

Filling the Egyptian pollinator knowledge-gap: checklist of flower-visiting insects in South Sinai, with new records for Egypt

With 1 table

OLIVIA NORFOLK¹ and HOLGER H. DATHE²

¹ School of Life Sciences, Anglia Ruskin University, East Road, Cambridge, CB1 1PT, UK. – olivia_norfolk@hotmail.com

² Senckenberg Deutsches Entomologisches Institut, Eberswalder Straße 90, 15374 Müncheberg, Germany.

– Holger.Dathe@senckenberg.de

Published on 2019-06-24

DOI: 10.21248/contrib.entomol.69.1.175-184

Abstract

Flower visitor surveys were conducted across the St Katherine Protectorate of South Sinai, Egypt, between April–July 2012 and 2013. We present a checklist of 112 species of flower visitors belonging to the orders Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera. The Hymenoptera were the most diverse group of flower visitors, consisting of 69 species from eight families: Apidae (14), Colletidae (8), Crabronidae (10), Halictidae (13), Megachilidae (19), Scoliidae (1), Sphecidae (2) and Vespidae (2). We recorded nine species that were endemic to the region and thirteen that were new to the Egyptian fauna, including one new to science, *Hylaeus oliviae* DATHE, 2015. The study provides a valuable initial checklist of pollinators within the St Katherine Protectorate, but the description of novel species and the high proportion of new records for Egypt suggest that species numbers are likely to be underestimated. We highlight the need for future research into Egyptian pollinator fauna, particularly within the St Katherine Protectorate where endemic bees are still being described.

Key words

Apidae, bee, butterfly, Colletidae, Crabronidae, Halictidae, hoverfly, Megachilidae, pollinator, Syrphidae, Tephritidae

Zusammenfassung

Jeweils von April bis Juli der Jahre 2012 und 2013 wurden im gesamten St. Katherine Protektorat Süd-Sinai (Ägypten) Blütenbesuche von Insekten registriert. Im Ergebnis entstand eine Checklist von 112 blütenbesuchenden Insektenarten aus den Ordnungen Coleoptera, Diptera, Hemiptera, Hymenoptera und Lepidoptera. Dabei waren die Hymenopteren mit 69 Arten aus acht Familien in der größten Vielfalt vertreten: Apidae (14 spp.), Colletidae (8), Crabronidae (10), Halictidae (13), Megachilidae (19), Scoliidae (1), Sphecidae (2) und Vespidae (2). Wir registrierten in der Region neun endemische Arten und 13 Arten als neu für die ägyptische Fauna, darunter eine für die Wissenschaft neue Spezies, *Hylaeus oliviae* DATHE, 2015. Die Studie liefert eine wertvolle erste Checklist von Bestäubern im St. Katherine Protektorat, wobei die Neubeschreibung und der hohe Anteil neuer Funde für Ägypten darauf hindeuten, dass die Artenzahlen wahrscheinlich noch unterschätzt werden. Wir betonen die Notwendigkeit weiterer Forschungen zur ägyptischen Bestäuberfauna, insbesondere im St. Katherine Protektorat, wo sicherlich noch weitere endemische Bienen zu finden sind.

Schlüsselwörter

Apidae, Biene, Schmetterling, Colletidae, Crabronidae, Halictidae, Schwebfliege, Megachilidae, Bestäuber, Syrphidae, Tephritidae

1. Introduction

Flower-visiting insects provide valuable pollination services, helping to maintain yields of 75 % of global crop species and an estimated 94 % of wild flowering plants (KLEIN et al. 2007). Despite their high ecological and economic importance, current trends suggest that pollinators are experiencing widespread declines (POTTS et al. 2010). The strongest evidence for these declines comes from Europe and the USA, but there is a distinct lack of pollination research in arid regions such as Northern Africa and the Middle East (POTTS et al. 2010, MAYER et al. 2011, ARCHER et al. 2014). There is likely to be a variety of political and social barriers slowing pollinator research across the Middle East, but efforts to prioritise pollinator research will be essential if we hope to quantify and tackle on-going pollinator declines in the region.

Despite the disproportionate lack of pollination research in the region, Middle Eastern smallholder farms tend to be heavily reliant on the economic and nutritional returns associated with pollinator-dependent crops such as fruit and vegetables (CHAPLIN-KRAMER et al. 2014, GALLAI et al. 2009, STEWARD et al. 2014). This is particularly true in the mountains of South Sinai, Egypt, where the local Bedouin community are highly dependent on products grown within traditional orchards gardens. Wild pollinators have been shown to enhance the fruit set of the primary almond crop within the region (NORFOLK et al. 2016) and many of the pollinator-dependent crops grown within the gardens are likely to experience similar yield benefits (GARIBALDI et al. 2013). An enhanced understanding of pollinator communities within such smallholder systems can help inform management practices that support pollination services and crop yields in the region.

The St Katherine Protectorate in South Sinai is rich in biodiversity and supports over half of Egypt's endemic flowering plants (AYYAD et al. 2000), many of which will also benefit from a diverse pollinator community. The region is known to support high butterfly diversity, with 40 of Egypt's 60 species present within the Protectorate (LARSEN 1990) and high levels of endemism have been reported within the Bombyliidae (EL-HAWAGRY & GILBERT 2014). Other studies have assessed the diversity of beetles (SEMIDA et al. 2001), ground arthropods (NORFOLK et al. 2012) and some flower visitors in the region (SEMIDA et al. 2001, ZALAT et al. 2001, ZALAT et al. 2009, NORFOLK et al. 2012), but there have been few comprehensive surveys of the pollinator fauna within the Protectorate. Here, we provide a checklist of the flower visitor fauna from the St Katherine Protectorate during extensive surveys between April–July in 2012 and 2013.

2. Methods

We surveyed flower visitors in six localities within the St Katherine Protectorate between April–July in 2012 and 2013: Sheik Awad, St Katherine Town, Wadi Rahah, Wadi Itlah, Wadi Gebel and Wadi Tinya. Repeat monthly surveys were carried out in 500 m² plots with all flower-visiting insects captured with a hand net (37 plots in 2012; 54 plots in 2013). Specimens were identified by C. O'Toole (Apidae), M. Kuhlmann and H. H. Dathe (Colletidae), A. Pauly (Halictidae), C. Praz and A. Müller (Megachilidae), C. Schmid-Egger (Sphecidae), A. Freidberg (Tephritidae) and O. Norfolk and F. Gilbert (Lepidoptera and Syrphidae). Reference specimens are stored in the personal collection of the first author and respective taxonomists (indicated by their initials). Distributions were determined according to Schuh et al. (2010), Kuhlman et al. (2014), Pauly (2011), Pauly (2016), Rasmont (2014), Kugler and Freidberg (1975), Peck (1988) and Schmid-Egger (2004).

3. Results

In total we recorded 112 species of flower visitors belonging to Coleoptera, Diptera, Hemiptera, Hymenoptera and Lepidoptera. The Hymenoptera were the most diverse group, consisting of 69 species from eight families: Apidae (14), Colletidae (8), Crabronidae (10), Halictidae (13), Megachilidae (19), Scoliidae (1), Sphecidae (2) and Vespidae (2). We recorded nine species endemic to the region and 13 that were new to the Egyptian fauna. We also present records for *Hylaeus oliviae* DATHE, 2015, which was described as new from specimens collected during this study, and for species *Anthophora* Sinai sp1 and *Anthophora (Heliophila)* Sinai sp1, which are probably new (official description pending access to reference collection). The list below provides details about species that are new to Egypt and/or have a restricted distribution. Table 1 is a full species list.

APOIDEA

Family: Apidae

Anthophora pauperata WALKER, 1871

Material: April 2012 - St Katherine town 28°33'N, 33°56'E (3 ♀ ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♀); April 2013 - St Katherine town 28°33'N, 33°56'E (2 ♀ ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♀), Wadi Gebel 28°32'N, 33°55'E (1 ♀). C.O'T.

Details: Observed foraging on *Alkanna orientalis* (L.) Boiss., *Zilla spinosa* (L.) PRANTL., *Stachys aegyptiaca* PERS. and *Anchusa milleri* SPRENG.

Distribution: Egypt and Saudi Arabia.

Anthophora caelebs GRIBODO, 1924

Material: April 2012- St Katherine town 28°33'N, 33°56'E (2 ♀ ♀), Wadi Gebel 28°32'N, 33°55'E (1 ♀). C.O'T.

Details: Observed foraging on *A. orientalis* and *Z. spinosa*.

Distribution: Libya, Egypt and Israel.

Anthophora hermanni SCHWARZ & GUSENLEITNER, 2003

Material: April-May 2013- St Katherine town 28°33'N, 33°56'E (1 ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♀), Wadi Tinya, 28°34'N, 33°54'E (2 ♀ ♀).

Details: Observed foraging on *A. orientalis*. C.O'T.

Distribution: Egypt.

Anthophora Sinai sp1

Material: April-May 2013 - St Katherine town 28°33'N, 33°56'E (21 ♂ ♂), Wadi Itlah 28°35'N, 33°55'E (25 ♀ ♀), Wadi Gebel 28°32'N, 33°55'E (4 ♀ ♀), Wadi Tinya, 28°34'N, 33°54'E (1 ♀). C.O'T.

Details: Observed foraging on *A. milleri*, *S. aegyptiaca* and *Z. spinosa*. Pending access to type material of Irano-Turanian species, this morphotype has been given a temporary designation and may be an undescribed species.

Anthophora (Heliophila) Sinai sp1

Material: May-June 2013 - Wadi Itlah 28°35'N, 33°55'E (2 ♀ ♀). C.O'T.

Details: Observed foraging on *A. milleri* and *Tanacetum santolinoides* FEINBRUN & FERTIG. Pending access to type material of Irano-Turanian species, this morphotype has been given a temporary designation and may be an undescribed species.

Family: Colletidae

Colletes tuberculatus MORAWITZ, 1894

Material: June-July 2013 - Wadi Tinya, 28°34'N, 33°54'E (1 ♀). M.K.

Details: Observed foraging on *Achillea santolina* L.

Distribution: Widespread across Eastern Palaearctic, including neighbouring Israel and Jordan. First record for Egypt.

Hylaeus sinaiticus (ALFKEN, 1938)

Material: May-June 2012 - St Katherine town 28°33'N, 33°56'E (2 ♂ ♂); April-July 2013 - St Katherine town 28°33'N, 33°56'E (2 ♀ ♀, 1 ♂), Wadi Rahah 28°34'N, 33°56'E (2 ♀ ♀), Wadi Itlah 28°35'N, 33°55'E (3 ♀ ♀, 1 ♂), Wadi Gebel 28°32'N, 33°55'E (4 ♀ ♀), Wadi Tinya, 28°34'N, 33°54'E (1 ♀). H.D.

Details: Observed foraging on *A. santolina*, *Diptotaxis harra* (FORSSK.) BOISS. and *Foeniculum vulgare* L.

Distribution: Sinai, Egypt.

Hylaeus oliviae DATHE 2015

Material: April-July 2013, St Katherine town 28°33'N, 33°56'E (1 ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♂), Wadi Gebel 28°32'N, 33°55'E (1 ♀). H.D.

Details: Observed foraging on *Anarrhinum pubescens* FRESEN. and *F. vulgare*.

Distribution: First record of this newly described species. First record for world and Egypt.

Family: Halictidae

Lasioglossum erraticum (BLÜTHGEN, 1931)

Material: July 2013 - Wadi Tinya, 28°34'N, 33°54'E (1 ♀). A.P.

Details: Observed foraging on *A. santolina* and *Stachys aegyptiaca* PERS.

Distribution: Greece, Turkey, Cyprus, Armenia. First record for Egypt.

Lasioglossum collopiense (PÉREZ 1903)

Material: July 2013 - Wadi Gebel 28°32'N, 33°55'E (1 ♀). A.P.

Details: Observed foraging on *A. santolina* and *T. santolinoides*.

Distribution: North Africa and the Canaries. First record for Egypt.

Halictus gemmellus PAULY, 2015

Material: June 2013 - St Katherine town 28°33'N, 33°56'E (4 ♀ ♀, 1 ♂), Wadi Rahah 28°34'N, 33°56'E (1 ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♂), Wadi Gebel 28°32'N, 33°55'E (1 ♀). A.P.

Details: Observed foraging on *A. santolina*, *T. santolinoides*, *Caylusea hexagyna* (FORSSK.) M.L. GREEN and *F. vulgare*.

Distribution: West Mediterranean. First record for Egypt.

Family: Megachilidae

Hoplitis africana (WARNCKE, 1990)

Material: April-May 2013 - Wadi Itlah 28°35'N, 33°55'E (5 ♀ ♀). A.M.

Details: Observed foraging on *Launaea nudicaulis* (L.) Hook.f. and *C. hexagyna*.

Distribution: Northern Africa and South West Asia. First record for Egypt.

Hoplitis epeoliformis (DUCKE, 1899)

Material: May 2013 - Wadi Itlah 28°35'N, 33°55'E (1 ♀).

Details: Observed foraging on *Peganum harmala* L.

Distribution: Northern Africa and Jordan. First record for Egypt.

Hoplitis gerofita (WARNCKE, 1990)

Material: April-May 2013 - Wadi Itlah 28°35'N, 33°55'E (4 ♀ ♀). A.M.

Details: Observed foraging on *Oligomeris linifolia* (VAHL) J.F. MACBR., *Ochradenus baccatus*, TAILY WEED. and *C. hexagyna*.

Distribution: Jordan, Israel. First record for Egypt.

Hoplitis hofferi TKALCÚ, 1977

Material: April-June 2012 - St Katherine town 28°33'N, 33°56'E (4 ♀ ♀, 2 ♂), Wadi Rahah 28°34'N, 33°56'E (1 ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♀). April-July 2013 - St Katherine town 28°33'N, 33°56'E (20 ♀ ♀, 2 ♂ ♂), Wadi Rahah 28°34'N, 33°56'E (2 ♀ ♀, 2 ♂ ♂), Wadi Itlah 28°35'N, 33°55'E (4 ♀ ♀, 3 ♂ ♂), Wadi Gebel 28°32'N, 33°55'E (1 ♀). A.M.

Details: Observed foraging almost exclusively on *P. harmala* and *C. hexagyna*.

Distribution: Israel, Jordan, UAE, Oman, Pakistan. First record for Egypt.

Megachile insignis VAN DER ZANDEN, 1996

Material: May-July 2013 - Wadi Itlah 28°35'N, 33°55'E (5 ♀ ♀), Wadi Gebel 28°32'N, 33°55'E (1 ♀). C.P.

Details: Observed foraging on *Medicago sativa* L. and *C. hexagyna*.

Distribution: Greece, Turkey, Syria, Iran and Israel. First record for Egypt.

Megachile montenegrensis DOURS, 1873

Material: April 2012 - St Katherine town 28°33'N, 33°56'E (2 ♀ ♀). C.P.

Details: Observed foraging on *Colutea istria* MILLER.

Distribution: Widespread across southern Palaearctic, including neighbouring Israel. First record for Egypt.

Osmia laticella VAN DER ZANDEN, 1986

Material: April-May 2013 - St Katherine town 28°33'N, 33°56'E (1 ♀), Wadi Itlah 28°35'N, 33°55'E (1 ♀). Wadi Gebel 28°32'N, 33°55'E (1 ♀), Wadi Tinya, 28°34'N, 33°54'E (3 ♀ ♀). A.M.

Details: Observed foraging on *Arabidopsis kneuckeri* (BORNH.) O. E. SCHULZ, *Z. spinosa* and *Rosmarinus officinalis* L.

Distribution: Israel and Egypt.

Family: Crabronidae

Bembecinus hebraeus DE BEAUMONT, 1968

Material: June 2013 - Wadi Itlah 28°35'N, 33°55'E (1 specimen, sex unknown) Wadi Gebel 28°32'N, 33°55'E (1 specimen, sex unknown). C.S-E.

Distribution: Previously only recorded in Israel. First record for Egypt.

DIPTERA

Family: Syrphidae

Eristalis arbustorum (LINNAEUS, 1758)

Material: July 2012 – St Katherine town 28°33'N, 33°56'E (1 specimen, sex unknown). F.G.

Details: Observed foraging on *A. santolina*.

Distribution: Widespread across Europe, Northern Africa and Asia (Syria, Iran and Afghanistan). First record for Egypt.

Melanostoma scalare (FABRICIUS, 1794)

Material: April 2012 – Sheik a Wad 28°38'N, 33°53'E (1 specimen, sex unknown), Wadi Itlah 28°35'N, 33°55'E (1 specimen, sex unknown). F.G.

Details: Observed foraging on *O. baccatus* and *Eruca sativa* MILL.

Distribution: Western Europe. First record for Egypt.

Family: Tephritidae

Katonaia aida HERING, 1938

Material: July 2013 – Wadi Itlah 28°35'N, 33°55'E (1 specimen, sex unknown). A.F.

Details: Host plant: Lamiaceae *Ballota* spp. but observed foraging on *A. santolina*.

Distribution: Israel and Egypt.

4. Discussion

Here we provide an initial checklist of some of the flower visitor fauna of the St Katherine Protectorate. Out of the 112 species recorded, thirteen were new records for Egypt,

highlighting the importance of continued pollinator research in the region. Solitary bees were the most diverse group of flower visitors with 53 species, which is just 10 % of Egypt's previously recorded bee species (427 species). Despite this low representation of Egypt's current species list, we recorded eleven bee species that were new records for the country, including the previously undescribed *Hylaeus oliviae* (described in DATHE, 2015).

The specimens in this study were collected between April and July, but flower visitors are known to be active both earlier and later in the season. Previous expeditions in August documented four additional bee species (*Anthophora albigena*, *Xylocopa pubescens*, *Chalicodoma maxillosa*, *Megachile submucida*) (ZALAT et al., 2009), suggesting that the Protectorate actually supports at least 57 bee species. Similar numbers of bee species have been reported in the Suez Canal region to the north of Sinai (62 species) (SHEBL et al., 2013, 2015), but despite the relatively close proximity of the sites, only eight of the species recorded in Suez were found in the St Katherine Protectorate. This high heterogeneity of species composition suggests that there is still much to learn about bee fauna across the Sinai Peninsula and that current species lists may be underestimates.

The St Katherine Protectorate supports a number of flower visitors that are regional endemics, such as the tephritid fly *Katonaia aida* (Israel and Egypt) and sand wasp *Bembecinus hebraeus* (Israel and Egypt). The solitary bees showed the highest levels of such regional endemism, with four species restricted to the Egypt and Israel region (*Anthophora hermanni*, *Hylaeus sinaiticus*, *Hylaeus oliviae*, *Osmia laticella*) and three with slightly wider ranges, i.e. *Anthophora pauperata* (Egypt, Saudi Arabia), *Anthophora caelebs* (Libya, Egypt, Israel), *Hoplitis gerofita* (Egypt, Israel, Jordan). These levels of regional endemism (13 % of the bee community) were much higher than those observed in other flower visitor groups, notably the hoverflies, which were dominated by widespread species.

Overall, this study provides a valuable initial checklist of flower-visiting insects within the St Katherine Protectorate. It is very likely that more undescribed species await discovery. This, together with the high proportion of new records for Egypt, suggests that species numbers are likely to be underestimated. We highlight the need for future research into the Egyptian pollinator fauna, particularly within the St Katherine Protectorate, where our surveys discovered undescribed and possibly endemic species.

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Tab. 1: Full species list of flower visitors observed within the St Katherine Protectorate in 2012 and 2013. E = new records for Egypt; S = records of new species; (S) = possible records of new species pending description.

		Number of individuals observed
COLEOPTERA		
Buprestidae		32
<i>Anthaxia scutellaris</i> GÉNÉ, 1839		
Coccinellidae		
<i>Coccinella septempunctata</i> LINNAEUS, 1758		133
DIPTERA		
Syrphidae		
<i>Eristalinus aeneus</i> (SCOPOLI, 1763)		22
<i>Eristalinus taeniops</i> (WIEDEMANN, 1818)		7
<i>Eristalis arbustorum</i> (LINNAEUS, 1758)	E	1
<i>Eristalis tenax</i> (LINNAEUS, 1758)		14
<i>Eumerus vestitus</i> BEZZI, 1912		1
<i>Eupeodes corollae</i> (FABRICIUS, 1794)		177
<i>Ischiodon aegyptius</i> (WIEDEMANN, 1830)		47
<i>Melanostoma scalare</i> (FABRICIUS, 1794)	E	2
<i>Paragus tibialis</i> (FALLÉN, 1817)		2
<i>Scaeva albomaculata</i> (MACQUART, 1842)		7
<i>Sphaerophoria rueppellii</i> WEIDEMANN, 1820		22
<i>Sphaerophoria scripta</i> (LINNAEUS, 1758)		46
<i>Syrirta fasciata</i> (WIEDEMANN, 1830)		250
Tephritidae		
<i>Acanthophilus helianthi</i> (ROSSI)		22
<i>Capitites augur</i> (FRAUENFELD)		2
<i>Carpomya incompleta</i> (BECKER)		3
<i>Dacus ciliatus</i> (LOEW)		1
<i>Euarestella iphionae</i> (EFFLATOUN)		9
<i>Goniurellia spinifera</i> FREIDBERG		1
<i>Katonaia aida</i> HERING		1
<i>Oxyaciura tibialis</i> (R.D.)		1
<i>Trupanea amoena</i> (FRAUENFELD)		3
<i>Trupanea pulcherrima</i> (EFFLATOUN)		3

		Number of individuals observed
HEMIPTERA		
Lygaeidae		
<i>Spilostethus pandurus</i> (SCOPOLI, 1763)		4
HYMENOPTERA		
Apidae		
<i>Amegilla cognata</i> (SMITH, 1854)		5
<i>Amegilla mucorea</i> (KLUG, 1845)		28
<i>Amegilla savignyi</i> (LEPELETIER, 1841)		7
<i>Anthophora caelebs</i> GRIBODO, 1924		3
<i>Anthophora concinna</i> (KLUG, 1845)		27
<i>Anthophora (Heliophila) SINAI</i> sp1	(S)	5
<i>Anthophora crassipes</i> LEPELETIER, 1841		19
<i>Anthophora hermanni</i> SCHWARZ & GUSENLEITNER, 2003		4
<i>Anthophora pauperata</i> WALKER, 1871		8
<i>Anthophora senescens</i> LEPELETIER, 1841		1
<i>Anthophora SINAI</i> sp1	(S)	51
<i>Apis cerana</i> FABRICIUS, 1793		2
<i>Apis mellifera</i> LINNAEUS, 1758		300
<i>Xylocopa sulcatipes</i> MAA, 1970		28
Colletidae		
<i>Colletes nanus</i> FRIESE, 1898		5
<i>Colletes perezi</i> MORICE, 1904		20
<i>Colletes pumilus</i> MORICE, 1904		1
<i>Colletes tuberculatus</i> MORAWITZ, 1894	E	1
<i>Hylaeus sinaiticus</i> (ALFKEN, 1938)		16
<i>Hylaeus oliviae</i> DATHE, 2015	S	3
<i>Hylaeus xanthopoda</i> (VACHAL, 1895)		8
<i>Hylaeus albonotatus</i> (WALKER, 1871)		12
Crabronidae		
<i>Bembecinus hebraeus</i> DE BEAUMONT, 1968	E	3
<i>Bembix arenaria</i> HANDLIRSCH, 1893		1
<i>Bembix oculata</i> PANZER, 1801		7
<i>Cerceris alboatra</i> MOCHI, 1938		5
<i>Cerceris sabulosa</i> (PANZER, 1799)		31
<i>Cerceris tricolorata</i> MOCHI, 1938		8
<i>Palarus histrio</i> SPINOLA, 1838		1
<i>Philanthus coarctatus</i> SPINOLA, 1839		16
<i>Philanthus triangulum</i> (FABRICIUS, 1775)		9
<i>Prosopigastra fumipennis</i> GUSSAKOVSKIJ, 1952		2

		Number of individuals observed
Halictidae		
<i>Ceylactus variegatus</i> (OLIVIER, 1789)		5
<i>Halictus tibalis</i> WALKER, 1871		12
<i>Halictus gemmellus</i> PAULY, 2015		7
<i>Halictus falx</i> EBMER, 2008		4
<i>Halictus pici</i> PÉREZ, 1895		5
<i>Lasioglossum erraticum</i> (BLÜTHGEN, 1931)	E	1
<i>Lasioglossum kowitzense</i> (COCKERELL, 1937)		1
<i>Lasioglossum subaenescens asiaticum</i> (DALLA TORRE, 1896)		3
<i>Lasioglossum colopiense</i> (PÉREZ, 1903)	E	1
<i>Nomioides rotundiceps</i> HANDLIRSCH, 1888		3
<i>Nomioides squamiger</i> SAUNDERS, 1908		1
<i>Nomioides turanicus</i> MORAWTIZ, 1876		14
<i>Pseudapis nilotica</i> (SMITH, 1875)		2
Megachilidae		
<i>Anthidium amabile</i> ALFKEN, 1932		1
<i>Anthidium bischoffi</i> MAVROMOUSTAKIS, 1954		3
<i>Chalicodoma montenegrense</i> DOURS, 1873		2
<i>Hoplitis africana</i> (WARNCKE, 1990)	E	5
<i>Hoplitis epeoliformis</i> (DUCKE, 1899)	E	1
<i>Hoplitis gerofita</i> (WARNCKE, 1990)	E	4
<i>Hoplitis hofferi</i> TKALCŮ, 1977	E	42
<i>Icteranthis ferrugineum</i> FABRICIUS, 1787		4
<i>Megachile concinna</i> SMITH, 1879		3
<i>Megachile inexpectata</i> REBMANN, 1968		1
<i>Megachile doriae</i> MAGRETTI, 1890		1
<i>Megachile flabellipes</i> PÉREZ, 1895		1
<i>Megachile insignis</i> VAN DER ZANDEN, 1996	E	6
<i>Megachile minutissima</i> RADOSZKOWSKI, 1876		1
<i>Megachile montenegrensis</i> DOURS, 1873	E	4
<i>Megachile tenuistriga</i> ALFKEN, 1938		2
<i>Megachile walkeri</i> DALLA TORRE, 1896		65
<i>Osmia alfkenii</i> DUCKE, 1900		1
<i>Osmia laticella</i> VAN DER ZANDEN, 1986		6
Scoliidae		
<i>Scolia carbonaria</i> (LINNAEUS, 1767)		6
Sphecidae		
<i>Chalybion flebile</i> (LEPELETIER, 1845)		1
<i>Podalonia tydei</i> (LE GUILLOU, 1841)		1

	Number of individuals observed
Vespidae	
<i>Celonites fischeri</i> SPINOLA, 1838	1
<i>Vespa orientalis</i> LINNAEUS, 1771	2
LEPIDOPTERA	
Hesperiidae	
<i>Spialia doris</i> (WALKER, 1870)	5
Lycaenidae	
<i>Agrodiaetus loewii</i> ZELLER, 1847	5
<i>Deudorix livia</i> (KLUG, 1834)	5
<i>Iolana alfieri</i> WILTSHIRE, 1948	10
<i>Lampides boeticus</i> (LINNAEUS, 1767)	348
<i>Leptotes pirithous</i> (LINNAEUS, 1767)	39
<i>Tarucus rosacea</i> (AUSTAUT, 1885)	85
<i>Polyommatus icarus</i> (ROTTEMBURG, 1775)	1
Nymphalidae	
<i>Danaus chrysippus</i> (LINNAEUS, 1758)	3
<i>Vanessa cardui</i> (LINNAEUS, 1758)	4
Pieridae	
<i>Belenois aurota</i> (FABRICIUS, 1793)	24
<i>Colias croceus</i> (GEOFFROY, 1785)	4
<i>Colotis fausta</i> (OLIVIER, 1804)	2
<i>Pieris rapae</i> (LINNAEUS, 1758)	4
<i>Pontia daplidice</i> (LINNAEUS, 1758)	17
<i>Pontia glauconome</i> KLUG, 1829	1
Sphingidae	
<i>Macroglossum stellatarum</i> (LINNAEUS, 1758)	7