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## Parasitic and phoretic mites (Arachnida, Acari) reported from insects (Arthropoda: Insecta) in Egypt

Hany M.G. El-Kawas<sup>1\*</sup>, Mohamed W. Negm<sup>2</sup>

<sup>1</sup> Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.

<sup>2</sup> Department of Plant Protection, Faculty of Agriculture, Assiut University, Assiut, Egypt.

**ABSTRACT.** Mites exploit various symbiotic associations with insects and other arthropods, mainly parasitism and phoresy. Faunistic information of parasitic and phoretic mites on insects in Egypt is reviewed. Previous published records are gathered and, in some cases, altered. This paper presents an annotated list of the 120 species, including unidentified spp., of mites extracted from insects in Egypt to date. Mite species belong to 42 families [16 of Mesostigmata, 19 of Prostigmata, five of Astigmata and two in Cryptostigmata (Oribatida)]. Information about insect hosts, attachment sites and geographic distribution is provided.

**Key words:** mites, Acari, Insecta, phoresy, parasitism, Egypt.

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### Introduction

Mites (Acari) develop diverse symbiotic relationships with other arthropods (Lindquist, 1975), mainly insects. They are commonly found to be parasitic or phoretic on insects, mostly of the orders Coleoptera, Diptera and Hymenoptera. In relation to mites parasitic on insects, honey bee mites are the best examples causing significant damage to apiculture. Also, the larvae of some Prostigmata families such as Erythraeidae, Trombiculidae and Trombidiidae are harmful to insects (Welbourn, 1983). Mullen (1975) grouped 238 worldwide records of parasitic mites on mosquitoes, attaching to membranous areas of the body. On the other hand, phoretic mites use insects and other arthropods as transporters to escape

unfavorable conditions and move to more suitable habitats (Peter, 1989). Mite-insect phoretic relationships have been reported in different mite orders (Athias-Binche, 1994). Astigmata deutonymphs (hypopi) are highly adapted phoronts due to having complicated suckers for attachment purposes (Evans et al., 1961; Negm & Alatawi, 2011). Several records of phoresy were found in Mesostigmata (Hunter & Rosario, 1988), among which, deutonymphs of uropodid mites occur in enormous numbers on dung-inhabiting Coleoptera and Diptera, and are of common incidence on Chilopoda, Diplopoda and Isopoda (OConnor, 1982; Houck & OConnor, 1991). Moreover, several world records have been reported for

Corresponding author: Hany M.G. El-Kawas, E-mail: [hmg733@yahoo.com](mailto:hmg733@yahoo.com)

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prostigmatid mites on insects (Saboori & Ostovan, 2000; Mağol & Wohltmann, 2012).

Mumcuoglu and Braverman (2010) list parasitic and phoretic mites on dipterous flies in Sinai Peninsula, Egypt and Israel. The exact impact that mites have on their host insects (e.g., through sucking haemolymph and damage or just hitching a ride), however, is not well understood. Until now, published data for mites on insects have appeared little, however, more research is taking place. Atwa et al. (2017) reviewed the host-parasite relationship between mosquitoes and parasitic mites. They described the role of larval mites of Arrenuridae, Thyasidae, Anystidae, Hydryphantidae as obligate parasites, which ingest haemolymph by piercing exoskeleton of the host.

Despite the importance of studying the mite-insect interactions, parasitic and phoretic mite fauna of Egyptian insects has received little consideration. Thus, the present review aims to bring together the scattered published information about the occurrence of parasitic and phoretic mites found on insects in Egypt, along with their hosts and geographic distribution. The provided checklist is planned to be a basis on which to build further knowledge of this fauna.

### Material and methods

In this paper, we review the literature concerning the parasitic and phoretic mite fauna associated with insects in Egypt. Due to nomenclatural changes in the taxonomic concepts for some families and genera, especially in Mesostigmata, certain taxa were revised and situated in their correctly updated taxonomic position following the systematic classification of Krantz (1970) and Evans (1992). Since several mite specimens of unpublished works were inaccessible or missing, data from unpublished theses was not included in the present work. Mite families, genera and

species were alphabetically sorted with information, where available, about locality, habitat, host insect, attachment sites and published source.

### Results

Based on available literature, a total of 16 families with 46 species of Mesostigmata, 19 families with 43 nominal species of Prostigmata, five families with 29 species of Astigmata and two families with one species each in Cryptostigmata, are known to be parasitic or phoretic on insects at various localities in Egypt (Table 1).

### Discussion

The present checklist summarizes our knowledge of parasitic and phoretic mites on insects in Egypt. So far, 120 mite species, including unidentified species, belonging to 42 families within four orders, were reviewed. Mesostigmata was represented by 16 families: Ameroseiidae, Ascidae, Blattisociidae, Digamasellidae, Dinychidae, Eviphididae, Laelapidae, Macrochelidae, Melicharidae, Ologamasidae, Parasitidae, Trachyuropodidae, Trematuridae, Urodinychidae, Uropodidae and Varroidae; Prostigmata by 19 families: Acarophenacidae, Arrenuridae, Bdellidae, Caligonellidae, Camerobiidae, Cunaxidae, Erythraeidae, Stigmaeidae, Limnesiidae, Neotrombidiidae, Podapolipidae, Pyemotidae, Pygmephoridae, Raphignathidae, Scutacaridae, Tarsonemidae, Tydeidae, Thyasidae and Trombidiidae; Astigmata by five families: Acaridae, Canestriniidae, Chaetodactylidae, Glycyphagidae and Histiosomatidae; and Cryptostigmata by two families: Brachychthoniidae and Pediculochelidae. Families including phoretic mites are more abundant than others include parasitic mites. The most diverse families including phoretic mites are Acaridae, Laelapidae and Macrochelidae.

**Table 1.** Parasitic and phoretic mites reported from insects in Egypt.

Taxon	Habit; insect host (order, family)	Attachment site(s)	Locality	References
<b>ORDER MESOSTIGMATA</b>				
<b>Ameroseiidae Evans, 1961</b>				
<i>Neocypholaelaps indicus</i> Evans, 1963 <sup>a</sup>	Phoretic; <i>Apis mellifera</i> L. (Hymenoptera, Apidae)	On the abdomen of workers	Gharbia	Abou Senna (1997)
<b>Ascidae Voigts &amp; Oudemans, 1905</b>				
<i>Iphidozercon zaheeri</i> Metwali & Ahmed, 1987	Phoretic; <i>Xylocopa aestuans</i> (L.) (Hymenoptera, Apidae)	Inside the acarinarium (a special abdominal pouch)	Giza	Metwali & Ahmed (1986, 1987a)
<i>Protogamasellus denticus</i> Nasr, 1986	Parasitic; <i>R. ferrugineus</i>	Dorsally on larvae, pupae and adults	Ismailia	Taha et al. (2014)
<b>Blattisociidae Garman, 1948</b>				
<i>Blattisocius apis</i> Basha & Yousef, 2000	Phoretic; <i>A. mellifera</i>	On workers broods	Qalyubia	Basha & Yousef (2000)
<i>B. capsicum</i> Basha & Yousef, 2000	Phoretic; psocopterous insects inhabiting the stored hot pepper, <i>Capsicum annuum</i> L.	With immatures	Sharkia	Basha & Yousef (2000)
<i>B. keegani</i> Fox, 1947	Phoretic; <i>Oxycoryphus compressicornis</i> (Latreille) (Orthoptera: Acrididae)	Dorsally on the thorax	Ismailia	Ibrahim et al. (1992); El-Naggar et al. (1993)
<i>B. tarsalis</i> (Berlese, 1918)	Phoretic; <i>Polistes</i> sp. (Hymenoptera, Vespidae)	Inside the nests	Fayoum	Ibrahim et al. (1992); El-Naggar et al. (1993)
<b>Digamasellidae Evans, 1957</b>				
<i>Dendrolaelaps</i> sp.	Phoretic; <i>R. ferrugineus</i>	On adults and inside the cocoons	Ismailia	Taha et al. (2014)
<i>Digamasellus</i> sp.	Phoretic; <i>R. ferrugineus</i>	On adults and inside the cocoons	Ismailia	Taha et al. (2014)
<i>Longoseius</i> sp.	Phoretic; <i>Aphodius liuidus</i> (Olivier) (Coleoptera, Scarabaeidae)	Dorsally on the thorax	Cairo	Ibrahim et al. (1992)
<b>Dinychidae Berlese, 1916</b>				
<i>Leiodinychus karmeri</i> (Canestrini, 1882)	Parasitic; <i>R. ferrugineus</i>	Dorsally on larvae pupae and adults	Ismailia	Taha et al. (2014)
<b>Eviphididae Berlese, 1913</b>				
<i>Alliphis</i> sp.	Phoretic; <i>Macrolister major</i> L. (Coleoptera, Histeridae)	On the legs	Qalyubia	Ibrahim et al. (1992)
<i>Iphidosoma</i> sp.	Phoretic; <i>R. ferrugineus</i>	On larvae, pupae, adult and inside the cocoons	Ismailia	El-Sharabasy (2010)
<i>Scarabaspis</i> sp.	Phoretic; <i>Scarabaeus sacer</i> L. (Coleoptera, Scarabaeidae)	Ventrally on the abdomen	Sharkia	Kandeel et al. (2007a)
<b>Laelapidae Berlese, 1892</b>				

Table 1. Continued

<i>Androlaelaps</i> sp.	Phoretic; <i>Coccotrypes dactyliperda</i> F. (Coleoptera, Curculionidae)	Between the head and thorax	Fayoum	Ibrahim et al. (1992)
<i>A. bayoumi</i> Basha & Yousef, 2000	Phoretic; <i>A. mellifera</i>	On legs of the workers	Beheira	Basha & Yousef (2000)
<i>Cosmolaelaps</i> sp.	Phoretic; <i>Antigastra catalaunalis</i> Duponchel (Lepidoptera, Pyraustidae); <i>Phoracantha semipunctata</i> (F.) (Coleoptera, Cerambycidae)	On legs of the larvae	Fayoum; Menofiya	Ibrahim et al. (1992)
<i>C. vacua</i> (Michael, 1891)	Phoretic; <i>Paederus alfieri</i> Koch (Coleoptera, Staphylinidae)	On the legs	Sharkia	Ibrahim et al. (1992)
<i>Dinogamasus inflatus</i> LeVeque, 1930	Phoretic; <i>X. aestuans</i>	In the acarinarium	Giza; Sharkia; Ismailia; Tahreer	Zaher et al. (1980); El-Kawas (2011)
<i>H. arabicus</i> Hafez, El-Badry & Nasr, 1982	Phoretic; <i>Scaurus aegyptiacus</i> Solier (Coleoptera, Tenebrionidae)	On the head	Sharkia	Hafez et al. (1982)
<i>H. sardoa</i> (Berlese, 1911)	Phoretic; <i>Truxalis grandis</i> Klug (Orthoptera, Acrididae); <i>R. ferrugineus</i>	Ventrally on the abdomen	Ismailia	Ibrahim et al. (1992); El-Sharabasy (2010)
<i>H. wahabi</i> Metwally & Ibrahim, 1986	Phoretic; <i>Blaps polychresta</i> (Forsk.) (Coleoptera, Tenebrionidae)	Ventrally on the abdomen	Sharkia	Metwally & Ibrahim (1986); El-Kawas (2011)
<i>Stratiolaelaps miles</i> (Berlese, 1892)	Phoretic; <i>Messor aegyptiacus</i> (Emery) (Hymenoptera, Formicidae); <i>Chrysomela</i> sp. (Coleoptera, Chrysomelidae)	On the legs	Giza	Ibrahim et al. (1992)
Macrochelidae Vitzthum, 1930				
<i>Holostaspella</i> sp.	Phoretic; <i>Monotoma quadricollis</i> Aube (Coleoptera, Monotomidae)	On the legs	Qalyubia; Giza	Ibrahim et al. (1992)
<i>Macrocheles</i> sp.	Phoretic; <i>Stomoxys calcitrans</i> (L.) (Diptera, Muscidae)	On the junction of proboscis and head	Beheira	Salit & Abd El-Rahim (1972)
<i>M. decoloratus</i> (Koch, 1839)	Phoretic; <i>Pachnoda fasciata</i> (F.) (Coleoptera, Cetoniidae)	Under the elytra	Qalyubia; Giza	Ibrahim et al. (1992)
<i>M. glaber</i> (Müller, 1860)	Phoretic; <i>Pentodon bispinosus</i> Kust. (Coleoptera, Scarabaeidae)	Dorsally under elytra and on legs	Qalyubia	Ibrahim et al. (1992)
<i>M. insignitus</i> Berlese, 1918	Phoretic; <i>Saprinus</i> sp. (Coleoptera, Histeridae)	On the legs	Qalyubia	Ibrahim et al. (1992)
<i>M. matrius</i> Hull, 1925	Phoretic; <i>P. bispinosus</i> ; <i>Corpis hispanus</i> Kust. (Coleoptera, Scarabaeidae)	Under the elytra; on thorax	Qalyubia; Sharkia	Ibrahim et al. (1992); El-Naggar et al. (1993)

Table 1. Continued

<i>M. merdarius</i> (Berlese, 1889)	Parasitic; <i>R. ferrugineus</i>	Dorsally on larvae, pupae and adults	Ismailia	Taha et al. (2014)
<i>M. muscadomesticae</i> (Scopoli, 1772)	Phoretic; <i>Anacridium</i> sp. (Orthoptera, Acrididae); <i>P. bispinosus</i>	Under the wings and on the legs	Qalyubia	Ibrahim et al. (1992); El-Naggar et al. (1993)
<i>M. nataliae</i> Bregetova & Koroleva, 1960	Phoretic; <i>Copris hispanus</i> L. (Coleoptera, Scarabaeidae)	Dorsally under the elytra	Cairo	Ibrahim et al. (1992); El-Naggar et al. (1993)
<i>M. pisentii</i> (Berlese, 1882)	Phoretic; <i>P. bispinosus</i>	On the legs	Qalyubia; Menofiya	Ibrahim et al. (1992); El-Naggar et al. (1993)
<i>M. sembelawanii</i> Hafez, El-Badry & Nasr, 1982	Phoretic; <i>Pentodon deserti</i> Heyden (Coleoptera, Scarabaeidae)	Ventrally on coxal region	Sharkia	Hafez et al. (1982)
<i>M. subbadius</i> (Berlese, 1904)	Phoretic; <i>Saprinus</i> sp.	On thorax and legs	Qalyubia	Ibrahim et al. (1992)
<b>Melicharidae Hirschmann, 1962</b>				
<i>Proctolaelaps holovertris</i> (= <i>orientalis</i> Nasr, in Zaher, 1986)	Phoretic; <i>C. bicolor</i>	Inside the nest	Cairo	Ibrahim et al. (1992); Metwally et al. (1996)
<i>Proctolaelaps afifii</i> (= <i>striatus</i> Afifi, Hassan & El Bishlawy, 1984)	Parasitic; <i>R. ferrugineus</i>	Dorsally on larvae, pupae and adults	Ismailia	Taha et al. (2014)
<i>P. subcorticalis</i> Lindquist, 1971	Phoretic; <i>Copris hispanus</i> L. (Coleoptera, Scarabaeidae); <i>Polistes gallicus</i> L. (Hymenoptera, Vespidae)	Under the elytra; in the nest and on the intersegmental membranes	Fayoum	Ibrahim et al. (1992)
<b>Ologamasidae Ryke, 1962</b>				
<i>Gamasiphis denticus</i> Hafez & Nasr, 1979	Phoretic; <i>C. bicolor</i>	Inside the nest	Ismailia	Hafez & Nasr (1979)
<b>Parasitidae Oudemans, 1901</b>				
<i>Paragamasus runciger</i> (Berlese, 1903)	Phoretic; <i>B. polychresta</i>	Not stated	Beni Suef	Ibrahim et al. (1992)
<i>Parasitus consanguineus</i> Oudemans & Voigts, 1904	Phoretic; <i>C. bicolor</i>	Inside the nest	Giza	Ibrahim et al. (1992)
<b>Trachyuropodidae Berlese, 191</b>				
<i>Aegyptus rhynchophorus</i> El Beshlawy & Allam, 2007	Parasitic; <i>R. ferrugineus</i>	Dorsally under the elytra, on thorax and abdomen and inside the cocoons	Sharkia; Ismailia	El Beshlawy & Allam (2007); Taha et al. (2014)
<b>Trematuridae Berlese, 1917</b>				
<i>Trichouropoda pataвина</i> (Canestrini, 1885)	Phoretic; <i>R. ferrugineus</i>	Dorsally under elytra and ventrally on the abdomen and the third pair of legs	Ismailia	El-Sharabasy (2010); Metwally et al. (2014)
<b>Urodynchidae Berlese, 1917</b>				

Table 1. Continued

<i>Uroobovella marginata</i> (Koch, 1839)	Phoretic; <i>R. ferrugineus</i>	Dorsally under the elytra and on larvae, pupae and adults	Sharkia; Ismailia	El-Kawas (2011); Metwally et al. (2014); Taha et al. (2014)
Uropodidae Kramer, 1881				
<i>Uropoda minima</i> Kramer, 1882	Phoretic; <i>R. ferrugineus</i>	Dorsally under the elytra	Sharkia	El-Kawas (2011)
Varroidae Delfinado & Baker, 1974				
<i>Varroa destructor</i> Anderson & Trueman, 2000	Parasitic; <i>A. mellifera</i>	On segmental membranes of adults and broods	Qalyubia; Sharkia; Dakahlia; Fayoum	Kandil (1998); El-Kawas (2011)
ORDER PROSTIGMATA				
Acarophenacidae Cross, 1965				
<i>Acarophenax bruchidisuii</i> Kandeel & Nassar, 1993	Parasitic; <i>Bruchidius incarnates</i> Schm. (Coleoptera, Bruchidae); <i>Tribolium castaneum</i> (Herbst.) (Coleoptera, Tenebrionidae)	Under the elytra	Sharkia	Kandeel & Nassar (1993); El-Kawas (2011)
Arrenuridae Thor, 1900				
<i>Arrenurus</i> spp.	Parasitic on <i>Culicoides seiffadinei</i> Dzshafarov (Diptera, Ceratopogonidae)	Not stated	Sinai Peninsula	Mumcuoglu & Braverman (2010)
Bdellidae Dugès, 1834				
<i>Spinibdella bifurcata</i> Ateyo, 1960	Phoretic; <i>X. aestuans</i> and <i>Osmia sordida</i> Ben. (Hymenoptera, Megachilidae)	The host nest	Ismailia; Sharkia	Zaher et al. (1980)
Caligonellidae Grandjean, 1944				
<i>Molothrognathus seusius</i> Soliman & Gomaa, 1980	Phoretic; <i>X. aestuans</i> and <i>O. sordida</i>	The host nest	Giza; Sharkia	Zaher et al. (1980)
Camerobiidae Southcott, 1957				
<i>Neophyllobius gonzali</i> Zaher & Gomaa, 1979	Phoretic; <i>X. aestuans</i>	The host nest	Ismailia	Zaher & Gomaa (1979); Zaher et al. (1980)
Cunaxidae Thor, 1902				
<i>Cunaxa capreolus</i> (Berlese, 1889)	Phoretic; <i>X. aestuans</i>	The host nest not stated	Ismailia	Zaher et al. (1980)
<i>C. setirostris</i> (Hermann, 1804)	Phoretic; <i>X. aestuans</i>	The host nest	Giza	Zaher et al. (1980)
Erythraeidae Oudemans, 1902				
<i>Leptus</i> sp.	Parasitic; <i>Gryllotalpa gryllotalpa</i> (L.) (Orthoptera, Gryllotalpidae); <i>Truxalis grandis</i> Klug (Orthoptera, Acrididae)	On the abdomen	Sharkia; Ismailia	Ibrahim et al. (1992)
Stigmaeidae Oudemans, 1931				
<i>Stigmaeus sinai</i> Swift, 1987	Parasitic; <i>Phlebotomus papatasi</i> (Scopoli) (Diptera, Psychodidae)	Not stated	Sinai Peninsula	Swift (1987)
Limnesiidae Thor, 1900				

Table 1. Continued

Unidentified larvae	Parasitic; <i>Culicoides</i> sp.; <i>C. calloti</i> Kremer, Delecolle & Bailly-Choumara; <i>C. seifadinei</i> Dzhafarov	Not stated	Sinai Peninsula	Mumcuoglu & Braverman (2010)
Neotrombidiidae Feider, 1959				
<i>Neotrombidium</i> sp.	Parasitic; <i>Agrypnus notodonta</i> (Latreille) (Dictyoptera, Elateridae); <i>Culicoides azerbaijdzhanicus</i> Dzhafarov	On intersegmental membranes	Sinai Peninsula; Cairo	Ibrahim et al. (1992); Mumcuoglu & Braverman (2010)
Podapolipidae Ewing, 1922				
<i>Locustacarus aegyptiacus</i> Kandeel, El-Zohairy, Aamir & Ibrahim, 1993	Parasitic; <i>Acrotylus insubricus</i> (Seop.) (Orthoptera, Acrididae)	Inside the tracheae	Sharkia	Kandeel et al. (1993)
<i>L. trachealis</i> Ewing, 1924	Parasitic; <i>Anacridium aegyptium</i> L. (Orthoptera, Acrididae)	Dorsally under the wings	Ismailia	El-Naggar et al. (1993)
<i>Podapolipoides acrotylusi</i> Kandeel, El-Zohairy, Aamir & Ibrahim, 1993	Parasitic; <i>E. plorans</i> ; <i>A. insubricus</i> ; <i>A. strepens</i>	Dorsally under the wings	Sharkia	Kandeel et al. (1993); El-Kawas (2011)
<i>P. egyptiacus</i> Omar & Mohamed, 2007	Parasitic; <i>Aiolopus strepens</i> (Latr.) (Orthoptera, Acrididae); <i>A. insubricus</i>	Under the wings	Sharkia	Omar & Mohamed (2007)
<i>P. grassi</i> Berlese, 1897	Parasitic; <i>A. aegyptium</i>	Dorsally under the wings	Fayoum	El-Naggar et al. (1993)
<i>Tarsopolipus corrugatus</i> Berlese, 1911	Parasitic; <i>Scarabaeus sacer</i>	Dorsally under the elytra	Giza	El-Naggar et al. (1993)
<i>T. rhynchophori</i> (Ewing, 1924)	Parasitic; <i>A. strepens</i> ; <i>E. plorans</i>	Dorsally under the wings	Sharkia	El-Kawas (2011); Kandeel et al. (2007a)
Pyemotidae Oudemans, 1937				
<i>Pyemotes herfsi</i> (Oudemans, 1936)	Parasitic; on larvae of <i>Pectinophora gossypiella</i> (Saunders) (Lepidoptera, Gelechiidae); larvae and adults of <i>Sitotroga cerealella</i> (Olivier) (Lepidoptera, Gelechiidae) in a laboratory culture	Dorsally on the larvae	Sharkia	Rizk et al. (1979); Kandeel et al. (2007a)
<i>P. tritici</i> (LaGrèze-Fossat & Montagné, 1851)	Parasitic; first instar larva of <i>P. gossypiella</i>	Dorsally on the first instar larvae	Sharkia	El-Kawas (2011)
Pygmephoridae Cross, 1965				
<i>Pediculaster egypticus</i> Omar, 2014	Phoretic; <i>Musca vicina</i> (Macquart) (Diptera, Muscidae)	On the abdomen	Sharkia	Omar (2014)
Raphignathidae Kramers, 1877				
<i>Raphignathus gracilis</i> (Rack, 1962)	Phoretic; <i>Chalicodoma siculum</i> Rossi (Hymenoptera, Megachilidae)	Inside the nest	Ismailia	Zaher et al. (1980)
Scutaridae Oudemans, 1916				
<i>Heterodispus yousefi</i> Metwali, 1984	Phoretic; <i>B. polychresta</i>	Dorsally under the elytra on thorax	Sharkia	Metwali (1984)

Table 1. Continued

<i>Imparipes messori</i> Metwali & Ahmed, 1987	<i>Messor aegyptiacus</i> (Emery) and <i>Monomorium salomonis</i> (L.) (Hymenoptera, Formicidae)	Inside the nest	Beheira	Metwali & Ahmed (1987b)
<i>Scutacarus</i> sp.	Phoretic; <i>R. ferrugineus</i>	Inside the cocoon	Sharkia	El-Sharabasy (2010)
<i>S. emadi</i> Mahunka & Zaki, 1992	Phoretic; unknown ptilid beetle	Not stated	Menofiya	Mahunka & Zaki (1992)
<i>S. fimbriatosimilis</i> Metwali & Ahmed, 1987	<i>M. aegyptiacus</i>	Inside the nest	Beheira	Metwali & Ahmed (1987b)
<i>S. gouheri</i> Metwali & Ahmed, 1987	<i>Paratrechina</i> (= <i>Prenolepis</i> ) <i>jaegerskioeldi</i> Santschi (Hymenoptera, Formicidae)	Inside the nest	Beheira	Metwali & Ahmed (1987b)
<i>S. longitarsus</i> (Berlese, 1905)	Phoretic; <i>Leptocera nigra</i> Olivier (Diptera, Sphaeroceridae)	Not stated	Menofiya	Zaki et al. (1987)
<i>S. magyarosimilis</i> Metwali & Ahmed, 1987	<i>Pheidole pallidula</i> (Nylander) (Hymenoptera, Formicidae)	Inside the nest	Beheira	Metwali & Ahmed (1987b)
<i>S. notabilosinilis</i> Metwali & Ahmed, 1987	<i>P. jaegerskioeldi</i>	Inside the nest	Behira	Metwali & Ahmed (1987b)
<i>S. pugillator</i> Mahunka & Zaki, 1992	Phoretic; unknown ptilid beetle	Not stated	Menofiya	Mahunka & Zaki (1992)
<b>Tarsonemidae Canestrini &amp; Fanzago, 1877</b>				
<i>Acarapis woodi</i> (Rennie, 1921)	Parasitic; <i>A. mellifera</i>	Inside trachea of mesothorax	Qalyubia; Sharkia	Ibrahim et al. (1992); El-Kawas (2011)
<i>Tarsonemus indoapis</i> Lindquist, 1968	Phoretic; <i>A. mellifera</i>	not stated	Gharbia	Abou Senna (1997)
<b>Tydeidae Kramer, 1877</b>				
<i>Brachytydeus oregonensis</i> (Baker, 1970)	Phoretic; <i>X. aestuans</i> ; <i>Andrena fuscosa</i> Erichson (Hymenoptera, Andrenidae)	Inside the nest	Giza; Sharkia	Zaher et al. (1980)
<i>Paralorryia woolleyi</i> Baker, 1968	Phoretic; <i>X. aestuans</i>	Inside the nest	Giza	Zaher et al. (1980)
<i>P. zaheri</i> Baker, 1968	Phoretic; <i>X. aestuans</i>	Inside the nest	Ismailia	Zaher et al. (1980)
<i>Pronematulus vandus</i> Baker, 1965	Phoretic; <i>X. aestuans</i>	Inside the nest	Ismailia	Zaher et al. (1980)
<b>Thyasidae Viets, 1926</b>				
Unidentified larvae	Parasitic; <i>Culicoides firuzae</i> Dzhafarov; <i>C. mosulensis</i> Khalaf	Not stated	Wadi baabaa (Sinai Peninsula)	Mumcuoglu & Braverman (2010)
Unidentified larvae	Parasitic; <i>Culicoides</i> <i>langeroni</i> Kieffer	Not stated	Saidna Mussa (Sinai Peninsula)	Mumcuoglu & Braverman (2010)
<b>Trombidiidae Leach, 1815</b>				



Table 1. Continued

Unidentified larva	Parasitic; <i>C. zerbajdzhanicus</i>	Not stated	Wadi baabaa (Sinai Peninsula)	Mumcuoglu & Braverman (2010)
<i>Microthrombidium egyptiacum</i> Rady, 1998	Parasitic; <i>Musca domestica</i> L. (Diptera, Muscidae)	Not stated	Qalyubia	Rady (1998)
<i>Trombidium</i> sp.	Parasitic; <i>Lepidosaphes pallida</i> (Maskell) (Homoptera, Diaspididae)	Under the scales	Sharkia	El-Kawas (2011)
<b>ORDER ASTIGMATA</b>				
<b>Acaridae Ewing &amp; Nesbitt, 1942</b>				
<i>A. solimani</i> Eraky, 1999	Phoretic; unidentified species of termites	Inside the nest	Aswan	Eraky (1999a)
<i>Acotyledon ahmadi</i> Eraky, 2003	Phoretic; unidentified species of termites	Inside the nest	Qena	Eraky (2003)
<i>A. lamiai</i> Eraky, 1998	Phoretic; <i>Psammotermes hypostoma</i> Desneux (Isoptera: Termitidae)	Not stated	New Valley	Eraky (1998)
<i>A. longsetoses</i> Eraky, 1999	Phoretic; <i>Amitermes desertorum</i> (Desneux) (Isoptera: Termitidae)	Not stated	Aswan	Eraky (1999b)
<i>A. termesi</i> Fakeer, Eraky, Ahmed & Soliman, 2014	Phoretic; unidentified species of termites	Not stated	New Valley	Fakeer et al. (2014)
<i>Caloglyphus</i> sp. (= <i>Sancassania</i> )	Phoretic; <i>B. polychresta</i> ; <i>P. bispinosus</i>	Under the elytra and on thorax and legs	Sharkia; Qalyubia	Ibrahim et al. (1992)
<i>C. krameri</i> (Berlese, 1881)	Phoretic; <i>Monomorium salomonism</i> (L.) and <i>Paratrechina jaegerskjoeldi</i> (Mayr) (Hymenoptera, Formicidae)	Not stated	Beheira; Giza	Metwali & Ahmed (1986)
<i>C. ornatus</i> Eraky, 2000	Phoretic; unidentified species of termites	Inside the nest	Aswan	Eraky (2000)
<i>C. subterraneusi</i> Fakeer, Eraky, Ahmed & Soliman, 2014	Phoretic; unidentified species of termites	Inside the nest	New Valley	Fakeer et al. (2014)
<i>Calvolia solimani</i> Eraky, 1999	Phoretic; <i>A. desertorum</i>	Inside the nest	Aswan	Eraky (1999b)
<i>C. zaheri</i> Eraky, 1998	Phoretic; <i>P. hypostoma</i>	Inside the nest	New Valley	Eraky (1998)
<i>Cosmoglyphus barbisetus</i> Eraky, 1999	Phoretic; unidentified species of termites	Inside the nest	Aswan	Eraky (1999a)
<i>Forcellinia egyptiaca</i> Eraky, 1998	Phoretic; <i>P. hypostoma</i>	Inside the nest	New Valley	Eraky (1998)
<i>Froriepia negmi</i> Eraky, 1999	Phoretic; <i>A. desertorum</i>	Inside the nest	Aswan	Eraky (1999b)
<i>Mahunkaglyphus solimani</i> Eraky, 1998	Phoretic; <i>P. hypostoma</i>	Inside the nest	New Valley	Eraky (1998)
<i>Mahunkallinia serratus</i> Eraky, 1999	Phoretic; <i>A. desertorum</i>	From the nests	Aswan	Eraky (1999b)
<i>T. putrescentiae</i> (Schrank, 1781)	Phoretic; <i>A. mellifera</i>	On thorax and abdomen of workers	Sharkia	Ibrahim et al. (1992)
<b>Canestriniidae Berlese, 1884</b>				

Table 1. Continued

<i>Percanestrinia egypti</i> El Bishlawy & Allam, 2003	Phoretic; <i>B. polychresta</i>	On the body	Ismailia	El Bishlawy & Allam (2003)
<b>Chaetodactylidae Zachvatkin, 1941</b>				
<i>Chaetodactylus osmiae</i> (Dufour, 1839)	Phoretic; <i>A. mellifera</i>	On the abdomen	Gharbia	Abou Senna (1997)
<i>Sennertia aegyptiacosimilis</i> Metwali & Ahmed, 1987	Phoretic; <i>X. aestuans</i>	In the acarinarium	Giza	Metwali & Ahmed (1986, 1987a)
<i>S. duweinii</i> Shereef & El-Duweini, 1980	Phoretic; <i>X. aestuans</i>	In the acarinarium	Giza	Shereef & El-Duweini (1980)
<i>S. egyptiaca</i> El-Badry, 1971	Phoretic; <i>X. aestuans</i>	In the acarinarium	Giza	El-Badry (1971); Zaher et al. (1980)
<b>Glycyphagidae Berlese, 1887</b>				
<i>Glycyphagus domesticus</i> (DeGeer, 1778)	Phoretic; <i>X. aestuans</i>	From nests	Ismailia	Zaher et al. (1980)
<b>Histiostomatidae Berlese, 1897</b>				
<i>Histiostoma</i> sp.	Phoretic; adults of <i>R. ferrugineus</i>	From cocoons	Ismailia	El-Sharabasy (2010)
<i>H. adarosii</i> Metwali & Ahmed, 1986	Phoretic; <i>C. bicolor</i>	Not stated	Sharkia; Beheira; Giza	Metwali & Ahmed (1986)
<i>H. camphori</i> Eraky, 1999	Phoretic; unidentified species of termites	From nests inside camphor trees	Aswan	Eraky (1999a)
<i>H. cataglyphi</i> Yousef & Metwali, 1973	Phoretic; <i>C. bicolor</i>	Inside nests	Not stated	Yousef et al. (1978)
<i>H. mannai</i> Eraky, 1999	Phoretic; unidentified species of termites	From nests inside camphor trees	Aswan	Eraky (1999c)
<i>H. sammari</i> Eraky, 1999	Phoretic; unidentified species of termites	From nests inside camphor trees	Aswan	Eraky (1999a)
<b>ORDER CRYPTOSTIGMATA</b>				
<b>Brachychthoniidae Thor, 1934</b>				
<i>Eobrachychthonius aegyptiacus</i> Kandeel, El-Naggar & El-Kawas, 2007	Phoretic; <i>Pulvinaria psidii</i> Maskell (Homoptera, Coccidae)	Under the scale	Gharbia; Sharkia; Ismailia	Kandeel et al. (2007b)
<b>Pediculochelidae Lavoipierre, 1946</b>				
<i>Pediculochelus raulti</i> Lavoipierre, 1946	Phoretic; <i>A. mellifera</i>	Not stated	Gharbia	Abou Senna (1997)

<sup>a</sup> This species was originally described as *Neocypholaelaps indica* by Evans (1963) with a feminine species epithet 'indica'. Since the genus name is masculine so the species name consecutively should be changed to 'indicus' (see Mařán, 2017).

Records of phoretic mites must be investigated in laboratory studies for being parasitic or just phoronts. In relation to parasitic mites on honey bees, El-Banhawy and Abou-Awad (1990) described a new acarid mite, *Lasioacarus morsei* (= *Kucinia morsei*, original designation) in association with the honey bee, *Apis dorsata* F. from the Philippines. This mite lives in honey bee

nests, probably feeds on bee bread, pollen or beehive debris, and disperses on adult bees through its deutonymphal stages (Klimov et al., 2016). In conclusion, we assume that this paper may encourage further works towards the utilization of parasitic mites against harmful insects of medical, veterinary or agriculture importance.

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### Conflict of Interests

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

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## کنه‌های انگل و همسفر (Arachnida: Acari) مرتبط با حشرات (Arthropoda: Insecta) در مصر

هانی م. ج. الکاواس<sup>۱\*</sup>، محمد و. نگم<sup>۲</sup>

۱ مؤسسه تحقیقات گیاهپزشکی، مرکز تحقیقات کشاورزی، دکی، گیزا، مصر.

۲ گروه گیاهپزشکی، دانشکده کشاورزی، دانشگاه آسیوط، آسیوط، مصر.

\* پست الکترونیکی نویسنده مسئول مکاتبه: [hmg733@yahoo.com](mailto:hmg733@yahoo.com)

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**چکیده:** کنه‌ها از راه‌های مختلف بویژه از طریق انگلی و همسفری از حشرات و سایر بندپایان بهره می‌گیرند. اطلاعات فون کنه‌های انگل و همسفر حشرات در مصر مورد بررسی قرار گرفت. اطلاعات منتشر شده قبلی جمع‌آوری شد و در برخی موارد اصلاح گردید. این مقاله لیستی از ۱۲۰ گونه، از جمله گونه‌های ناشناخته‌ی کنه‌ها است که تا امروز از روی بدن حشرات جمع‌آوری شده‌اند. گونه‌های شناسایی شده متعلق به ۴۲ خانواده (۱۶ خانواده از Mesostigmata، ۱۹ خانواده از Prostigmata، ۵ خانواده از Astigmata و ۲ خانواده از Cryptostigmata (Oribatida)) می‌باشند. اطلاعات درمورد حشرات میزبان، محل استقرار کنه روی بدن میزبان و پراکنش جغرافیایی ارائه شده است.

**واژگان کلیدی:** کنه‌ها، Acari، Insecta، همسفری، انگلی، مصر