



# Survey of Mite Species Inhabiting Animal Production Farm at Sohag Governorate, with Checklist of Mites Existing Manure and Dung Hills in Egypt

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Received: 📅 April 24, 2020

Published: 📅 June 02, 2020

## Abstract

The present study was carried out in the newly established animal production farm of the Faculty of Agriculture, Sohag University, in order to survey the mite species inhabiting manure and dung hills. The study showed the occurrence of six species of mites (i.e., *Macrocheles solimani* Hafez, El-Badry & Nasr, 1985; *Macrocheles merdarius* (Berlese, 1889); *Uropodiaspis aegyptiacus* Ahmed, 1984; *Siteroptes manure* Soliman & Kandeel, 1986; *Histiostoma arcuatus* Negm, 2007 and *Hormosianoetus mahunkai* Eraky & Shoker, 1993. The checklist reported 120 mite species pertaining to 18 families and 53 genera. Interestingly, the largest diversities of mite species were recorded to the *Mesostigmata* (50 species) and the *Acaridida* (45 species). Therefore, it is clear that, there are large numbers of mite pests (*Acaridida* species) inhabiting manure in Egypt, that may be transferred to agricultural crops when manure used in cultivation. On the other side, the diversity of the predatory mite species should be taken into consideration to establish control programs by using these species as a biological control agent to control the pest ones [1-15].

**Keywords:** Mites; Sohag; Egypt; Manure; Dung hills; Survey

## Introduction

The *Acaridida* Latreille, 1802 is a diverse group of mites specialized for exploiting spatially or temporarily restricted habitats. The modified deutonymph (hypopus) in this group is specialized for dispersal and resisting adverse environmental conditions (OC'onnor, 1982) [16-25]. Dispersal between habitat patches is affected by phoretic association between the specialized deutonymphs of the *Acaridida* mites and the host, which may be either another arthropod or a vertebrate (Hughes, 1976; OC'onnor, 1991; Houck and OC'onnor, 1991). Most species are living as saprophytic and fungivores in soil, litter, debris and organic manure, while others can be found on different economic plants, causing injury to plant directly by feeding, or by transmitting various disease agents (Zakhvatkin, 1941; Baker and Wharton, 1952; Scheucher, 1957; Hughes and Jackson, 1958; Hughes, 1961; Griffiths, 1977; OC'onnor, 1994; Kettle, 1995). On the other side, The *Acaridida* mites are a very important food source for many

*Mesostigmata* species, as the latter reduce the number of the former in different environments (on manure or plants).

Knowledge concerning the *Acaridida* fauna in Egypt is extremely poor as compared with the other groups of mites, such as: *Mesostigmata* and *Prostigmata*. Many points concerning to this group are questionable. However, several taxa were found to be new and several morphological characteristics were described. Many species and few genera affiliated to the *Acaridida* mites were recorded in Upper Egypt by: Eraky (1993; 1994a,b; 1997; 1998; 1999a,b,c; 2000a,b); Eraky and Shoker (1993a,b; 1994); Abu El-Maged (1998); Negm (2007); Eraky and Osman (2008a,b); Eraky (2010); Abdelgayed et al. (2017); Eraky et al. (2017) [26-32].

The work herein concerned with the species composition of mite species inhabiting manure and dung hills in the newly established animal production farm of the Faculty of Agriculture, Sohag University. An annotated list of mite species surveyed from

animal farms in Egyptian Governorates was provided for both the present work and previous studies of certain authors. [33-45]. Such information is needed to support future ecological works of mite fauna inhabiting animal farms.

## Materials and Methods

Samples (10 replicates) were taken fortnightly from manure and dung hills of the experimental animal production farm, Faculty of Agriculture, Sohag University, during two years started from march, 2018. Each sample (500g) was preserved in plastic bags labeled with necessary information, then transferred to the laboratory for extraction by using the modified Berlese's extractor apparatus. From the extracted *arthropod fauna*, mites were isolated in small vials, then cleared up in lactic acid (4 days) and mounted in Hayer's medium. The mounted slides were placed in an oven at 45-50 °C (7 days) till dryness. The identification of mite species was done using illustrated keys established by: Scheucher (1957); O'Connor (1982); Zaher (1984a,b; 1986); Evans (1992); O'Connor (2001); Eraky and Osman (2008a); Eraky (2010).

## Results and Discussion

The mite fauna inhabiting animal farms in Egypt, currently include 120 species pertaining to 18 families and 53 genera of different mite groups. Most of the surveyed species were reported from the husbandry farms of animals by: Shoker and Eraky (1994); Abu El-Maged (1998); Negm (2007) (Assiut Governorate)

and Abdel-Aziz (1999) (Sohag Governorate). The present study recorded only six species. Of these, two histostomatid (*Histiostoma arcuatus* Negm, 2007, *Hormosianoetus mahunkai* Eraky & Shoker, 1993); single siteroptid species (*Siteroptes manure* Soliman & Kandeel, 1986); two macrochelid species (*Macrocheles solimani* Hafez, El-Badry & Nasr, 1985; *Macrocheles merdarius* (Berlese, 1889) and one uropodid species (*Uropodiaspis aegyptiacus* Ahmed, 1984), from manure and dung hills of the experimental production farm of the Faculty of Agriculture, Sohag University. On the contrary, Abdel-Aziz (1999), recorded 35 species of mites (*Tarsonemina*, 3 species; *Oribatei*, 2 species; *Acarididia*, 16 species and *Mesostigmata*, 14 species), from three husbandries of animals at Sohag Governorate. While Shoker and Eraky (1994), surveyed 28 species of the *Mesostigmata* belonging to 9 families and 18 genera extracted from animal farms, also Negm (2007) recorded 47 species of different groups of mites at Assiut Governorate (Table 1). This difference between the scarce number of mite species collected in the current study and the number of mite species recorded from other farms, may be due to the fact that, the farms of high numbers of mite species were established from more than 35 years ago and that made the species stable, in comparison to the farm of the present study, which did not exceed five years of construction. Through the present study, attention is required to reduce the number of mite pests, which may be transmitted to agricultural crops. Also, attention must be taken into consideration to the predatory mites, to study their efficiencies in reducing the numbers of the phytophagous ones on different crops [46,47].

**Table 1:**

Order/family/species	Habitat	Location	Reference
<b>MESOSTIGMATA</b>			
Ameroseiidae Evans, 1963			
<i>Klemaniaplumosus</i> (Oudemans, 1902)	Animal farm	Assiut, Sohag (Upper Egypt)	Abu El-Maged [6] Abdel-Aziz, [1] Negm, [3]
<b>Ascidae Voigts &amp; Oudemans, 1905</b>			
<i>Proctolaelaps pygmaeus</i> (Müller, 1860)	Animal farm	Assiut, Sohag	Abdel-Aziz [1] Negm, [3]
<i>Protogamasellus denticus</i> Naser, 1978	Animal farm	Assiut	Abu El-Maged, [6] Negm, [3]
<b>Blattisociidae Garman, 1948</b>			
<i>Lasioseiusthermophilus</i> (Willmans, 1942)	Animal farm	Assiut	Abu El-Maged, [6] Negm, [3]
<i>Lasioseius zaheri</i> Nasr 1987	Manure	Giza, Sohag (Upper Egypt).	Zaher, [44]
<i>Lasioseius aegypticus</i> Afifi, 1982	Organic manure	Giza	Zaher, [44]
<b>Digamasellidae Evans, 1957</b>			
<i>Digamasellus presepum</i> Berlese, 1918	Animal farm	Assiut	(Negm, [3])
<i>Dendrolaelaps rasmi</i> Nasr & Mersal, 1986	Organic manure	Giza	Zaher, [44]
<b>Halolaelapidae Berlese, 1892</b>			
<i>Halolaelaps sexclavatus</i> (Oudemans, 1902)	Animal farm	Assiut	Abu El-Maged, [6] Negm [3]
<b>Laelapidae Berlese, 1892</b>			
<i>Androlaelaps casalis</i> (Berlese, 1887)	Animal farm, Organic manure	Assiut, Sohag, El-Monofeia, Demiatta	Zaher, [44] Abu El-Maged, [6] Abdel-Aziz, [1] Negm, [3] Abdelgayed [2]

<i>Androlaelaps aegypticus</i> Hafez, El-Badry & Nasr, 1982	Organic manure	Giza	Zaher, [44]
<i>Androlaelaps zaheri</i> Hafez, El-Badry & Nasr, 1982	Organic manure	Giza	Zaher, [44]
<i>Androlaelaps fahrenheiti</i> (Berlese, 1911)	Animal farm	Assiut	Negm, [3] Abdelgayed, [2]
<i>Ololaelaps bregetovae</i> Shereef&Soliman, 1980	Organicmanure	Assiut	Abdelgayed, [2]
<i>Hypoaspis astronomicus</i> (Koch, 1839)	Animal farm	Assiut	Negm, [3]
<i>Hypoaspis arabicus</i> Hafez, El-Badry & Nasr, 1982	Organic manure	Giza	Zaher, [44]
<i>Hypoaspis miles</i> (Berlese, 1892)	Animal farm	Assiut, Sohag	AbuEl-Maged,[6] AbdelAziz[1]Negm,[3]
<i>Hypoaspis bregetovae</i> Shereef & Afifi, 1980	Organic manure	Giza	Zaher, [44]
<i>Hypoaspis vacua</i> (Michael, 1891)	Animal farm	Assiut	AbuEl-Maged[6] Negm, [3]
<i>Hypoaspis zachvatkinae</i> Shereef & Afifi, 1980	Organic cattle manure	Giza	Zaher, [44]
<i>Hypoaspis baloghi</i> Shereef & Afifi, 1980	Organic cattle manure	Giza	Zaher, [44]
<i>Hypoaspis pertrovae</i> Shereef & Afifi, 1980	Organic cattle manure	Al-Exandria (Lower Egypt).	Zaher, [44]
<i>Laelaspis astronomicus</i> (Koch, 1839)	Organic manure	Giza, Demiatta, El-Dakahleia (Lower Egypt).	Zaher, [44]
<i>Laelaspis volgini</i> Shereef & Afifi, 1980	Organic cattle manure	Giza	Zaher, [44]
<b>MacrochelidaeVitzthum, 1930</b>			
<i>Macrocheles krantzi</i> Evans & Hyatt, 1963	Animal farm	Assiut	AbuEl-Maged, [6]Negm, [3]
<i>Macrocheles merdarius</i> (Berelese, 1889)	Animal farm	Sohag	present study
<i>Macrocheles muscadomesticae</i> (Scopoli, 1772)	Animal farm	Sohag	Abdel-Aziz,[1] Negm, [3]
<i>Macrocheles solimani</i> Hafez, El-Badry & Nasr, 1985	Animal farm	Sohag	present study
<i>Macrocheles shereefi</i> Hafez, El-Badry & Nasr, 1985	Organic manure	El-Ismaelia (Canal zone), Sinai.	Zaher, [44]
<i>Macrocheles glaber</i> (Müller, 1860)	Organic manure	Alloverthe country	Zaher, [44]
<i>Macrocheles matrius</i> (Hull, 1925)	Organic manure	Alloverthe country	Zaher, [44]
<i>Macrocheles sembelawanii</i> Hafez, El-Badry & Nasr, 1985	Organic manure	El-Dakahleia, El-Beheira, Kafr El-Skeikh (Lower Egypt).	Zaher, [44]
<i>Macrocheles africanus</i> Hafez, El-Badry & Nasr, 1985	Organic manure	Giza	Zaher, [44]
<b>Pachylaelapidae Vitzthum, 1931</b>			
<i>Zygoseius furciger</i> Berlese, 1916	Organic manure	Assiut	Abdelgayed, [2]
<b>ParasitidaeOudemans, 1901</b>			
<i>Parasitusbeta</i> Oudemans & Voigts, 1904	Animal farm	Assiut	Negm, [3]
<i>Parasitus lunaris</i> (Berlese, 1882)	Animal farm	Assiut	Negm, [3]
<i>Parasitusmammilatus</i> (Berlese, 1905)	Animal farm	Assiut, Sohag	AbuEl-Maged,[6] AbdelAziz,[1]Negm, [3]
<i>Parasitusnumerous</i> Karg, 1965	Animal farm	Assiut	Negm, [3]
<i>Parasitus badrii</i> Hafez & Nasr, 1986	Organic manure	El-Beherira, Giza, El Gharbeia	Zaher, [44]
<i>Parasitus burchanensis</i> Oudemans, 1903	Organic manure	El-Gharbeia, El-Monofeia (Lower Egypt), Giza, Benisuef (Upper Egypt).	Zaher, [44]
<i>Pergamasus misellus</i> Berlese, 1904	Animal farm	Assiut, Sohag	Abu El-Maged, [6] Abdel-Aziz,[1]Negm, [3]
<b>PhytoseiidaeBerlese, 1914</b>			
<i>Amblyseiusmoir</i> (Karg, 1970)	Animal farm	Assiut	(Negm, [3])
<b>UropodidaeKramer, 1881</b>			
<i>Fuscuropoda marginata</i> (Koch, 1839)	Animal farm	Assiut	(Negm, [3])

<i>Leiodynychus krameri</i> (Canestrini, 1882)	Animal farm	Assiut, Sohag	AbuEl-Maged, [6]Abdel-Aziz,[1]Negm, [3]
<i>Trichouropoda krantzi</i> Hirschumann, 1961	Animal farm	Assiut, Sohag	Abu El-Maged, [6] Abdel-Aziz,[1]Negm, [3]
<i>Trichouropoda patavina</i> (Canestrini, 1977)	Organic manure	Giza	Zaher, [44]
<i>Urodynychus pilosus</i> Ahmed, 1934	Animal farm	Assiut, Giza	Zaher, [44] Negm, [3]
<i>Uropodiaspis aegyptiacus</i> Ahmed, 1984	Animal farm	Sohag	presentstudy
<i>Uroobovella krantzi</i> Zaher & Afifi, 1986	Organic manure	Giza	Zaher, [44]
<i>Chiropturopoda bakeri</i> Zaher & Afifi, 1986	Organic manure	Giza, Benisuef (Upper Egypt).	Zaher, [44]
<b>Astigmata Acaridida)</b>			
<b>AcaridaeEwing &amp; Nesbitt, 1942</b>			
<i>Acotyledon khalifai</i> Eraky et al. 2000	Manur of animals	Sohag	Eraky [22] Negm, [3]
<i>Acotyledon manuri</i> Eraky, 1999b	Manure of animals	Assiut	Eraky, [22]Negm, [3]
<i>Acotyledon nerminka</i> Eraky, 1999b	Manure of animals	Assiut	Eraky,[22]Negm, [3]
<i>Acotyldon thernyshevi</i> Zakhvatkin, 1941)	Animal-sheds, Animal farm	Assiut, Sohag	Eraky [22]Nasser, [3]AbuEl-Maged, [6] Abdel-Aziz, [1]
<i>Acotyledon krameri</i> (Berlese, 1892)	Animal farm	Assiut, Sohag	AbuEl-Maged [6] Abdel-Aziz, [1]
<i>Cosmoglyphus rizkii</i> Eraky et al. 2000	Manure of animals	Assiut	Eraky et al. [22] Negm [3]
<i>Cosmoglyphus manuri</i> Negm, 2007	Manure of animals	Assiut	(Negm, [3])
<i>Caloglyphus arafati</i> Eraky, 2000a	Manure of animals	Assiut	Eraky, [22]Negm, [3]
<i>Caloglyphus oudemans</i> Zakhvatkin, 1937	Animal farm	Assiut	Eraky [22] Nasser, [3]
<i>Caloglyphus csibii</i> Eraky, 1999c	Animal farm	Assiut	Eraky,[22]Negm, [3]
<i>Caloglyphus labiduratus</i> Negm, 2007	Animal farm	Assiut	(Negm [3])
<i>Forcellinia mahunkai</i> Eraky, 1999d	Manure of animals	Sohag	Eraky, [22] Negm, [3]
<i>Calvolia solimani</i> Eraky, 1999b	Animal farm	Assiut	Eraky, [22] Negm, [3]
<i>Calvolia zaheri</i> Eraky, 1998	Animal farm	Assiut	Eraky,[22]Negm, [3]
<i>Acarus clavatus</i> Negm, 2007	Manure of animals	Assiut	(Negm, [3])
<i>Cosmoglyphus barbisetus</i> Eraky, 1999d	Animal farm	Assiut	Eraky, [22] Negm, [3]
<i>Caloglyphus berlesei</i> (Oudemans, 1902)	Animal farm	Assiut	AbuEl-Maged, [6]
<i>Calvolia mahunkai</i> Negm, 2007	Manure of animals	Assiut	(Negm, [3])
<i>Tyroglyphus putrescentiae</i> (Shrank, 1781)	Animal farm	Assiut, Sohag	Eraky [3]Nasser, [5] Abdel-Sater [5] Abu El-Maged, [6] Abdel-Aziz, [1] Abdel-Sater and Eraky, [3,5]
<i>Calvolia heterocoma</i> (Michael, 1903)	Animal farm	Assiut, Sohag	Eraky and Nasser, [3,5] Abu El-Maged, [6] Abdel-Aziz, [1]
<i>Rhizoglyphus robini</i> Claparede, 1869	Animal farm	Assiut	Abdel-Sater and Eraky, [3,5]
<b>Histiostomatidae Berlese, 1897</b>			
<i>Copronomia mahunkai</i> Eraky, 1999c	Animal farm	Assiut	Eraky, Negm, [3]
<i>Copronomia sphaerocerae</i> (Vitzthum, 1922)	Animal farm	Assiut, Sohag	Eraky and Nasser, [3,5] Abu El-Maged, [6] Abdel-Aziz, [1] Negm, [3]
<i>Glyphanoetus mahunkai</i> Eraky, 1994a	Animal farm	Assiut, Sohag	Eraky, Abu El-Maged, [3,6]Abdel-Aziz, [1] Negm, [3]
<i>Glyphanoetus omari</i> Eraky et al. 2000	manure of animals	Sohag	Erky, Negm, [3]
<i>Glyphanoetus processum</i> Eraky, 1994a	Animal farm	Assiut	Eraky, [3]
<i>Histiostoma alii</i> Eraky, 2000b	manure of animals	Sohag	Eraky, Negm, [3]
<i>Histiostoma farghali</i> Eraky, 2000b	manure of animals	Sohag	Eraky, Negm, [3]
<i>Histiostoma manuri</i> Eraky, 2000b	manure of animals	Sohag	Eraky, Negm, [3]
<i>Histiostoma tinydorsalis</i> Eraky, 1999a	manure of animals	Assiut	Eraky, Negm, [3]
<i>Histiostoma negmi</i> Eraky, 2000b	Manure of animals	Sohag	Eraky, Negm,[3]

<i>Histiostoma essami</i> Eraky et al. 2000	manure of animals	Sohag	Eraky [3]
<i>Histiostoma pickaxeii</i> Eraky & Shoker, 1993b	Animal-sheds, Skin of dead animals	Assiut, El-Minia	Eraky and Shoker, [3,24] Abdel-Aziz, [1] Negm, [3]
<i>Histiostoma arcuatus</i> Negm, 2007	Animal farm	Sohag	present study
<i>Histiostoma camphori</i> Eraky, 1999d	Animal farm	Assiut	Eraky, Negm, [3]
<i>Histiostoma darwishii</i> Eraky, 1994a	Animal farm	Assiut, Sohag	Eraky, [3] Abu El-Maged, [6] Abdel-Aziz, [1] Negm, [3]
<i>Histiostoma onioni</i> Eraky & Shoker, 1994	Animal-sheds	Sohag	Abdel-Aziz, [3]
<i>Histiostoma rizkii</i> Eraky, 1994	Animal-sheds	Sohag	Abdel-Aziz, [3]
<i>Histiostoma sarrai</i> Eraky & Shoker, 1994	Animal-sheds	Sohag	Abdel-Aziz, [3]
<i>Histiostoma nasseri</i> Eraky, 1994	Animal-sheds	Sohag	Abdel-Aziz, [3]
<i>Histiostoma sammari</i> Eraky, 1999d	Animal farm	Assiut	Eraky, Negm, [3]
<i>Histiostoma zaheeri</i> Eraky, 1997	Manure of animals	Assiut	Eraky, Negm, [3]
<i>Histiostoma solimani</i> Eraky, 1997	Manure of animals	Assiut	Eraky, Negm, [3]
<i>Hormosianoetus mahunkai</i> Eraky & Shoker, 1993a	Animal farm	Sohag	present study
<i>Myianoetus lili</i> Eraky, 1993	Animal farm	Assiut, Sohag	Eraky Nasser, [3,5] Abu El-Maged, [6] Abdel-Aziz, [1] Negm, [3]
<b>TROMBIDIFORMES</b>			
<b>Caligonellidae Grandjean, 1944</b>			
<i>Caligonella humilis</i> Grandjean, 1838	Organic manure	El-Dakahleia (Lower Egypt).	Zaher [44]
<i>Neognathus oteifi</i> Soliman & Gomaa, 1986	Organic manure	Giza	Zaher, [44]
<b>Cheyletidae Leach, 1815</b>			
<i>Acaropsella notchi</i> Gomaa & Hassan, 1986	Organic manure	Giza, El-Beherira, El-Monofeia, Assiut, Tahreer province.	Zaher, [44] Zaher, [44]
<i>Cheletomorpha lepidopterorum</i> (Shaw, 1794)	Organic manure	Several localities of Egypt.	Zaher, [44]
<i>Cheyletus badryi</i> Zaher & Hassan, 1986	Organic manure	Giza, Tahreer province, El-Qualyobia, El-Monofeia, Assiut, El-Sharkeia.	Zaher, [44]
<i>Cheyletus cacahuamilpensis</i> Baker, 1949	Organic manure	El-Monofeia, Al-Exandria, Kafr El-Sheikh.	Zaher, [44]
<i>Cheyletus eruditus</i> (Schrank, 1781)	Organic manure	Giza	Zaher, [44]
<i>Cheyletus malaccensis</i> Oudemans, 1930	Organic manure	Giza	Zaher, [44]
<i>Hemicheyletia congensis</i> (Cunliffe, 1962)	Organic manure	Giza, El-Fayoum, El-Monofia, Tahreer province.	Zaher, [44]
<i>Lepidocheylea solimani</i> Zaher & Hassan, 1986	Organic manure	Giza	Zaher, [44]
<i>Grallacheles baker</i> De Leon, 1962	Organic manure	Giza, Kafr El-Sheikha.	Zaher, [44]
<i>Ker bakeri</i> Zaher & Soliman, 1967	Organic manure	Giza	Zaher, [44]
<i>Ker summersi</i> Gomaa & Hassan, 1986	Organic manure	El-Monofeia	Zaher, [44]
<i>Neoeucheyla ornate</i> Wafa & Soliman, 1968	Organic manure	Giza, Beisuef	Zaher, [44]
<b>Pygmephoridae Cross, 1969</b>			
<i>Trochometridium aegypticus</i> Yousef & Kandeel, 1986	Organic manure	Giza	Zaher, [44]
<i>Pediculaster arabicus</i> Zaher & Kandeel, 1986	Organic manure	Giza	Zaher, [44]
<i>Moseriella africanus</i> Zaher & Kandeel, 1986	Organic manure	Assiut	Zaher, [44]
<b>Stigmaeidae Oudemans, 1931</b>			
<i>Apostigmaeus navicella</i> Grandjean, 1944	Organic manure	Giza	Zaher, [44]

<i>Apostigmaeus aegypticus</i> Soliman & Gomaa, 1986	Organic manure	Giza	Zaher, [44]
<i>Stigmaeus banksi</i> Gomaa & Hassan, 1986	Organic manure	Giza, El-Qualyabia (Lower Egypt).	Zaher, [44]
<i>Stigmaeus triramus</i> Soliman & Gomaa, 1986	Organic manure	Giza	Zaher, [44]
<i>Stigmaeus africanus</i> Soliman & Gomaa, 1986	Organic manure	El-Dakahleia, El-Gharbeia (Lower Egypt).	Zaher, [44]
<b>Siteroptidae Mahunka, 1970</b>			
<i>Siteroptes serratesetae</i> Soliman & Kandeel, 1986	Organic manure	El-Sharkia (Lower Egypt).	Zaher, [44]
<i>Siteroptes posterotruncata</i> Yousef & Kandeel, 1986	Organic manure	Giza	Zaher, [44]
<i>Siteroptes manurei</i> Soliman & Kandeel, 1986	Animal farm	Sohag	present study

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DOI: [10.32474/DDIPIJ.2020.03.000169](https://doi.org/10.32474/DDIPIJ.2020.03.000169)



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