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Some Records of Butterflies (Lepidoptera) from the Palestinian Territories

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Abstract

Butterflies were collected from 49 localities in the occupied West Bank of Jordan (Palestinian Territories). Fifty-four species were identified belonging to five families (Papilionidae, Pieridae, Lycaenidae, Hesperiidae, and Nymphalidae) during 2013-2015. The three most common butterflies observed and collected were the small White *Pieris rapae,* the Bath White *Pontia daplidice*, and the Common Blue *Polyommatus icarus.* Many species seemed rare and to be threatened by loss of habitats including *Archon apollinus*, *Zegris eupheme*, *Gonepteryx cleopatra taurica*, and *Hipparchia fatua sichaea.* We suggest that the most significant threats to butterfly biodiversity in Palestine and the Arab World in general is habitat destruction and climate change.

Keywords: Lepidoptera, Palestine, Butterflies, Biodiversity, West Bank.

1. Introduction

Scientific studies on butterflies in Eastern Mediterranean started in early 20th century when many of the species and subspecies were described (Amsel, 1935a, 1935b, 1955; Amsel & Hering, 1931; Larsen, 1974; Larsen & Nakamura, 1983). [1] However, some of the older literature is problematical. For example, Bodenheimer (1935) provided dozens of anecdotal observations and speculations that are not substantiated by any data on the butterflies of Palestine. The work of Benyamini (1984, 1988, 1997, 2002a,b) focused on the areas of Palestine that became the state of Israel in 1949. The butterflies of Jordan were studied on different occasions (Larsen & Nakamura, 1983); the most recent updates include studies by Katbeh-Bader *et al*. (1998 [2003] & 2004); Saudi Arabia (Larsen, 1983; 1984); Lebanon (Larsen, 1974); and recently Egypt (Gilbert & Zalat, 2007). After the establishment of the Palestine Museum of Natural History in 2014, one of its obligations was to identify the neglected biodiversity elements of the West Bank, an area that has not been studied well by scientists since its occupation in 1967. The present study aims to identify the butterfly fauna of the West Bank (Occupied Palestinian Territory) and update its status.

2. Materials and Methods

All specimens were collected from the Occupied Palestinian Territory of the West Bank by The Palestine Museum of Natural History (PMNH) team. A total of 49 sampling stations were visited during 2013-2015 (Table 1). Butterflies were collected by means of nets and occasionally by hand from various localities and habitats. All collected specimens are deposited at PMNH.

The collected specimens were numbered and sexed. For each species, specimens were listed according to the alphabetical order of the collecting site and the date of collecting.

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[1] For more information about the history of studying Palestinian butterflies see Benyamini (1983).

Table 1. List of visited localities and their coordinates

Locality	N	E	Locality	N	E
Ain Al Fawar	31° 50'	35° 21'	Jericho	31° 51'	35° 27'
Ain Fara	31° 49'	35° 18'	Jiftlik	32°08’	35°29’
Ain Kenia	31° 55'	35° 9'	Jinsafut	32° 10	35° 07'
Ain Samiya	31° 59'	35° 20'	Kfr Zaybad	32° 13'	35° 4'
Ain Shibly - Bardala	32° 22'	35° 29'	Mar Saba.Bethlehem	31° 42'	35° 19'
Al Aqaba	32° 21'	35° 21'	Mikhmas	31° 52'	35° 16'
Al Aroub	31° 37'	35° 8'	Nabi Saleh	32° 0'	35° 7'
Al Nabi Mousa	31° 47'	35° 25'	Nahaleen	31° 41'	35° 7'
Al Qarn	31° 37'	35° 7'	Rawabi	32° 0'	35° 11'
Artas	31°69’	35°19’	Masafer Yatta	31° 26'	35° 7'
Auja	31°56′	35°27'	Salfit	32° 5	35° 10
Bardala	32° 23'	35° 28'	Silit Adahr	32° 22'	35° 19'
Beit Fajjar	31°37′	35°9'	Tayba	31° 56'	35° 18'
Beit Jala	31°42’	35°11’	Tarqumia	31° 34'	35° 1'
Beit Lid	32° 15'	35° 7'	Ubeidiya	31°43’	35°18’
Beit sahour	31°70’	35°22’	Umm Al Tut	32°25’	35°20’
Beni Neim	31° 31'	35° 9'	Wadi Fasayal	32°01′	35°26′
Bethlehem	31°42’	35°12’	Wadi Al Abyad, 6 km NW of Nuwaima	31°54’	35°23’
Birzeit	31° 58'	35° 11'	Wadi Al Qelt/Jericho	31° 50'	35° 24'
Bruqeen	32° 4’	35° 5’	Wadi Fukeen	31°71’	35°10’
Burak Sulaiman	31° 41'	35° 10'	Wadi Haramiya	31°59’	35°14’
Edhna	31° 33'	34° 58'	Wadi Quff	31° 33	34° 58'
Fasayil	32°01′	35°26′	Walaja	31° 43'	35° 9
Haris Village	32°06’	35°08’	Zeim, Jerusalem	32°01′	35°26′
Husan	31° 42'	35° 7'			

3. Results

Fifty-four species of butterflies belonging to five families (Papilionidae, Pieridae, Lycaenidae, Hesperiidae, and Nymphalidae) were identified.

Family Papilionidae

This family is represented in the Palestinian Territories by two subfamilies (Papilioninae and Parnassiinae) and three species.

Subfamily Papilioninae

Papilio machaon syriacus Verity, 1905 (Fig. 1-A) Swallowtail butterfly

Material examined: Beit Sahour (PMNH4445, ♂, 6.10.2014); Bethlehem (PMNH6355, ♂, 21.3.2015; PMNH4385, ♂, 6.8.2014; PMNH4506, ♂, 2.7.2014; PMNH5329, 2.7.2014; PMNH5330, ♀, 19.5.2014); Ubeidya (PMNH1748-7. ♂♂, 13.5.2013), Wadi Al Qelt (PMNH6201, ♀. 4.4.2015; PMNH6202, ♀, 4.4.2015; PMNH6204, ♀, 4.4.2015). Observed in Wadi Quf, Wadi Fukin, Battir, and Al Walaja.

Remarks: Specimens of this Holarctic butterfly were collected and observed during May to August, mostly in the southern part of the occupied West Bank where our studies concentrated. According to Benyamini (1997), these butterflies occur all year round, except for January, and are found throughout Palestine. It is found in nearby countries and it is not likely a migrant (Larsen, 1975). It feeds on members of the Apiaceae and Rutaceae, especially cultivated *Ruta graveolens* (Wiltshire, 1957; Larsen, 1974; Larsen & Nakamura, 1983; Katbeh-Bader *et al*., 1998 [2003]) and Cleomaceae (Halperin & Sauter, 1991-1992). Larvae are green banded with black and spotted with orange (Wiltshire, 1957). It is also considered as a pest that eats foliage of citrus trees, carrots, dill and fennel (Larsen, 1974).

Subfamily Parnassiinae

Archon apollinus (Herbst, 1798) False Apollo

Material examined: Bethlehem (PMNH5305, 16.12.2014; PMNH5593, 21.1.2015; PMNH5663, 30.1.2015; PMNH5668, 30.1.2015).

Remarks: The genus *Archon* is found only in areas of the Eastern Mediterranean extending from Turkey to Iran, with Palestine being the most southern range of the distribution (Larsen & Nakamura, 1983). Specimens were collected from Bethlehem (PMNH garden) in February; it was also observed in March. Benyamini (1997) collected them during late November till April. According to Katbeh-Bader *et al.* (1998 [2003]), this species is limited to Bulgaria, Turkey, the Levant and Iraq. Larvae are black and spotted with orange dots and feeds on all species of *Aristolochia* (Larsen & Nakamura, 1983). The likely subspecies of our material is *A. a. bellargus* Staudinger, 1891. Nazari & Sperling (2007) found a significant

genetic divergence between populations from Palestine and those from Turkey, suggesting that there might be more species in this complex than what was reported previously. *Archon apollinus* is nearly threatened in Europe according to the IUCN criteria (Van Swaay *et al*., 2011).

Allancastria deyrollei eisneri (Bernardi, 1971) (Fig. 1-B) The Lebanese Festoon

Material examined: Bethlehem (PMNH6409, ♀, 27.3.2015).

Remarks: According to Benyamini (1983) *A. deyrollei* was recorded for the first time in Palestine in 1983, and inhabits the northern and central region of Palestine. This species is likely to ascend up to 2000m (Larsen, 1974). A single specimen was collected from Bethlehem below 800m at the southern end of its known distribution in Palestine, but it seems to penetrate the southern Mediterranean zone in Jordan (Larsen & Nakamura, 1983). The Lebanese Festoon is known to feed on various species of the family Aristolochiaceae, such as *Aristolochia scabridula* and *Aristolochia maurorum* (Larsen, 1974). *A. deyrollei* is widespread in Turkey, the Levant, and Iran with a single brood from March to April (Katbeh-Bader *et al*., 1998 [2003]; Nazari *et al*., 2007) and the larvae usually pupate under stones in rudimentary cocoons (Larsen & Nakamura, 1983).

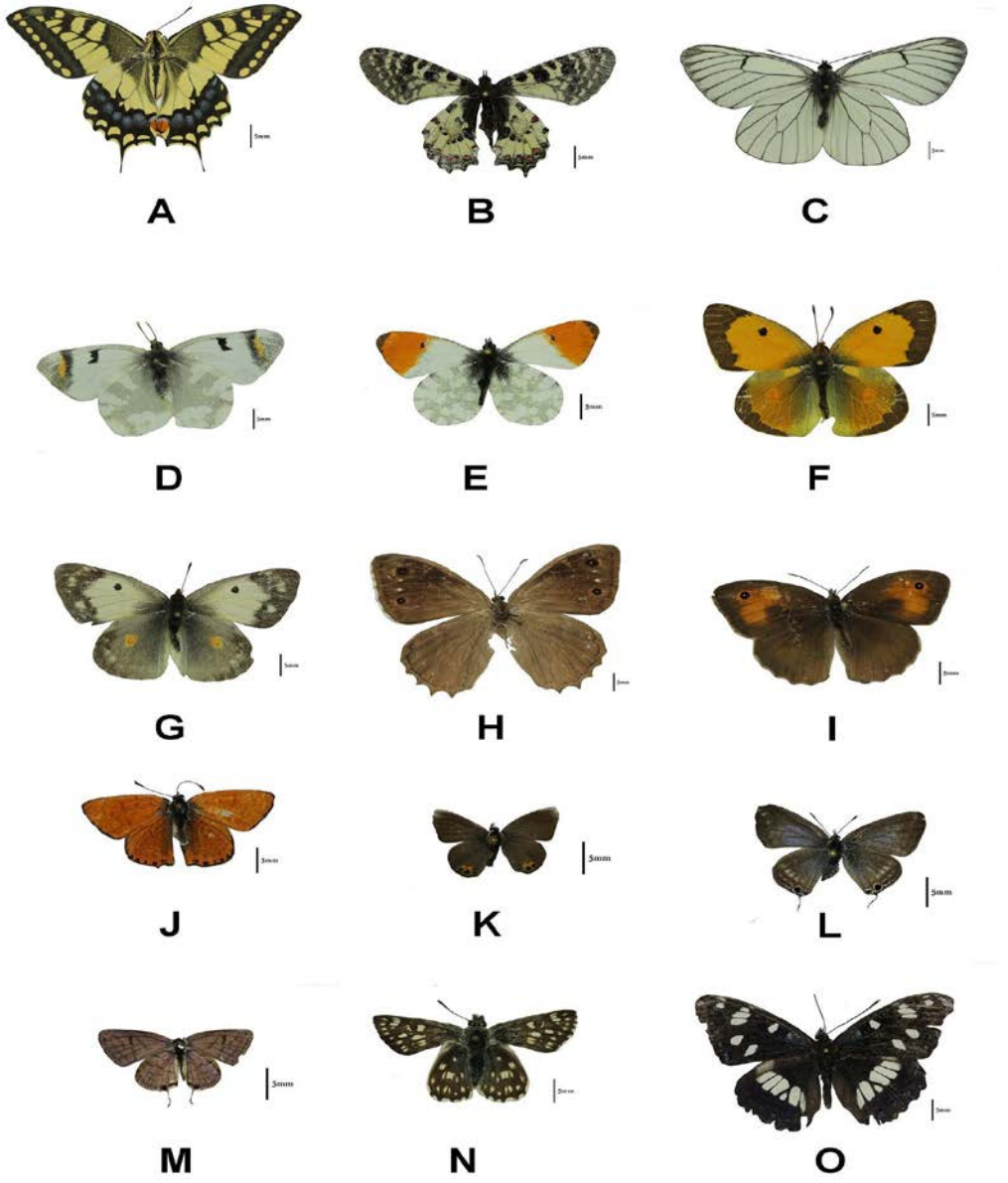

Figure 1. A- *Papilio machaon syriacus*, B- *Allancastria deyrollei eisneri*, C- *Aporia crataegi augustior*, D- *Zegris eupheme*, E- *Anthocharis cardamines phoenissa*, F- *Colias croceus*, G- *Colias croceus* morph, H- *Hipparchia pisidice*, I- *Maniola telmessia*, J- *Lycaena thersamon*, K- *Chilades (Freyeria) trochylus*, L- *Lampides boeticus*, M- *Tarucus rosaceus*, N- *Syrichtus tessellum nomas*, O- *Limenitis reducta schiffermuelleri*.

Family Pieridae

Based on the updated classification, there are four subfamilies and only two occur in Palestine (Pierinae and Coliadinae).

Subfamily Pierinae

Anaphaeis aurota **(**Fabricius, 1793) Brown-veined White

Material examined: Ain Fasayel (PMNH5500, ♂, 14.1.2015); Artas (PMNH5251, ♂, 12.8.2014); Beit Sahour (PMNH4092, ♀, 4.5.2014); Bethlehem (PMNH6440, ♂, 20.4.2015; PMNH6352, ♀, 25.10.2014; PMNH4988, ♂, 17.8.2014; PMNH5300, ♂, 8.11.2014); Edna (PMNH4996, ♂, 23.8.2014; PMNH4999, ♂, 23.8.2014; PMNH5002, ♂, 23.8.2014; PMNH5004, ♀, 23.8.2014; PMNH5010, ♂, 23.8.2014); Salfit (PMNH5074, ♂, 22.8.2014; PMNH5093, ♀, 22.8.2014); Wadi Al Qelt (PMNH6197, ♂, 4.4.2015).

Remarks: Specimens were collected in January, April, May, August, October, and November. Larsen (1975) and Benyamini (1983) reported that this species declined in both Palestine and Lebanon since the 1940s and 1950s. However, it seems to recover in certain areas. Brown-veined White butterfly is known in Africa, Arabia and India (Larsen, 1990). Larvae feed on *Capparis* sp. and *Maerua* sp. (Larsen, 1990).

Anthocharis cardamines phoenissa von Kalchberg, 1894 (Fig. 1-E) Orange Tip

Material examined: Bethlehem (PMNH5688, ♂, 8.2.2015; PMNH6408, ♀, 14.3.2015; PMNH6407, ♂, 16.3.2015; PMNH6406, ♀, 10.3.2015; PMNH6396, ♀, 24.3.2015; PMNH63594, ♂, 21.3.2015; PMNH6389, ♂, 26.3.2015; PMNH6387, ♂, 26.3.2015; PMNH6386, ♂, 27.3.2015; PMNH6380, ♀, 26.3.2015; PMNH6379, ♀, 26.3.2015; PMNH6354, ♂, 24.2.2015; PMNH6351, ♀, 24.2.2015; PMNH6028, ♂, 26.2.2015); Wadi Al Qelt (PMNH6417, ♀, 28.3.2015; PMNH6418, ♂, 17.3.2015).

Remarks: Collected in February and March. *A. cardamines* is common in Western Europe, temperate Asia to China (Larsen, 1974). In Palestine, Orange Tip is common in the coastal and central areas (Benyamini, 1983). It has a single brood that appears in late February and the larva feeds on various Brassicaceae, including *Torilis* sp., *Alliaria* sp., *Cardamine* sp., *Barbarea* sp., *Cochlearia* sp. and *Nasturtium* sp.

Aporia crataegi augustior Graves, 1925 (Fig. 1-C) The Black-veined White

Material examined: Al Makhrour-Bethlehem (PMNH6326, ♂, 19.4.2015; PMNH6329, ♂, 15.4.2015), Wadi Al Qelt (PMNH6323, ♂, 2.4.2015; PMNH6324, ♂, 2.4.2015), Wadi Fukein (PMNH6318, ♂, 19.4.2015).

Remarks: The Black-veined White is found from North Africa, Western Europe to the Middle East and the Far East. Our specimens were collected in April. This spring species is found in our area from March to June (Benyamini, 1997). According to Benyamini (1983), this butterfly is common in north and central Palestine; excluding Jericho; but we also caught it at Wadi Al Qelt (Jericho area). *A. crataegi augustior* feeds on Rosaceae such as *Crataegus* sp. and *Amygdalus* sp. (Halperin & Sauter, 1992).

Colotis fausta fausta **(**Olivier, 1804) Large Salmon Arab

Material examined: Ain Fara (PMNH4978, ♂, 16.8.2014); Ain Kenia (PMNH4794, ♂, 15.8.2014; PMNH4796, ♂, 15.8.2014; PMNH4802, ♂, 15.8.2014); Al Walaja (PMNH4609, ♀ , 8.8.2014; PMNH4612, ♂, 8.8.2014; PMNH4616, ♀, 8.8.2014; PMNH4635, ♂, 8.8.2014; PMNH4675, ♂, 11.8.2014; PMNH5250, ♂, 20.9.2014); Artas (PMNH4730, ♂, 13.8.2014; PMNH4731, ♂, 13.8.2014); Bethlehem (PMNH5341, 2.7.2014; PMNH5342, ♂, 22.6.2014; PMNH5343, 8.8.2014; PMNH4596, ♂, 22.7.2014; PMNH4740, ♀, 13.8.2014); Edna (PMNH4989, ♀, 23.8.2014); Mar Saba-Bethlehem (PMNH5935, ♂, 13.3.2015); Burak Sulaiman (PMNH4963, ♂, 17.8.2014);; Salfit (PMNH5046, ♂, 22.8.2014; PMNH5046, ♂, 22.8.2014; PMNH5047, ♂, 22.8.2014; PMNH5057, ♂, 22.8.2014; PMNH5067, ♂, 22.8.2014; PMNH5070, ♂, 22.8.2014; PMNH5072, ♂, 22.8.2014; PMNH5085, ♀, 22.8.2014; PMNH5086, ♀, 22.8.2014; PMNH5087, ♀, 22.8.2014; PMNH5097, ♂, 22.8.2014; PMNH5101, ♂, 22.8.2014); Wadi Al Quff (PMNH3000-8, ♂♂, 30.8.2013); Wadi Fukein (PMNH4697, ♂, 9.8.2014).

Remarks: Specimens were collected between March and September. *M. fausta* is common in the Mediterranean zone, the Arabian Peninsula, India and Iraq (Larsen & Nakamura, 1983). In Palestine, it was collected even from arid areas (near the Dead Sea) all year round (Benyamini, 1997). Larvae feed on *Capparis* sp., and *Cartilaginea* (Larsen, 1990; Halperin & Sauter, 1992).

Euchloe ausonia melisande Fruhstorfer, 1908 The Dappled White

Material examined: Bethlehem (PMNH6360, ♀, 28.3.2015; PMNH6362, ♂, 26.3.2015; PMNH6369, ♀, 16.3.2015; PMNH6372, ♀, 14.3.2015; PMNH6405, ♂, 24.3.2015; PMNH5957, ♂, 13.3.2015); Mar Saba (PMNH5911, ♂, 13.3.2015); Wadi Al Qelt (PMNH6420, ♂, 17.3.2015).

Remarks: All specimens of this species were collected in March. The *E. ausonia* complex is found all around the Mediterranean and in Asia Minor. The Dappled White is common in both Mediterranean zones of Jordan. It feeds on *Brassica* and *Sinapis* (Brassicaceae). It was collected from several localities along the Jordanian side of the Jordan Valley (Katbeh-Bader *et al*., 2003).

Euchloe belemia belemia **(**Esper, 1799) The Green-striped White

Material examined: Bethlehem (PMNH6388, ♂, 26.3.2015; PMNH5667, ♀, 3.1.2015); Mar Saba (PMNH5918, ♂, 13.3.2015); Auja (PMNH5885, ♀, 9.3.2015; PMNH5887, 9.3.2015; PMNH5888, 9.3.2015; PMNH5886, 9.3.2015); Al Nabi Mousa (PMNH5940, 13.3.2015); Matahen Al Sukkar (PMNH5547, ♂, 21.1.2015); Wadi Al Qelt (PMNH6416, ♂, 24.2.2015).

Remarks: Specimens were collected in January in the Jordan Valley around Jericho and in March in the Bethlehem area. The Green-striped White extends from Iberian Peninsula, via North Africa to the Middle East and Iran to Baluchistan. In addition, it was recorded in Ethiopia and Arabia. It is a common species in the northern Mediterranean zone of Jordan and known to occur in the Jordan Valley (Katbeh-Bader *et al*., 2003).

Apparently, it has one brood in the spring, with highest peak of emergence in April. It feeds on *Erucaria* in the Jordan Valley (Trought, in Larsen & Nakamura, 1983).

Euchloe charlonia **(**Donzel, 1842) Greenish Black-tip

Material examined: Ain Hijla (PMNH 3992, 18.4.2014), Bethlehem (PMNH6384, ♂, 9.3.2015; PMNH6383, ♀, 9.3.2015; PMNH 5304, ♀, 16.12.2014); Jericho (PMNH5429, ♂, 12.1.2015); Mar Saba (PMNH5963, ♂, 13.3.2015; PMNH5966, ♂, 13.3.2015; PMNH5961, ♂, 13.3.2015; PMNH5960, ♀, 13.3.2015;PMNH 5951, ♂, 13.3.2015; PMNH5915,♂, 13.3.2015; PMNH5936, ♂, 13.3.2015; PMNH5949,♀, 13.3.2015; PMNH5945, ♂, 13.3.2015); Wadi Al Qelt (PMNH5897, ♀, 9.3.2015; PMNH5896, ♂, 9.3.2015); Wadi Al Quff (PMNH5549, ♂, 24.1.2015).

Remarks: Specimens were collected in January, March, April and December. Our data are in agreement with Larsen & Nakamura (1983) that the Greenish Black-tip has two broods: One in March and the second in November. This species is known from Morocco to Western India but its distribution is rather sporadic. *E. charlonia* is common in Hebron to Tiberias except coastal areas (Benyamini, 1997). The larval food plants are *Diplotaxis* sp., *Lonchophora* sp. and other Brassicaceae.

Pieris brassicae **(**Linnaeus, 1758) Large cabbage white

Material examined: Ain Fasayel (PMNH5465, ♀, 14.1.2015); Al Makhrour-Bethlehem (PMNH6539, ♀, 3.5.2015); Bethlehem (PMNH6346, ♂, 24.2.2015; PMNH6357, ♀, 16.3.2015; PMNH5320, ♀, 18.6.2014; PMNH5321, ♀, 15.8.2013); Burak Sulaiman (PMNH5749, 16.2.2015); Jiftlik (PMNH1708-12, ♂♂, 27.3.2013); Mar Saba-Bethlehem (PMNH5920, ♂, 13.3.2015; PMNH5937, ♀, 13.3.2015; PMNH5947, ♂, 13.3.2015; PMNH5926, ♀, 13.3.2015); Wadi Al Qelt (PMNH6198, ♂, 4.4.2015); Wadi Al Quff (PMNH3965, ♀, 11.4.2014; PMNH3967, ♂, 4.11.2014); Wadi Qana (PMNH5612, ♂, 26.11.2014).

Remarks: Specimens were collected during January and August, with three specimens collected in November. *P. brassicae* is associated with many cultivated fields including cabbage and other vegetables around human habitation and is not migratory in our region (Larsen, 1975). There are slight variations in wing patterns in this species (Freitak *et al*., 2005). This Palaearctic species is common throughout North Africa, Europe, and Eastern Mediterranean regions with more than one successful brood (Larsen, 1974). Benyamini (1997) and Katbeh-Bader *et al*. (2004) reported this species all year round, except for January; however, we collected specimens during January from the Jordan Valley at Ain Fasayel where the climate is warm all year round. It mainly feeds on family Brassicaceae and Capparaceae (Halperin & Sauter, 1992; Katbeh-Bader *et al*., 2004). Subspecies commonly assigned to our material is *catoleuca* Röber 1896 but there are many issues in subspecies designations and we prefer not to use.

Pieris rapae leucosoma **(**Schawerda, 1905) The Small White

Material examined: 3 km W Mar Saba (PMNH5950, ♂, 13.3.2015; PMNH5921, ♂, 13.3.2015; PMNH5912, ♂, 13.3.2015); Ain Hijla (PMNH4002, ♂, 18.4.2014; PMNH 4000, ♂, 18.4.2014; PMNH4001, ♂, 18.4.2014; PMNH4024, ♂, 18.4.2014); Ain Kenia (PMNH4811, ♀, 15.8.2014); Ain Shibly-Bardala (PMNH6554, ♂, 6.5.2015); Al Aroub (PMNH4588, ♂, 7.7.2014; PMNH4589, ♂, 7.7.2014); Al Makhrour-Bethlehem (PMNH6543, ♀, 3.5.2015; PMNH6325, ♂, 15.4.2015); Al Walaja (PMNH4618, ♀, 8.8.2014); Artas (PMNH4718, ♂, 12.8.2014); Auja (PMNH1710-15, ♂♂, 27.3.2013; PMNH1710-11, ♂♂, 27.3.2013; PMNH5884, ♂, 9.3.2015); Bethlehem (PMNH5428, ♂, 27.4.2015; PMNH6349, ♂, 24.2.2015; PMNH6348, ♂, 24.2.2015; PMNH6393, ♂, 26.3.2015; PMNH6390, ♂, 26.3.2015; PMNH6398, ♀, 13.3.2015; PMNH6400, ♂, 16.3.2015; PMNH6401, ♂, 26.3.2015; PMNH6402, ♂, 26.3.2015; PMNH6403, ♂, 21.3.2015; PMNH6399, ♂, 21.3.2015; PMNH6404, ♂, 14.3.2015; PMNH6391, ♂, 16.3.2015; PMNH6392, ♂, 16.3.2015; PMNH6397, ♀, 21.3.2015; PMNH6395, ♂, 21.3.2015; PMNH5889, ♂, 16.3.2015; PMNH4508, ♂, 2.7.2014; PMNH5306, ♀, 10.5.2014; PMNH5307, ♀, 10.5.2014; PMNH5308, ♂, 10.5.14; PMNH4329, ♂, 6.2.2014); Beit Qad (PMNH6066, ♂, 18.3.2015; PMNH6067, ♂, 18.3.2015; PMNH6068, ♂, 18.3.2015); Bruqeen (PMNH5165, ♂, 22.8.2014); Burak Sulaiman (PMNH4964, ♀, 17.8.2014); Edna (PMNH4997, ♂, 23.8.2014; PMNH5000, ♂, 23.8.2014; PMNH5005, ♂, 23.8.2014); Em El Tout (PMNH6548, ♂, 6.5.2015); Kfr Zaybad (PMNH1755-20, ♂♂, 18.5.2013; PMNH1755-28, ♂♂, 18.5.2013); Mar Saba-Bethlehem (PMNH5932, ♂, 13.3.2015; PMNH5953, ♀, 13.3.2015); Mikhmas (PMNH 1759-9, ♀♀, 23.5.2013); Salfit (PMNH5044, ♂, 22.8.2014; PMNH5051, ♂, 22.8.2014; PMNH5075, ♂, 22.8.2014; PMNH5077, ♂, 22.8.2014; PMNH5079, ♂, 22.8.2014; PMNH5084, ♀, 22.8.2014); Tulkarm (PMNH6069, ♂, 19.3.2015; PMNH6070, ♂, 19.3.2015; PMNH6071, ♂, 19.3.2015; PMNH6072, ♂, 19.3.2015); Wadi Al Abyad, 6 km NW of Nuwaima (PMNH6500, ♂, 24.4.2015); Wadi Al Quff (PMNH4079, ♀, 21.4.2014; PMNH4448, ♀, 6.9.2014; PMNH5303, ♂, 30.11.2014); Wadi Al Qelt/Jericho (PMNH6195, ♂, 4.4.2015; PMNH6196, ♂, 4.4.2015; PMNH6194, ♀, 4.4.2015; PMNH6193, ♀, 4.4.2015; PMNH6192, ♂, 4.4.2015; PMNH5900, ♀, 9.3.2015; PMNH5905, ♀, 9.3.2015; PMNH6415, ♂, 9.3.2015; PMNH6419, ♂ 28.2.2015; PMNH5903, ♀, 9.3.2015); Wadi Fukein (PMNH6314, ♀, 19.4.2015); Wadi Haramiya (PMNH1730-1, ♂♂, 18.4.2014; PMNH 4111, ♂, 15.5.2014).

Remarks: This was one of the most common species we encountered with specimens collected during most months of the year from most localities visited during the present study. Migrations in this species are well documented, including over sea water in the Eastern Mediterranean region (John *et al*., 2008). *P. rapae* is found in the Mediterranean zone, including the Levant and Egypt. It is common in all Palestine, except for the Negev all year round (Benyamini, 1997). Larvae feed on Cruciferae like cabbage, and the adult butterflies prefer to take the nectar from flowers of alfalfa, *Medicago sativa* (Larsen, 1990). Other plants are associated with this species, including the families Capparaceae (Halperin & Sauter, 1992).

***Pontia daplidice* (**Linnaeus, 1758) Bath White

Material examined: 3 km w Mar Saba (PMNH5990, ♂, 13.3.2015); Mar Saba-Bethlehem (PMNH5955, ♀, 13.3.2015; PMNH5948, ♀,13.3.2015; PMNH5928, ♀.13.3.2015; PMNH5938, ♀, 13.3.2015; PMNH 5925, ♀.13.3.2015; PMNH5923, ♀, 13.3.2015; PMNH5917, ♀, 13.3.2015; PMNH5916, ♀, 13.3.2015; PMNH5914, ♀, 13.3.2015); Ain Hijla (PMNH3988, ♂, 18.4.2014; PMNH3990, ♂, 18.4.2014; PMNH4010, ♀, 18.4.2014; PMNH4011, ♂, 18.4.2014); Ain Fasayel (PMNH5460, ♀, 14.1.2015); Ain Kenia (PMNH4808, ♂, 15.8.2014); Al Aqaba (PMNH 4044, ♂, 18.4.2014); Al Makhrour-Bethlehem (PMNH6310, ♀, 15.4.2015; PMNH6327, ♂, 15.4.2015; PMNH6330, ♂, 15.4.2015; PMNH6335, ♀, 15.4.2015); Al Nabi Mousa (PMNH5941, ♀, 13.3.2015); Al Shawawreh-Bethlehem (PMNH5395, ♂, 26.12.2014); Al Walaja (PMNH4661 ♀, 8.8.2014); Artas (PMNH4732, ♀, 13.8.2014); Beit Lid (PMNH3469, ♀, 1.2,2014); Beirzeit (PMNH3974, ♂, 15.4.2014; PMNH3969, ♀, 15.4.2014); Bethlehem (PMNH6359, ♀, 23.3.2015; PMNH6381, ♂. 10.3.2015; PMNH6382, ♀, 10.3.2015; PMNH5939, ♀, 13.3.2015; PMNH5317, ♀, 14.5.2014); Burak Sulaiman (PMNH5705, ♀, 16.2.2015); Safeer (PMNH1713, ♀, 7.4.2013); Salfit (PMNH4094, ♂, 22.8.2014; PMNH5082, ♂, 22.8.2014; PMNH5098, ♂, 22.8.2014; PMNH5099, ♀, 22.8.2014); Wadi Al Quff (PMNH3871, ♀, 16.3.2014; PMNH3964, ♀, 11.4.2014; PMNH3912, ♂, 21.3.2014; PMNH3941, ♀, 4.11.2014; PMNH3942, ♀, 4.11.2014; PMNH3945, ♀, 4.11.2014; PMNH 3949, ♀, 4.11.2014; PMNH4026, ♂, 21.4.2014; PMNH4028, ♀, 21.4.2014; PMNH4033, ♂, 21.4.2014; PMNH4034, ♀, 21.4.2014; PMNH4076 ♀, 21.4.2014; PMNH4077, ♂, 21.4.2014; PMNH4102, ♀, 5.3.2014; PMNH4331, ♀, 5.3.2014; PMNH4342, ♀, 5.3.2014; PMNH4451, ♂, 6.9.2014; PMNH4452, ♀, 6.9.2014); Wadi Al Qelt - Jericho (PMNH6200, ♂, 4.4.2015; PMNH6206, ♂, 4.4.2015; PMNH5766, 23.2.2015; PMNH5881 ♀, 9.3.2015; PMNH5823, ♀, 9.3.2015; PMNH5901, ♀, 9.3.2015; PMNH5838, ♀, 9.3.2015; PMNH5835, ♀ , 9.3.2015; PMNH5899, ♀, 9.3.2015; PMNH5833, ♀, 9.3.2015; PMNH5904, ♀, 9.3.2015; PMNH5830, ♀, 9.3.2015; PMNH5902, ♀, 9.3.2015; PMNH5877, ♀, 9.3.2015; PMNH5837, ♀, 9.3.2015; PMNH5898, ♀, 9.3.2015; PMNH5906, ♀, 9.3.2015); Wadi Fukein (PMNH6313, ♂,19.4.2015; PMNH6322, ♂, 19.4.2015).

Remarks: Recently, this complex has been noted to possibly include two species or two major subspecies that are almost identical morphologically but differing at the molecular level: *P. daplidice* and *P. edusa* (Geiger & Scholl, 1982; John *et al*., 2013). This seems to be a very common and widely distributed species throughout Palestine. Like other authors (Benyamini, 1983, 1997; Larsen, 1975 & 1982), we collected specimens of this migratory species throughout the year.

Pontia glauconome glauconome (Klug, 1829) Desert White

Material examined: 3 km w Mar Saba (PMNH5991, ♀, 13.3.2015); Ain Al Fawar (PMNH 4984, ♀, 16.8.2014); Ain Hijla (PMNH 3991, ♀, 18.4.2014; PMNH4012, ♂, 18.4.2014); Ain Kenia (PMNH4832, ♀, 15.8.2014); Al Qarn (PMNH4585, ♂, 7.7.2014); Al Walaja (PMNH4631, ♀, 8.8.2014); Bethlehem (PMNH5319, ♀, 10.5.2014; PMNH5318, ♂, 15.8.2013); Salfit (PMNH5094, ♂, 22.8.2014); Wadi Al Quff (PMNH4447, ♀, 6.9.2014; PMNH4330, ♀, 5.3.2014; PMNH4449, ♂, 6.9.2014; PMNH4081, ♀, 5.3.2014; PMNH 4454, ♂, 6.9.2014; PMNH 4450, ♂, 6.9.2014).

Remarks: Collected from March to September, except in June. According to Benyamini (1997), *P. glauconome* is found all year round, except in January. This is a Saharo-Sindian and eremic species, with a known distribution in North Africa, Jordanian desert, Sinai Peninsula, Iraq, Oman and in Palestine where it is common in the Dead Sea area and the Negev (Benyamini, 1983 & 1997; Larsen & Larsen, 1980; Larsen, 1990). However, we observed it in the Mediterranean areas, including records from Bethlehem, Wadi Al Quff, and Salfit. Food plants of this species include the families Capparicaceae and Resedaceae (Halperin & Sauter, 1992).

***Zegris eupheme* (**Esper, 1804) (Fig. 1-D) The Sooty Orange Tip

Material examined: Wadi Al Qelt (PMNH5832, ♀, 9.3.2015).

Remarks: A single specimen was collected in March from Wadi Al Qelt, Jericho. According to Larsen & Nakamura (1983), *Z. eupheme* is found in the Irano-Turanian zone from the dry part of Spain, Morocco and to the desert between Jordan and Iraq. Locally, the subspecies *urda* Hemming, 1929 seems to appear in the Dead Sea area and the northern parts of Negev (Benyamini, 1983 & 1997). The Sooty Orange Tip is found in one brood in early spring. It feeds mainly on the family Brassicaceae, especially *Isatis tinctoria* and *Erucaria boveana* and other Cruciferae may host larvae (Courtney, 1982; Larsen & Nakamura, 1983). This species is nearly threatened in Europe per IUCN criteria (Van Swaay *et al*., 2011); we have only one specimen, which may suggest that it is threatened here in Palestine.

Subfamily Coliadinae

***Colias croceus* (Fourcoy, 1785)** (Fig. 1-F and G) Clouded Yellow

Material examined: Al Makhrour–Bethlehem (PMNH538, ♀, 3.5.2015; PMNH6328, ♂, 15.4.2015; PMNH6300, ♂, 15.4.2015); Auja (PMNH 5851, ♂, 9.3.2015; PMNH5850, ♂, 9.3.2015); Bethlehem (PMNH6436, ♀, 20.4.2015; PMNH6410, ♀, 28.3.2015; PMNH6356, ♀, 26.3.2015); Edna (PMNH4987, ♀, 23.8.2014; PMNH4990, ♀, 23.8.2014; PMNH4994, ♂, 23.8.2014; PMNH4995, ♂, 23.8.2014); Salfit (PMNH5078, ♂, 22.8.2014); Nabi Saleh (PMNH1736-22, ♂♂, 3-4.5.2013), Wadi Al Qelt (PMNH5831, ♀, 9.3.2015; PMNH6199, ♂, 4.4.2015); Wadi Haramiya (PMNH4109, ♂, 15.5.2014).

Remarks: Specimens were collected in March and August. *Colias* as a genus (clouded yellow butterflies) has three species that potentially occur in Palestine: *C. libanotica* Lederer 1858, *C. croceus* Geoffroy 1785 and *C. erate* Esper, 1805. Recent molecular studies have been performed on *Colias*, showing that the sister taxon for *C. croceus* is *C. erate* (Pollock *et al*., 1998). The latter is mentioned in Lebanon and Cyprus although the records from Cyprus maybe misidentified and are actually

croceus. Other color forms can be observed for this species even within the same location (Fig. 1-G).

Gonepteryx cleopatra taurica (Staudinger, 1881) The Cleopatra

Material examined: Bethlehem (PMNH5686, ♂, 6.2.2015).

Remarks: A single sample was collected from Bethlehem in February. According to Benyamini (1997), *G. cleopatra* can be observed all year round except in December. The subspecies present in Palestine is *taurica* which is ponto-mediterranean found in Turkey and the Levant (Larsen, 1983). *G. cleopatra* is found in northern to the middle of Palestine, except for the Jordan Valley (Benyamini, 1997). It is a migratory species and feeds on *Rhamnus* sp. (Larsen, 1974 & 1983). Decline in its numbers and distribution may reflect the degradation of forests (Katbeh-Bader *et al*., 2003).

Subfamily Satyrinae

Hipparchia fatua sichaea (Lederer, 1857) The Freyer's Grayling

Material examined: Wadi Fukeen (PMNH4693, ♂, 9.8.2014).

Remarks: One specimen was collected in August. *H. fatua* is common throughout Balkans and Middle East to Iran and Turkmenistan (Larsen & Nakamura, 1983). In Palestine, it is widespread in the northern and middle areas (Benyamini, 1983) around well-wooded regions, such as Wadi Fukeen. The Freyer's Grayling appears from early summer till late autumn and feeds on grasses according to Larsen & Nakamura (1983) but this is a rare species that is likely threatened in our area by development. Other species of the genus are threatened or nearly threatened in Europe (Van Swaay *et al*., 2011).

Hipparchia pisidice Klug, 1932 (Fig. 1-H) The Sinai Grayling

Material examined: Salfit (PMNH5062, ♀, 22.8.2014); Wadi Fukeen (PMNH5143, ♀, 29.8.2014).

Remarks: We collected specimens in August. The Sinai Grayling occurs in Sinai, the Levant and southern parts of Turkey (Katbeh-Bader *et al*., 2003). It was previously recorded in several localities in the northern Mediterranean zone of Jordan only. Larvae feed on grasses.

Hyponephele lupinus centralis (Riley, 1921) The Oriental Meadow Brown

Material examined: Beit Fajjar (PMNH5118, ♀, 23.8.2014; PMNH5120, ♀, 23.8.2014).

Remarks: Specimens were collected in August. The Oriental Meadow brown occurs in North Africa, southern Europe, Asia Minor, the Levant, Iran, Afghanistan (Katbeh-Bader *et al*., 2003). It has a single brood in May and June or July. Specimens collected in August or September are assumed to be aestivating individuals appearing to oviposit (Larsen & Nakamura, 1983). Larvae feed on grasses.

Lasiommata maera **(**Linnaeus, 1758) The Large Wall Brown

Material examined: Al Walaja (PMNH4592, 19.8.2014); Bethlehem (PMNH6365, 28.3.2015; PMNH5322, ♂, 3.7.2014; PMNH5323, ♂, 3.7.2014; PMNH5324, 22.5.2014; PMNH5325, ♂, 18.5.2014; PMNH5326, ♂, 18.5.2014;PMNH 5327, ♂, 11.5.2014; PMNH4507, ♂, 2.7.2014;PMNH5328, ♂, 9.8.2013); Birzeit (PMNH1729-1, ♂♂, 4.11.2013); Haris village (PMNH4594, ♀, 1.7.2014; PMNH4593, ♂, 1.7.2014); Mikhmas (PMNH1759-3, 23.5.2013); Wadi Al Quff (PMNH3872, ♀, 16.3.2014; PMNH3959, ♂, 4.11.2014; PMNH3000-10, ♀♀, 30.8.2013; PMNH3771, 15.3.2014; PMNH4333, 5.3.2014).

Remarks: Specimens were collected in March, May, July, August and November. The Large Wall Brown has a distribution that extends from North Africa, Europe, and the Middle East to Central of Asia. In Palestine, *L. maera* ranges from northern Palestine to Hebron in the south (Benyamini, 1983). We noted a great variation in our samples, so we do not prefer to use the ssp. *orientalis* Heyne, 1894, which is used for the Levantine populations. Collecting dates suggests that this butterfly has three broods as Larsen & Nakamura (1983) expected for the Jordanian population, two of them in early spring and summer and the third in September. Larvae feed on grasses including *Poa, Glyceria, Hordeum* and *Festuca* (Larsen & Nakamura, 1983).

Lasiommata megera emilyssa **(**Verity, 1919) The Wall Brown

Material examined: Umm El Tout (PMNH6549, ♂, 6.5.2015).

Remarks: A single specimen was collected in May. *L. megera* is found in North Africa, Europe and the Middle East to Iran. In Palestine, the Wall Brown is widespread from northern Palestine to the Negev borders. Like *L. maera*, Larsen & Nakamura (1983) suggested three broods for *L. megera* from February to September. Obviously, it is less abundant than the *L. maera* species.

Maniola telmessia (Zeller, 1847) (Fig. 1-I) The Eastern Meadow Brown

Material examined: Jerusalem (PMNH1749-5, ♀♀, 13.5.2013); Nahaleen (PMNH1735-16, ♂♂, 5.2.2013; PMNH1735-8, ♀♀, 5.2.2013); Tarqurija (PMNH1712-4, ♂♂, 4.4.2013); Wadi Fukeen (PMNH6317, ♂, 19.4.2015; PMNH6324, ♂, 19.4.2015); Wadi Al Quff (PMNH3000-3, ♀♀, 30.8.2013; PMNH4030, ♂, 21.4.2014; PMNH4032, ♂, 21.4.2014; PMNH4460, ♀, 6.9.2014).

Remarks: We collected specimens in Mediterranean habitats during February, April, August, and September. The Eastern Meadow Brown is found in Turkey, Iran and the Levant. It is restricted to the northern Mediterranean zone. It has one brood in April and May (Katbeh-Bader *et al*., 2003). Specimens collected later in the year are aestivating individuals appearing to oviposit (Larsen & Nakamura, 1983). The *Maniola* group has undergone recent speciation and had likely migrated during the last glacials into the Levant (Kreuzinger *et al*., 2015).

Melanargia titea **(**Klug, 1832) The Levantine Marbled White

Material examined: Ain Samiya (PMNH1731-13, ♀♀, 12.4.2013; PMNH1731-9, ♀♀, 12.4.2013); Bethlehem (PMNH6439, ♀, 20.4.2015; PMNH6438, ♀, 20.4.2015; PMNH5338, 1.5.2014; PMNH5339, 11.5.2014); Beni Neim (PMNH1714-27, ♂♂, 7.4.2013); Birzeit (PMNH1729-2, ♀♀, 11.4.2013; PMNH1729-3, ♂♂, 11.4.2013; PMNH1729-4, ♀♀, 11.4.2013); Mikhmas (PMNH1733-1, ♀♀, 27.4.2013); Nahaleen (PMNH1735-3, ♂♂, 2.5.2013; PMNH1735-4, ♂♂, 2.5.2013); Rawabi

(PMNH1732,♀, 18.4.2013); Masafer Yatta (PMNH1713-8, ♂♂, 7.4.2013; PMNH1713-9, ♂♂, 7.4.2013); Tayba (PMNH1734-23, ♀♀, 12.4.2013); Wadi Fasayel (PMNH4075, ♂, 21.4.2014); Wadi Fukein (PMNH6315, 19.4.2015; PMNH6316, 19.4.2015; PMNH6319, ♂, 19.4.2015; PMNH6320, 19.4.2015); Wadi Haramiya (PMNH4106, ♀, 15.5.2014; PMNH4107, ♀, 15.5.2014; PMNH4108, ♂, 15.5.2014).

Remarks: The Levantine Marbled White is limited to the Mediterranean region from southern Turkey to far south Jordan (Larsen & Nakamura, 1983). In Palestine, *M. titea* has two subspecies: *titania* and *palaestinensis* which were observed in the northern part of Palestine with Beni Niem being the most southern locality. We collected specimens in April and May.

Pseudochazara thelephassa (Geyer, [1827]) The Telephassa Grayling

Material examined: Mikhmas (PMNH1759-1, ♀♀, 23.5.2013); Walaja (PMNH4636, ♀, 8.8.2014).

Remarks: Specimens were collected in May and August. This species migrates in Turkey (Osthelder & Pfeiffer, 1932) and in Lebanon (Larsen, 1975). Even though it was collected from June to August, Larsen & Nakamura (1983) mentioned records in October and they assumed a single protracted brood.

Ypthima asterope (Klug, 1832) The African Ringlet

Material examined: 3 km w Mar Saba(PMNH5929, ♂, 13.3.2015); Ain Kenia (PMNH4814, ♂, 15.8.2014; PMNH4830, ♀, 15.8.2014); Auja (PMNH1710-20, ♂♂, 27.3.2014); Salfit (PMNH5166, ♂, 22.8.2013); Mikhmas (PMNH1759-8, ♂♂, 23.5.2013); Wadi Al Qelt (PMNH6205, ♀, 4.4.2015; PMNH6207, ♂, 4.4.2015; PMNH6208, ♀, 4.4.2015); Wadi Al Quff (PMNH3772, ♂, 3.7.2014; PMNH3940, ♂, 4.11.2014; PMNH3953, ♂, 4.11.2014; PMNH4446, ♀, 6.9.2014; PMNH4456, ♂, 6.9.2014; PMNH4457, ♀, 6.9.2014).

Remarks: Specimens were collected from March to November. This species prefers a warm climate, and it has likely migrated from tropical areas to the Eastern Mediterranean region through the Great Rift Valley (John *et al*., 2010).[2] Larvae feed on Poaceae especially *Hyparrhenia hirta* (Benyamini, 2002a).

Family Nymphalidae

Subfamily Limenitidinae

Limenitis reducta schiffermuelleri Higgins, 1933 (Fig. 1-O) The Southern White Admiral

Material examined: Al Makhrour-Bethlehem (PMNH6331, ♀, 15.4.2015); Nabi Saleh (PMNH4798, ♂, 21.7.2014); Ain Kenia (PMNH4803, ♂, 15.8.2014); Salfit (PMNH5081, ♀, 22.8.2014); Al Walaja (PMNH4615, ♂, 8.8.2014).

Remarks: We collected specimens in April, July, and August. Larsen and Nakamura (1983) used subfamily Nymphalinae for this species; however, Wahlberg *et al*. (2003) found that it belongs to the subfamily Limenitidinae. The Southern White Admiral ranges globally from southern and central Europe to Iran. Locally, it is widespread in the well wooded areas like Salfit and Al Makhrour. According to Benyamini (1997) it flies from April till mid-October in northern and central Palestine. *L. reducta* is known to feed on *Lonicera* sp. (Larsen, 1974).

Subfamily Nymphalinae

Melitaea deserticola macromaculata Belter, 1934 Desert Fritillary

Material examined: Mar Saba (PMNH6427, ♂, 15.3.2015; PMNH5962, ♂, 13.3.2015); Wadi Al Quff (PMNH3917, ♀, 21.3.2014; PMNH3918,♂, 21.3.2014; PMNH4078, ♂, 21.4.2014; PMNH4103, ♂, 5.3.2014; PMNH4455, 6.9.2014).

Remarks: We collected specimens in March, April, and September. The genus *Melitaea* belongs to Melitaeini tribe. According to Larsen & Nakamura (1983), this Palaearctic species is mostly found in North Africa and Levant regions. In Palestine, *M. deserticola* is found in northern and middle areas, including the Jordan Valley (Benyamini, 1983). The Desert Fritillary is observed from February to May and in October (Benyamini, 1997), which is confirmed by the PMNH team when they caught it in early September; this leads us to agree with Larsen and Nakamura (1983) in that *M. deserticola* has three broods - the second and third are irregular - with the first being the largest brood. Larvae feed on Scrophulariaceae, especially *Anarrhinum orientalis*, *Linaria aegyptiaca* and *Kickxia aegyptiaca* (Larsen & Nakamura, 1983; Larsen, 1990).

Melitaea telona Fruhstorfer, 1908 The Knapweed Fritillary

Material examined: Al Makhrour-Bethlehem (PMNH6301, ♂, 15.4.2015), Wadi Al Quff (PMNH4461, 9.6.2014; PMNH4104, ♂, 5.3.2014), Wadi Al Qelt (PMNH6426, ♂, 2.4.2015).

Remarks: We collected specimens in March, April, and June. Tóth & Varga (2010) found that *M. phoebe* is a distinct species and is confined to the Euro-Siberian region, while *Melitaea telona* is Ponto-Mediterranean. In Palestine, it is widely common in northern Negev, being the most southern regions (Benyamini, 1983). Unlike the Jordanian population, our population seems to have only one brood in early spring. Its larvae feed on *Scabiosa*, *Centaurea*, and *Plantago* (Larsen, 1974).

Melitaea trivia syriaca Rebel, 1905 The Mullein Fritillary

Material examined: Wadi Al Quff (PMNH4458, 9.6.2014).

Remarks: We collected one specimen of this species in June, and according to Benyamini (1997), *M. trivia* was observed from March to early November. This species occurs in the hot parts of southern Europe to central Asia, including the Middle East. It is known in north and middle Palestine and almost to central Negev (Benyamini, 1997, 1983). Its larvae feed on *Verbascum* sp. (Katbeh-Bader *et al*., 2003).

[2] For nearby area distributions, see: Larsen & Nakamura (1983); Amr *et al*. (1997); Benyamini (2002a, b); Katbeh-Bader *et al*. (2003).

Polygonia egea (Cramer, 1775) The Southern Comma

Material examined: Al Makhrour-Bethlehem (PMNH6544, ♂, 3.5.2015), Bethlehem (PMNH5144, ♂, 28.8.2014; PMNH5334, ♂, 21.6.2014; PMNH5335, ♂, 19.6.2014; PMNH5336, ♂, 12.8.2014).

Remarks: Specimens were collected in May, June and August. The Southern Comma is found along the Mediterranean coast from Provence to Greece, through Turkey and the Levant to Afghanistan (Larsen & Nakamura, 1983). According to Benyamini (1997), *P. egea* was observed from January to August. When *P. egea* closes its wings, it looks like an old and dry leaf. *P. egea* is found along the Mediterranean, Asia Minor to north India; it is also found in north and middle Palestine; the common food plants are species of *Parietaria* (Benyamini, 1997; Larsen, 1974 & 1983).

Vanessa atalanta (Linnaeus, 1758) The Red Admiral

Material examined: Bethlehem (PMNH5666, 30.1.2015; PMNH6358, 23.3.2015; PMNH6363, 15.3.2015; PMNH5262, 12.3.2014); Wadi Al Qelt (PMNH6347, 28.2.2015).

Remarks: Collected in January, February and March. The Holarctic Red Admiral is found in most parts of Palestine, except for the Negev (Benyamini, 1983). Larsen (1974 & 1990) reported that its larvae feed on *Urtica* sp. and *Parietaria* sp., especially *Parietaria alsinifolia*. According to Larsen (1990), *V. atalanta* lay eggs where it cannot survive, a reason for its migration behavior.

Vanessa cardui cardui (Linnaeus, 1758) Painted Lady

Material examined: Ain Hijla (PMNH3995, 18.4.2014); Al Aqaba (PMNH4048, 18.4.2014; PMNH4049, 18.4.2014); Bardala (PMNH4052, 18.4.2014), (PMNH4054, 18.4.2014); Bethlehem (PMNH5665, 30.1.2015; PMNH6353, 24.2.2015; PMNH5313, 3.7.2014; PMNH5965, 13.3.2015; PMNH5337, 16.5.2014); Mar Saba-Bethlehem (PMNH5959, 13.3.2015; PMNH5946, 13.3.2015); Matahen Al Sukkar-Jericho (PMNH5546, 21.1.2015); Wadi Al Qelt (PMNH5765, 23.2.2015); Wadi Al Quff (PMNH3958, 4.11.2014; PMNH4029, 21.4.2014; PMNH4080, 21.4.2014).

Remarks: This is a rather common species and was collected during most of the year. *V.cardui* has a worldwide distribution but it is rare in the tropical areas (Larsen, 1974, 1983 & 1990). According to Benyamini (1997), the Painted Lady is found all over Palestine. It migrates to the north in both Lebanon and Palestine during March and April and it migrates from Jordan to Saudi Arabia. *V. cardui* larvae feed on *Malva parvifolia* and *Malva sylvestris (*Larsen, 1983).

Family Lycaenidae

Subfamily Theclinae

Satyrium spini melantho **(**Klug, 1832) Blue Spot Hairstreak

Material examined: Nabi Saleh (PMNH1736-25, ♀♀, 3.4.2013).

Remarks: We collected one sample through our trips in April from Nabi Saleh. The Blue Spot Hairstreak is found in South and Central Europe and the Middle East to Iran. *S. spini* is found in north and central Palestine, during late spring and summer (Benyamini, 1997). Its larvae feed on *Rhamnus* spp. (Rhamnaceae) and possibly oak (Larsen, 1974; Halperin & Sauter, 1992).

Subfamily Aphnaeini

Apharitis acamas **(**Klug, 1834) Arab Leopard Butterfly

Material examined: Wadi Fukeen (PMNH 4690, ♀, 9.8.2014); Al Walaja (PMNH4611, ♀, 8.8.2014).

Remarks: The Leopard Butterfly is an Eremic butterfly with a wide distribution range in the Arab World with different subspecies; two of them, *acamas* Klug and *egyptiaca* Riley, are likely to occur in Palestine. *A. acamas* flies from early spring till late summer and it has three broods according to Benyamini (1997) and Larsen & Nakamura (1983).

Subfamily Lycaeninae

Lycaena phlaeas **(**Linnaeus, 1761) The Small Copper Butterfly

Material examined: Bethlehem (PMNH6435, ♀, 20.4.2015); Wadi Al Qelt (PMNH6203, ♂, 4.4.2015).

Remarks: Specimens were collected in April. The small copper has a worldwide distribution from the United States of America to Asia and Africa with Europe in the middle. In Palestine, *L. phlaeas* is dominant in agricultural lands, from the most northern areas till Hebron, being in the south, including Jericho, 500m below the sea level (Benyamini, 1983). Like *L. thersamon, L. phlaeas* feeds on *Rumex* sp., *Sarothamnus* sp. and *Polygonum* sp. (Katbeh-Bader *et al.,* 2003).

Lycaena thersamon **(**Esper, 1784) (Fig. 1-J) Lesser Fiery Copper

Material examined: Ain Kenia (PMNH4807, ♂, 15.8.2014); Al Makhrour – Bethlehem (PMNH6302, 15.4.2015); Al Walaja (PMNH4591, ♀, 19.7.2014); Artas (PMNH4714, 12.8.2014; PMNH4712, ♀, 12.8.2014; PMNH4715, ♀, 12.8.2014; PMNH4735, ♀, 13.8.2014); Bethlehem (PMNH4597, ♂, 22.7.2014; PMNH5331,♂, 15.8.2013; PMNH5332, ♂, 09.8.2013; PMNH6433, ♀, 20.4.2015); Burak Sulaiman (PMNH4951, ♂, 17.8.2014; PMNH4953, ♀, 17.8.2014); Salfit (PMNH5060, ♂, 22.8.2014; PMNH5076, ♂, 22.8.2014; PMNH5080, ♂, 22.8.2014; PMNH5088, ♂, 22.8.2014; PMNH5091, ♂, 22.8.2014; PMNH5152, ♂, 22.8.2014); Wadi Al Quff (PMNH3961, ♂, 4.11.2014; PMNH4453, ♀, 6.9.2014).

Remarks: We collected specimens from April to November. This species has a distribution extending from Italy and Austria to the Balkans; it is more focused in Middle East regions (Larsen, 1990) with a vast distribution in Palestine. Katbeh-Bader *et al*. (2003) suggested that two broods occur: One in April and the other in August and that the larvae live on *Rumex, Sarothamnus* and *Polygonum*. The genus *Lycaena* Fabricius, 1807 has six species in the Levant: *thetis* Klug, 1834, *tityrus* Poda, 1761, *asabinus* Herrich-Schäffer, 1851, *ochimus* Herrich-Schäffer, 1851, *thersamon* Esper, 1784, and *phlaeas* Linnaeus, 1761. Two subspecies (*thersamon* Esper, 1784, *omphale* Klug and *kurdistanica* Riley) were suspected to occur in the Levant; however, we noticed a wide variation among our samples, so we did not assign a specific sub-level to our specimens.

Subfamily Polyommatinae

Aricia agestis agestis (Denis & Schiffermüller, 1775) The Brown Argus

Material examined: Ain Shibly- Bardala (PMNH6552, ♀, 6.5.2015; PMNH6555, ♀, 6.5.2015; PMNH6558, ♀, 6.5.2015); Beit Jala (PMNH5309, ♀,12.8.2014); Bethlehem (PMNH 6413, ♂, 26.3.2015; PMNH5311, ♀, 22.5.2014), Salfit (PMNH5095, ♀, 22.8.2014).

Remarks: Specimens were collected in March, May and August. *A. agestis* is known in Europe, the Levant and Iran. The Brown Argus occurs in central Palestine, and some populations, in the northern areas of Palestine, are connected with the Lebanese populations (Benyamini, 1983). Its larvae feed on *Erodium cicutarium* and *Helianthemum* sp. (Larsen, 1974).

Azanus ubaldus (Stoll, 1782) Desert Babul Blue

Material examined: Ain Hijla (PMNH4013, ♂, 18.4.2014).

Remarks: We collected a single specimen in April. *A. ubaldus* occurs in North Africa, the Middle East and India (Larsen, 1990). In Palestine, it is common in the arid areas near water surface (Benyamini, 1983). Larvae of the Desert Babul Blue feed on *Acacia* sp. and pupate under stones (Larsen, 1990).

Freyeria trochylus **(**Freyer, 1845) (Fig. 1-K) The Grass Jewel

Material examined: Al Walaja (PMNH5249, ♂, 20.9.2014); Beit Ta'mar (PMNH5284, ♂, 22.10.2014; PMNH5340, ♂, 28.6.2014); Salfeet (PMNH5096, ♂, 22.8.2014); Wadi Al Qelt (PMNH5895, ♂, 9.3.2015; PMNH 5894, ♂, 9.3.2015); Wadi Al Quff (PMNH4459, ♂, 9.6.2015).

Remarks: We collected specimens from March to October. *Freyeria trochylus* is widespread in Africa, the Balkans, the Middle East, India, and other oriental regions (Larsen & Larsen, 1980). The Grass Jewel is found throughout Palestine and all year round, except in January (Benyamini, 1997). The larval food plants are *Heliotropium* and *Indigofera* (Larsen & Nakamura, 1983).

Lampides boeticus **(**Linnaeus, 1767) (Fig. 1-L) The Long-tailed Blue

Material examined: Bethlehem (PMNH6981, ♀, 21.6.2015).

Remarks: This is one of the most widespread species occurring in the Palearctic region and in Africa and from England to Japan. Phylogenitically, it likely originated in Africa some 7 million years ago and spread from there (Lohman *et al*., 2008). Halperin and Sauter (1992) reported *Colutea* and *Tephrosia* (Fabaceae) as larval food plants.

Leptotes pirithous **(**Linnaeus, 1767) Lang's Short-Tail Blue

Material examined: Beit Jala (PMNH5333, ♀, 8.8.2015).

Remarks: A single specimen was collected in August. *Leptotes pirithous* is known in southern Europe and most of Africa and the Middle East. In Palestine, it occurs in all the country all year round (Benyamini, 1997). Larvae feed on leguminous plants (Fabaceae) and *Plumbago* sp. (Plumbaginaceae) (Larsen, 1990; Halperin & Sauter, 1992).

Polyommatus icarus **(**Rottemburg, 1775) Common Blue

Material examined: 3 km w Mar Saba (PMNH5952, ♀, 13.3.2015; PMNH5958, ♂, 13.3.2015); Al Makhrour– Bethlehem (PMNH6308, ♂, 15.4.2015); Al Qarn (PMNH4586, ♀, 7.7.2015); Ain Kenia (PMNH4813, ♀, 15.8.2014; PMNH4819, ♂, 15.8.2014; PMNH4837, ♂, 15.8.2014); Ain Shibly-Bardala (PMNH6556, ♂, 6.5.2015); Artas (PMNH4710, ♂, 12.8.2014; PMNH4716, ♂, 12.8.2014); Bethlehem (PMNH6367, ♂, 26.3.2015;PMNH6414, ♂, 16.3.2015; PMNH6377, ♂, 26.3.2015; PMNH6376, ♀, 27.3.2015; PMNH6370, ♂, 21.3.2015; PMNH5310, ♀, 18.5.2014; PMNH5312, ♀, 30.6.2014; PMNH5316, ♂, 2.7.2014; PMNH4599, ♀, 22.7.2014; PMNH4598, ♂, 22.7.2014); Beit Fajjar (PMNH5116, ♀, 23.8.2014); Husan (PMNH1954-10, ♀♀, 17.6.2013; PMNH1954-7, ♂♂, 17.6.2013); Nabi Saleh (PMNH1736-5, ♂♂, 3-4.5.2013); Salfit (PMNH5071, ♂, 22.8.2014; PMNH5089, ♂, 22.8.2014; PMNH5103, ♂, 22.8.2014); Wadi Al Quff (PMNH3914, ♂, 21.3.2014); Silit Adahr (PMNH18003-5, ♂♂, 14.6.2013); Wadi Fukeen (PMNH5141, ♂, 29.8.2014; PMNH5142, ♂, 29.8.2014);Wadi Al Abyad, 6 km NW of Nuwaima (PMNH6430, ♀, 24.4.2015; PMNH6431, ♀, 24.4.2015); Wadi Al Qelt (PMNH6422, ♂, 2.4.2015; PMNH6421, ♂, 2.4.2015); Zatara (PMNH6084, ♀, 22.4.2014).

Remarks: Specimens were collected in March, April, May, June, July, and August. The genus *Polyommatus* has 183 species and needs further studies at the molecular and morphological level (Talavera *et al*., 2012). Two subspecies of *P. icarus* were previously reported in Palestine: *zelleri* Verity, 1919 and *juno* Hemming, 1933. But we noted significant variations and intergradation in coloration, and we do not suggest using subspecies names here. Furthermore, population genetic studies illustrate that there are few genetic differences between the different populations of *P. icarus* in southern Europe (Schmitt *et al*., 2003).

Tarucus balkanicus **(**Freyer, 1845) Little Tiger Blue

Material examined: Ain Shibly- Bardala (PMNH6557, ♂, 6.5.2015).

Remarks: One specimen of this Eremic species was collected in May from Ain Shibly. *T. balkanicus* is found in the Eremic part of Africa, the Balkans, Asia Minor and the Far East (Larsen, 1974). In Palestine, the Little Tiger Blue is found in the Jordan Valley and most of northern Palestine and in the southern Palestinian Mediterranean coast all year round, except in January and February (Benyamini, 1983). Larvae feed on *Zizyphus vulgaris*, *Z. spina-christi*, *Paliurus spina-christi* and *P. vulgaris* (Larsen, 1974).

Tarucus rosaceus (Austaut, 1885) (Fig. 1-M) The Mediterranean Pierrot

Material examined: Ain Hijla (PMNH3996, ♀, 18.4.2014); Jericho (PMNH5880, ♂, 9.3.2015; PMNH5263, ♂, 9.8.2013).

Remarks: Collected in March, April, and August. *T. rosaceus* has a wide distribution extending from North Africa and Middle East to India. In Palestine, it is more

common on the border line with Jordan, including the Jordan Valley and Jericho all year round (Benyamini, 1997). Its larvae feed on *Zizyphus* and *Paliurus* (Rhamnaceae) (Larsen, 1990).

Zizeeria karsandra (Moore, 1865) The Asian Grass Blue

Material examined: Wadi Al Abyad, 6 km NW of Nuwaima (PMNH6429, ♀, 24.4.2015).

Remarks: This is the smallest butterfly collected in this survey. It is hard to find because of its small size, so it may be more common than thought. The Asian Grass Blue found from Australasia, via India, to Oman, Iraq, Lebanon, Egypt, Libya and Tunisia, and it is common in all Palestine, except in west Negev all year round (Benyamini, 1997). Larvae feed on *Trifolium alexandrinum* and other related plants (Larsen, 1974).

Family Hesperiidae

Subfamily Pyrginae

Carcharodus alceae alceae (Esper, 1780) The Hollyhock Skipper

Material examined: Ain Kenia (PMNH4799, ♂, 15.8.2014); Beni Neim (PMNH5711, ♀, 17.2.2015); Bethlehem (PMNH5314, ♀, 8.8.2013; PMNH5315, ♀, 3.7.2014), Edna (PMNH4998, ♀, 23.8.2014); Wadi Al Qelt (PMNH6425, 27.3.2015).

Remarks: Specimens were collected in July and August. This species has a wide-range of distribution extending from Europe to the Mediterranean area. It has three broods (Benyamini, 1997; Larsen and Nakamura, 1983). The larvae feed on species of the family Malvaceae such as *Althaea*, *Malva*, and *Alcea* (Alexiou, 2014; Benyamini, 1984, 1997; Gilbert & Zalat, 2007; Larsen, 1990; Larsen & Nakamura, 1983).

Pyrgus melotis **(**Duponchel, 1834) The Levantine Grizzled Skipper

Material examined: Salfit (PMNH5104, ♀, 22.8.2014).

Remarks: We collected one specimen in August of this Palearctic species. Palestine is the most southern range of its distribution and represented by the subspecies *P. melotis melotis* (DeJong, 1987). It prefers moist habitats, such as small permanent springs bordered by *Rubus* (Larsen & Nakamura, 1983). Apparently, one brood is formed in the spring, while, in Lebanon, Larsen (1974) indicated that two generations appear.

Spialia orbifer hilaris (Staudinger, 1901) The Orbiferous Skipper

Material examined: Ain Kenia (PMNH4831, ♀, 15.8.2014); Al Makhrour-Bethlehem (PMNH6039, 15.4.2015; PMNH6337, 15.4.2015; PMNH6303, 15.4.2015; PMNH6209, 15.4.2015); Al Walaja (PMNH4632, ♂, 8.8.2014); Wadi Al Abyad (PMNH6501, ♀, 24.4.2015); Wadi Al Quff (PMNH4031, ♀,21.4.2014).

Remarks: We collected specimens in the months of April and August. The Orbiferous Skipper occurs in a series of subspecies in Yugoslavia, the Middle East, Russia, western China and Korea. In Palestine, it is confined to the Mediterranean zone. Larsen & Nakamura (1983) stated that two broods are produced, one in early April and the second in July.

Syrichtus proto hieromax Hemming, 1932 The Large Grizzled Skipper

Material examined: Edna (PMNH5003, ♀, 23.8.2014).

Remarks: A single specimens was collected in August. Large Grizzled Skipper is a Mediterranean butterfly found in North Africa, Iberian Peninsula, Turkey and the Levant (Larsen & Nakamura, 1983). The subspecies *hieromax* was originally described in Ajlune [Ajloun], Jordan (Hemming, 1932), and seems to be localized in Jordan, Palestine and the coastal region of Lebanon. Larsen & Nakamura (1983) discussed the status of the two subspecies of this form; *Syrichtus proto hieromax* is found in the coastal areas of Lebanon and it is rare in both Jordan and Palestine, and *Syrichtus proto lycaonius* is distributed in the Lebanese mountains. Its larvae feed on *Phlomis* (Lamiaceae) (Larsen & Nakamura, 1983; Halperin & Saute, 1992).

Syrichtus tessellum nomas **(**Lederer, 1855) (Fig. 1-N) The Tessellated Skipper

Material examined: Al Makhrour-Bethlehem (PMNH6339, ♀, 15.4.2015; PMNH6336, ♀, 15.4.2015).

Remarks: Specimens were collected in April. The Tessellated Skipper can be found in the Balkans via the Middle East to Central Asia. The subspecies *nomas* is rare in Jordan (Katbeh-Bader *et al*., 2003). It is quite common in Palestine and Lebanon (Larsen & Nakamura, 1983). Plants like *Phlomis* (Lamiaceae) are larval food plants for this species (Benyamini, 1990; Halperin & Sauter, 1992).

Subfamily Hesperiinae

Gegenes gambica (Mabille, 1878) The Pigmy Skipper

Material examined: Salfit (PMNH5058, ♂, 22.8.2014).

Remarks: A single specimen was collected from Salfit in August. According to Benyamini (1997), *G. gambica* is found from March to December. The Pigmy Skipper is a Mediterranean butterfly. It feeds on grasses (Katbeh-Bader *et al.*, 2003).

Thymelicus hyrax hyrax **(**Lederer, 1861)Levantine Skipper

Material examined: Artas (PMNH1711-19, ♀♀, 31.4.2013); Ain Samiya (PMNH1731-12, ♂♂, 12.4.2013); Bethlehem (PMNH6364, ♀, 26.3.2015; PMNH6368, ♂, 26.3.2015; PMNH6411, ♂, 16.3.2015).

Remarks: We collected specimens in March and April. The Levantine Skipper is common in the Levant from Turkey east to Iran and south to Palestine. In Palestine, it is found in the central and northern areas from April till early July (Benyamini, 1997). The Levantine Skipper feeds on *Dianthus multipunctatus* (Larsen, 1974).

Thymelicus sylvestris syriaca (Tutt, 1905) Small Skipper

Material examined: Bethlehem (PMNH6361, ♂, 27.3.2015; PMNH6368, ♂, 26.3.2015; PMNH6374, ♂, 21.3.2015; PMNH6373, ♂, 21.3.2015; PMNH6371, ♀, 21.3.2015; PMNH6385, ♂, 16.3.2015; PMNH6350, ♂, 28.2.2015; PMNH6366, ♂, 26.3.2015; PMNH6412, ♀, 16.3.2015; PMNH5712, 12.2.2015); Mar Saba (PMNH5964, ♂, 13.3.2015; PMNH5954, ♀, 13.3.2015; PMNH5943, ♂, 13.3.2015; PMNH5956, ♂, 13.3.2015; PMNH5934, ♂, 13.3.2015; PMNH5919, 13.3.2015; PMNH5913, ♂, 13.3.2015).

Remarks: We collected the Small Skipper in February and March, mainly in the area of Bethlehem to Mar Saba (an area of 20 km x 20 km). *T. sylvestris* is found in the Mediterranean zone of North Africa, Europe and across Asia Minor to Central Asia and Iran. In Palestine, it is common in the center and the areas around Tiberias (Benyamini, 1997). According to Benyamini (1997), this skipper flies from April to early July, but we collected the specimens in February and March, which means that the brood flies earlier here. Its larval food plants are *Phleum pratense, Holcus mollis* and *Dactylis glomeratus* according to Larsen (1974) who records this species under the name *Adopoea flava syriaca.*

4. Discussion

Palestinian areas have a very rich fauna, including butterflies. Even with this preliminary study, we have managed to record 54 species of butterflies, representing 5 families in a very small part of historic Palestine (parts of the Israeli occupied West Bank). Benyamini (1997) listed 139 species, one third of which was recorded from Sinai (Egyptian territory) and the Golan (occupied Syrian territories) that are not part of historic Palestine. Thus, our sampling has been satisfactory for this initial study of the occupied West Bank. The three most common butterflies observed and collected were the small White *Pieris rapae,* the Bath White *Pontia daplidice*, and the Common Blue *Polyommatus icarus*. Possible threatened species, based on our preliminary studies are: *Archon apollinus, Zegris eupheme, Gonepteryx cleopatra taurica*, and *Hipparchia fatua sichaea*.

There have been significant environmental changes that impacted the biodiversity of this area. For example, Qumsiyeh *et al*. (2014) showed a decline in vertebrate biodiversity in the Bethlehem Region. Salman *et al*. (2014) discussed the negative impact of human activities on the amphibian distributions in our areas. For butterflies, we anticipate that a significant decline also occurred and certainly some European butterflies are on the IUCN threatened or near-threatened lists (Van Swaay *et al*., 2011). In our region and from personal observations, we especially highlight the rarity and the potential threat to the species that we saw and were able to collect one or two specimens of each (see above). For example, Sana Atallah observed that the orange tufted butterfly *Anthocharis cardamines* was very common in Bethlehem area in the 1960s (from his field notes and collected specimens). However, we were able to see this species only in one area that was fenced in the 1960s and likely protected the local plants that this species feeds on from excessive grazing by livestock. It is also possible that the desertification is driving this and other Mediterranean species towards the more mountainous and northern regions. With the climate change expected to raise temperatures in the next two decades by 2-4 degrees centigrade and decrease the annual rainfall by 20-30% in our region (see Sowers *et al*., 2011), the problems encountered in the decrease in biodiversity might get exacerbated. In addition, the use of insecticides and herbicides on a large scale would certainly affect the populations of the sensitive and rare species.

Our findings of the significant biodiversity in butterflies in the present study are also an underestimation of the total butterfly diversity. Opportunistic sampling, even if carried out in different seasons, usually misses many species (see, for example, Dennis *et al*., 2010). Thus, much more work has to be undertaken on the butterflies of Palestine, including the northern parts of the West Bank and in the Jordan Valley because the current studies have focused mostly on the southern areas (Jerusalem to Hebron). Yet, the present preliminary work highlights the biodiversity in this very small region undergoing dramatic changes in population and habitats that could threaten this important faunistic element.

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