikov)

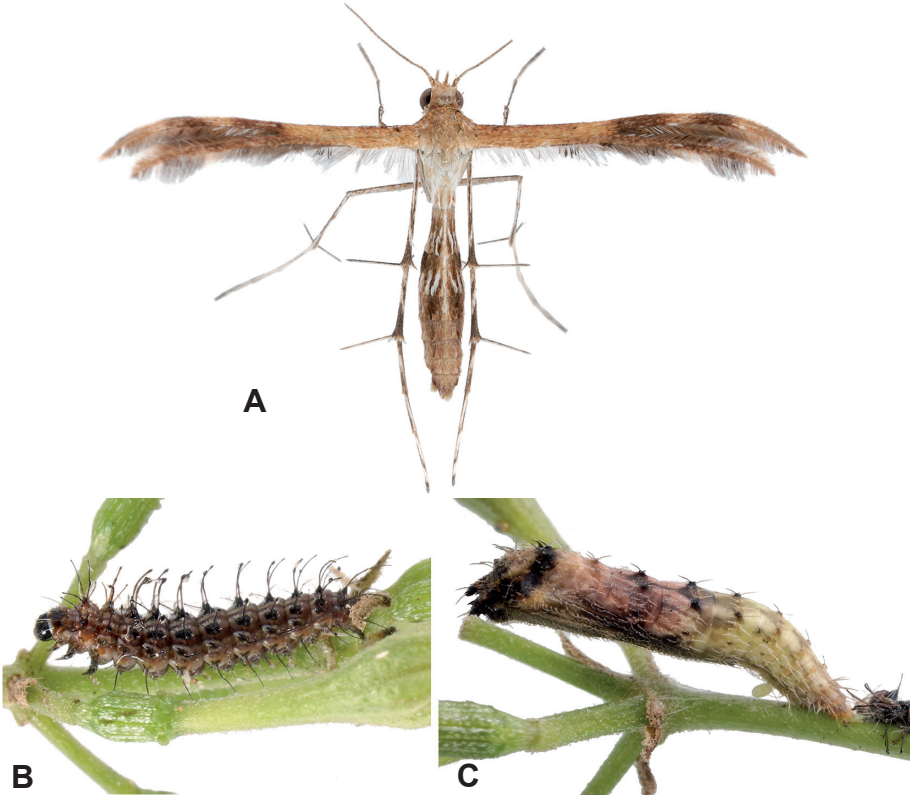

Fig. 5: *Megalorhipida leucodactyla* (Fabricius), Central Coastal Plain, Tel Aviv: (A) adult moth, (B) presumed caterpillar, (C) presumed pupa. (Photos A. Weinstein)

broad range of hosts, including both *Boerhavia* sp. and *Commicarpus* spp. (Gielis 2003).

28. *Merrifieldia baliodactyla* (Zeller, 1841)

Distribution: Entire Europe, Morocco, Lebanon, Kyrgyzstan (Gielis 2003). In Israel, the species was recorded by Amsel (1935*a*) as uncommon.

29. *Merrifieldia calcaria* (Lederer, 1870)

Distribution: Iran, Turkmenistan, Kazakhstan (Gielis 2003). In Israel, *M. calcaria* was recorded by Amsel (1935*a*) as a rare species.

30. *Merrifieldia malacodactyla* (Zeller, 1847)

Material examined: 2♂ Carmel, Nahal Oren, iii.2003, G. Müller; 1♂ Shoham, 21.ii.2014, A. Weinstein.

Distribution: Southern Europe, European Russia, the Caucasus, Ukraine, Kazakhstan, Turkey, Lebanon, Syria, Israel, Iraq, Iran, Afghanistan, Saudi Arabia (Amsel 1935*a*; Gielis 2003).

31. *Oxyptilus parvidactylus* (Haworth, 1811)

Distribution: Europe, Asia Minor, Caucasus, Iran, SW Siberia, Israel (Amsel 1935*a*; Gielis 2003).

32. *Porrittia imbecilla* (Meyrick, 1925)

Distribution: Egypt, Israel, Saudi Arabia, Yemen (Gielis 2003).

Host plants: In Israel, the species was recorded on *Pluchea dioscoridis* (L.) DC. (Asteraceae) (Halperin & Sauter 1992).

33. *Pterophorus ischnodactyla* (Treitschke, 1833)

Distribution: Southern Europe, south European Russia, Crimea, the Caucasus, Turkey, Syria, Israel, Lebanon, Oman, Yemen, Bahrain, Iraq, Mongolia (Amsel 1935*a*; Gielis 2003).

34. *Pterophorus pentadactyla* (Linnaeus, 1758)*

(Fig. 6)

Material examined: 1♂ 1♀ Kfar Shmuel, 15.iv.1968, D. Gerling.

Distribution: Europe, Turkey, Israel, Syria, Iran, Caucasus, Mongolia, Kazakhstan, west Siberia, south of Russian Far East, China: Jilin, Sichuan, Yunnan, Xinjiang, Taiwan.

35. *Puerphorus olbiadactylus* (Millière, 1859)

Material examined: 1♂ Abu Ghosh, 3.v.1968, A. Freidberg.

Fig. 6: *Pterophorus pentadactyla* (Linnaeus), ♂, foothills of Judean Mountains, Kfar Shmuel. (Photo S. Reshetnikov)

Distribution: Southern Europe, Morocco, Algeria, Tunisia, Turkey, Lebanon, Syria, Israel, Jordan, Yemen, Iran, Afghanistan (Amsel 1935*a*; Gielis 2003).

36. *Stangeia siceliota* (Zeller, 1847)

Material examined: 1♂ Latrun, 27.iii.1968, [no collector]; 1♀ Ein Gedi, 25.iii.1968, [no collector]; 2♂ Holon, 15.iv.1968, A. Freidberg.

Distribution: Southern Europe, Transcaucasia, Middle East including Israel, Afghanistan and Central Asia (Amsel 1935*a*; Gielis 2003).

Host plants: Amsel (1935*a*: 258) noted that the moths "...im März aus Podonosma syriaca [*Podonosma orientalis* (L.) Feinbrun (Boraginaceae)] häufig aufgescheucht." This host plant was not listed by Gielis (2003) for *S. siceliota*.

37. *Stenoptilia arida* (Zeller, 1847)

Material examined: 5 ex., Kfar Shmuel, 15–19.iv.1968, D. Gerling.

Distribution: Southern Europe, Turkey, Israel, Kazakhstan (Arenberger 2005).

38. *Stenoptilia bipunctidactyla* (Scopoli, 1763)

Distribution: All over Europe, Tunisia, Egypt, Syria, Lebanon, Kazakhstan, Iran, Pakistan according to Gielis (2003), who overlooked the Israeli records of this species by Freiherrn von Kalchberg (1897) and Amsel (1935*a*).

39. *Stenoptilia stigmatodactyla* (Zeller, 1852)

Distribution: North Africa, Western, Central and Mediterranean Europe, Turkey,

Israel (Arenberger 2005), Transcaucasia, Iran, Kazakhstan, South Siberia, Yakutia, Magadan region.

40. *Stenoptilodes taprobanes* (Felder & Rogenhofer, 1875)

Distribution: In all biogeographic regions, predominantly in tropical and subtropical zones according to Gielis (2003), who, however, overlooked the Israeli record of the species by Amsel (1935*a*, as *Platyptilia brachymorpha* Meyr.). Vargas *et al*. (2020) also mentioned *S. taprobanes* from Israel.

41. *Tabulaephorus parthicus* (Lederer, 1870)

Distribution: Turkey, Israel, Jordan, Syria, Iran, Turkmenistan, Armenia, Azerbaijan, Afghanistan (Gielis 2003).

42. *Wheeleria obsoleta* (Zeller, 1841)

Material examined: 1♀ Kfar Shmuel, 12.iv.1968, D. Gerling; 1♀ Mt Hermon,1800 m, 12.viii.1973, D. Furth.

Distribution: Southern Europe, European Russia, the Caucasus, Turkey, Israel, Jordan, Iran, Turkmenistan (Amsel 1935*a*; Arenberger 1995).

Host plants: Several species of the Lamiaceae (Gielis 2003). In Israel, *Wh. obsoleta* was recorded on *Pseudodictamnus undulatus* (Benth.) Salmaki & Siadati (Lamiaceae) (Halperin & Sauter 1992).

43. *Wheeleria phlomidis* (Staudinger, 1870)

Distribution: Greece, [European] Russia, Turkey, Israel, Jordan, Syria, Iran, Kazakhstan (Gielis 2003).

44. *Wheeleria sobeidae* (Arenberger, 1981)*

(Fig. 7)

Material examined: 1♂ Mt Hermon, 1800 m, 13.vii.1973, D. Furth.

Distribution: Turkey, Iran, Afghanistan (Arenberger 1995). New for Israel.

45. *Wheeleria spilodactyla* (Curtis, 1827)

Distribution: Great Britain, The Netherlands, Belgium, Luxemburg, France, Spain, Portugal, Morocco, Algeria, Tunisia, Libya, Germany, Italy, Corsica, Sardinia, Poland, Slovakia, Austria, Hungary, Ukraine and Australia according to Gielis (2003), who overlooked Amsel's (1935*a*) observation that the species was often seen on *Marrubium* sp. (Lamiaceae) between Hebron and Solomon Pools in al-Khader, i.e. in Judea.

Fig. 7: *Wheeleria sobeidae* (Arenberger), ♂, Mt Hermon. (Photo S. Reshetnikov)

DISCUSSION

The presented list includes 45 species with four being new for Israel: *Agdistis bellissima* Arenberger, 1975; *Marasmarcha ehrenbergiana* (Zeller, 1841); *Pterophorus pentadactyla* (Linnaeus, 1758); and *Wheeleria sobeidae* (Arenberger, 1981). Five species are endemics or sub-endemics (occurring also in neighbouring countries like Cyprus, south Turkey or northern Egypt) of Israel: *Hellinsia aegyptiacus* (Rebel, 1914); *Hellinsia scholastica* (Meyrick, 1924); *Agdistis pygmaea* Amsel, 1955; *Agdistis nigra* Amsel, 1955; *Capperia fletcheri* Adamczewski, 1951.

The Pterophoridae are predominantly elusive nocturnal moths and are generally underrepresented in museum collections, unless a dedicated project is undertaken by a specialist. Certain species prefer particular ecozones and habitats. Thus, members of the genus *Agdistis* are especially diverse in deserts and semi-deserts (e.g. Kovtunovich & Ustjuzhanin 2015), whereas species of other genera may be associated with grasslands, woodlands or alpine meadows (e.g. Kovtunovich & Ustjuzhanin 2011). At this stage, clearly sporadic records of the plume moths in Israel precludes a proper biogeographic analysis of their distribution a similar way as it has been done, for example, for the Crambidae (Kravchenko *et al.* 2020), until further material from various parts of the country is accumulated. The diversity of ecologies in Israel would certainly warrant such an effort.

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