


Mesostigmata mites (Acari: Parasitiformes) associated with birds and their nests from Egypt

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Abstract: A survey of gamasid mites (Arachnida: Acari: Mesostigmata) associated with domestic and wild birds in Egypt was conducted. In total, 16 species within 10 families were collected from 22 bird species. The most abundant species belonged to the genera *Dermanyssus* Dugès (Dermanyssidae), *Ornithonyssus* Sambon, and *Steatonyssus* Kolenati (both Macronyssidae). Among various birds examined, the distribution and occurrence of mites were recorded. Taxonomic remarks about the morphology of the collected mites are presented to facilitate species discrimination for non-acarologists. *Steatonyssus longipes* Radovsky & Yunker, 1963, previously described as a new species from the Egyptian slit-faced bat, *Nycteris thebaica* Geoffroy (Chiroptera), is first recorded from various bird hosts in Egypt. Among the examined birds, chickens, *Gallus gallus domesticus* (Linnaeus) (Galliformes); palm doves, *Streptopelia senegalensis aegyptiacus* (Linnaeus); domestic pigeons, *Columba livia domestica* Gmelin (both Columbiformes); and house sparrows, *Passer domesticus niloticus*, were the highly mite-infested birds. Commonly, mites were observed under the wings, around the vent region, in the breast area, and around the head and neck. The present study showed that Egyptian birds harbor various species of ectoparasitic mites, with chickens having more diversity, and macronyssid and dermanyssid mites are the most abundant.

Key words: Acari, mites, checklist, Egypt, birds

Birds are attacked by a remarkable diversity of ectoparasites, mostly arthropods. After lice (Insecta: Phthiraptera), the richest group is mites (Arachnida: Acari). Several mite families, with about 2500 species (Proctor and Owens, 2000), live in close association with birds being less harmful, such as feather mites (Astigmata: Analgoidea, Pterolichoidea), or severe blood feeders (Dermanyssidae and Macronyssidae). The existence and feeding of parasitic mites may cause some pathological effects like irritation, anemia, allergy, transmission of pathogens, and death as well (Chirico et al., 2003). While surveying parasitic mites associated with Egyptian birds, we recognized the need for taxonomical and ecological information that could be useful for bird biologists, veterinarians, and ornithologists interested in studying bird-associated mites.

Faunistic studies about mites of birds in Egypt are limited. First reports of mites from Egyptian birds were published by Wafa and Soliman (1968) for Prostigmata (Cheyletidae), by Rakha (1980) for Astigmata, and by Zaher (1986) for mites of various orders. Abd-Alla

(1993) also provided taxonomic information about mites reported from wild birds. To our knowledge, there is no taxonomic information source that contains the mite fauna of Egyptian domestic birds that helps researchers find out what taxa have been reported to date and where they were found. To establish a baseline and enhance knowledge for further work on birds' mite fauna, this work presents data on the taxonomy and occurrence of mesostigmatid mites associated with domestic and certain wild birds in Egypt.

A survey was carried out to determine the diversity and occurrence of mites associated with domestic and wild birds, and their nests. Mite samplings were conducted at different localities representing Upper and Lower Egypt, as follows: Beheira, Beni Suef, Cairo, Fayoum, Giza, Kafr Elsheikh, Minia, Sohag, and Qena. Necessary information about host, collection date, and locality was recorded.

Domestic birds in poultry markets were caught with the permission of their owners. Certain wild birds were also collected from the Animal Zoo of the Giza governorate. Nests were collected from trees and various buildings, and feces were collected from poultry farms in paper bags.

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Nests and feces were put in modified Tullgren funnels for 24–48 h for mite extraction. Birds were carefully examined by feather separation with fingers and forceps to expose the skin and check for the presence of mites. Mites were commonly found attached to different body parts, the skin, head, neck, under the wings, around the thighs and breast, and around the vent (cloaca). Permanent slides were prepared using Hoyer's medium under a stereomicroscope at 40× magnification power.

The main classification works followed in the identification of different mites were as follows: Ameroseiidae (Nasr and Abou-Awad, 1986; Mašán, 2017); Blattisociidae and Laelapidae (Basha and Yousef, 2000); Dermanyssidae (Di Palma et al., 2012); Macronyssidae (Zumpt and Till, 1961; Radovsky and Yunker, 1963; Evans and Till, 1979); Melicharidae (Faraji, 2011; Abo-Shnaf and de Moraes, 2016); Phytoseiidae (Chant and McMurtry, 2007); and Uropodoidea (Evans, 1957). The voucher material is preserved as slide-mounted specimens in the Acari collection at Shandaweel Research Station, Agricultural Research Center, Sohag.

Common names of birds are based on Avibase–The World Bird Database. The present study examined 22 species of birds belonging to 11 orders, as follows: Columbiformes: palm dove, *Streptopelia senegalensis aegyptiacus* (Linnaeus), turtle dove, *Streptopelia turtur arenicola* (Hartert), domestic pigeon, *Columba livia domestica* Gmelin, Egyptian rock pigeon, *Columba livia schimperi* Bonaparte; Passeriformes: house sparrow, *Passer domesticus niloticus* Nicoll & Bonhote, pale rock sparrow, *Carpodacus brachydactyla* (Bonaparte), hooded crow, *Corvus cornix* (Linnaeus); Anseriformes: bean goose, *Anser fabalis* (Latham), Egyptian goose, *Alopochen aegyptiaca* (Linnaeus), marbled duck, *Marmaronetta angustirostris* (Menetries), mallard, *Anas platyrhynchos* Linnaeus; Galliformes: turkey, *Meleagris gallopavo* Linnaeus, common quail, *Coturnix coturnix* (Linnaeus), chicken, *Gallus gallus domesticus* (Linnaeus), peacock, *Pavo cristatus* Linnaeus; Strigiformes: little owl, *Athene noctua* (Scopoli); Accipitriformes: peregrine falcon, *Pernis ptilorhynchus* (Linnaeus); Bucerotiformes: Egyptian hoopoe, *Upupa epops major* Brehm; Pelecaniformes: cattle egret, *Bubulcus ibis* (Linnaeus); Struthioniformes: ostrich, *Struthio camelus* Linnaeus; Falconiformes: Egyptian kestrel, *Falco tinnunculus rupicolaeformis* (Brehm); and Psittaciformes: rose-ringed parakeet, *Psittacula krameri* (Scopoli).

The mite species *Dermanyssus gallinae*, *Macrocheles merdarius*, *Ornithonyssus bursa*, *Steatonyssus longipes*, *Typhlodromus* (A.) *transvaalensis*, and *T. (T.) athiasae* are the most common compared to other species. Four bird hosts were attributed as highly parasitized (house sparrow, chicken, domestic pigeon, and palm dove) (Table).

Regardless of the habitat, *P. domesticus niloticus* seemed to host the highest diversity of mites, hosting several species except *M. merdarius*. The macrochelid mite *M. merdarius* is usually reported from manure habitats, being a potential predator against fly (Insecta: Diptera) eggs and larvae. However, the macronyssid species *S. longipes* and *O. bursa* were mostly found inside the nests.

Species accounts

Family Ameroseiidae

Kleemannia nova Nasr & Abou-Awad, 1986

[= *Ameroseius novus* (Nasr & Abou-Awad, 1986) – Hajizadeh et al., 2013]

Mites of the family Ameroseiidae usually inhabit soil, litter, organic matter, and stored food and can be found associated with fungi, insects, birds, and mammals (Hughes, 1961; Mašán, 1998). *Ameroseius* Berlese is the largest genus with about 100 described species. Some authors assigned *Kleemannia* as a probable synonym of *Ameroseius* (Westerboer and Bernhard, 1963; Halliday, 1997; Karg, 2005; Karg and Schorlemmer, 2009; Narita et al., 2013); however, Mašán (2017), in a recent family revision, validated *Kleemannia* and removed it from synonymy with *Ameroseius*, depending on variations in the number of posterolateral setae on genu III and tibia III–IV; proximal teeth on fixed cheliceral digits; preanal setae on ventrianal shield; the palptarsal claw two-tined (*Kleemannia*) or three-tined (*Ameroseius*); and the tectum usually with sharp pointed apex in *Kleemannia*. Hajizadeh et al. (2013) listed this species as *Ameroseius novus* (Nasr & Abou-Awad), and since the species was transferred from the genus *Kleemannia* to *Ameroseius*, the epithet 'nova', which is feminine, was consecutively changed to 'novus' to fit the new masculine genus name 'Ameroseius'. Herein, we follow the work of Mašán (2017) and list the species as *K. nova*, which was described as new due to having 29 pairs of sword-like dorsal setae except the vertical setae *j1*, which are fan-like (Figures 1 and 2). The type material of *K. nova* was collected from manure in the Kafr Elsheikh governorate, which agrees with the present finding of *K. nova* from manure, bird nests, and feathers (Table), suggesting that it may feed on fungal matter in these habitats. In Iran, the same species was recorded from citrus soil in Fars Province (Khademi et al., 2006).

Family Blattisociidae

Blattisocius keegani Fox, 1947

Blattisociid mites are famous for feeding on fungi and microarthropods (Lindquist and Moraza, 2010). In the present study, *Blattisocius keegani* Fox was recorded from several bird hosts at two different habitats, mainly from manure of common quail and nests of house sparrow and hooded crow (Table). Fend'a (2010) also listed this species as an inhabitant of bird nests of the orders Accipitriformes, Anseriformes, Coraciiformes, and Passeriformes in

Table. Diversity and prevalence of Mesostigmata mites associated with birds and/or their nests from Egypt.

Mite taxa (family, genus, and species)		Bird host(s)	Habitat/attachment site	Localities*
Ameroseiidae	<i>Kleemannia nova</i> Nasr & Abou-Awad	Peacock, <i>Pavo cristatus</i>	Manure	6
		Marbled duck, <i>Marmaronetta angustirostris</i>	Feathers	6
		Bean goose, <i>Anser fabalis</i>	Nests	4
		<i>M. angustirostris</i>	Nests	9, 16
Blattisociidae	<i>Blattisocius keegani</i> Fox	Mallard, <i>Anas platyrhynchos platyrhynchos</i>	Manure	13
		Common quail, <i>Coturnix coturnix coturnix</i>	Manure	5
		Egyptian goose, <i>Alopochen aegyptiaca</i>	Manure	11
		<i>P. cristatus</i>	Manure	6
		Domestic pigeon, <i>Columba livia domestica</i>	Nests	4
		Hooded crow, <i>Corvus cornix</i>	Nests	12
		<i>C. livia domestica</i>	Manure	7
		House sparrow, <i>Passer domesticus niloticus</i>	Nests	3, 9, 15
	<i>B. tarsalis</i> (Berlese)	Chicken, <i>Gallus gallus domesticus</i>	Manure	11
		<i>C. coturnix coturnix</i>	Manure	8
		Cattle egret, <i>Bubulcus ibis</i>	Nests	17
		<i>P. domesticus niloticus</i>	Nests	9, 15
		<i>C. livia domestica</i>	Nests	4
		<i>C. livia domestica</i>	Manure	4, 17
Dermanyssidae	<i>Dermanyssus gallinae</i> (De Geer)	<i>G. gallus domesticus</i>	Manure	4, 7
		<i>A. platyrhynchos platyrhynchos</i>	Manure	13
		<i>A. platyrhynchos platyrhynchos</i>	Nests	16
		<i>P. domesticus niloticus</i>	Nests	1, 4
Laelapidae	<i>Androlaelaps casalis</i> (Berlese)	<i>G. gallus domesticus</i>	Manure	2
		<i>A. platyrhynchos platyrhynchos</i>	Manure	6
		<i>A. platyrhynchos platyrhynchos</i>	Nests	6
		<i>C. livia domestica</i>	Nests	4
		<i>A. platyrhynchos platyrhynchos</i> and <i>G. gallus domesticus</i>	Manure	4
		<i>A. platyrhynchos platyrhynchos</i> and <i>A. fabalis</i>	Manure	6
		<i>G. gallus domesticus</i> and <i>A. aegyptiaca</i>	Manure	4
		<i>A. platyrhynchos platyrhynchos</i>	Nests	6, 9
		<i>A. platyrhynchos platyrhynchos</i>	Manure	6
		<i>A. aegyptiaca</i>	Nests	4
		<i>G. gallus domesticus</i>	Manure	2, 4, 11
		Palm dove, <i>Streptopelia senegalensis aegyptiacus</i>	Feathers	1
		<i>S. senegalensis aegyptiacus</i>	Nests	1
		Little owl, <i>Athene noctua</i>	Nests	4
		<i>P. domesticus niloticus</i>	Nests	1, 9
		<i>C. livia domestica</i>	Manure	17
		<i>C. livia domestica</i>	Nests	4
		<i>B. ibis</i>	Nests	17
		<i>B. ibis</i>	Feathers	17
		Egyptian hoopoe, <i>Upupa epops major</i>	Feathers	17
		<i>P. cristatus</i>	Manure	6
		<i>A. platyrhynchos platyrhynchos</i> and <i>G. gallus domestica</i>	Manure	4

Table. (Continued).

Macrochelidae	<i>Macrocheles merdarius</i> (Berlese)	<i>G. gallus domesticus</i>	Manure	1, 4, 7, 8
		<i>A. platyrhyncha platyrhyncha</i> and <i>G. gallus domesticus</i>	Manure	4
		Ostrich, <i>Struthio camelus</i>	Manure	6
Macronyssidae	<i>Ornithonyssus bacoti</i> (Hirst)	Turkey, <i>Meleagris gallopavo</i>	Manure	3
	<i>Ornithonyssus bursa</i> (Berlese)	<i>A. platyrhyncha platyrhyncha</i>	Manure	2, 4
		<i>A. platyrhyncha platyrhyncha</i>	Nests	4, 7, 9
		<i>S. senegalensis aegyptiacus</i>	Nests	1, 3
		<i>S. senegalensis aegyptiacus</i>	Skin	1, 3
		Turtle dove, <i>Streptopelia turtur arenicola</i>	Skin	14
		<i>S. senegalensis aegyptiacus</i>	Feathers	1
		<i>S. turtur arenicola</i>	Feathers	14
		<i>C. livia domestica</i>	Manure	4, 7, 9, 17
		<i>P. domesticus niloticus</i>	Nests	1, 2, 3, 4, 10
		<i>P. domesticus niloticus</i>	Skin	3, 16
		<i>P. domesticus niloticus</i>	Feathers	1
		Rose-ringed parakeet, <i>Psittacula krameri</i> (Scopoli)	Skin	5
		Pale rock sparrow, <i>Carpospiza brachydactyla</i>	Skin	5
		<i>A. fabalis</i>	Nest	4
		<i>G. gallus domesticus</i>	Manure	4, 5
	<i>Steatonyssus longipes</i> Radovsky & Yunker	<i>P. domesticus niloticus</i>	Nests	1, 3, 4, 5, 9, 15, 16, 17
		<i>P. domesticus niloticus</i>	Skin	3, 5, 16, 17
		<i>S. senegalensis aegyptiacus</i>	Nest	1
		<i>A. platyrhyncha platyrhyncha</i>	Nest	7, 16
		<i>B. ibis</i>	Nest	17
		<i>C. livia domestica</i>	Manure	7, 17
		Egyptian rock pigeon, <i>Columba livia schimperi</i>	Manure	13
		<i>C. brachydactyla</i>	Skin	5
Melicharidae	<i>Proctolaelaps pygmaeus</i> (Müller)	<i>C. livia domestica</i>	Nests	4
		<i>G. gallus domesticus</i> and <i>A. aegyptiaca</i>	Manure	4
Phytoseiidae	<i>Amblyseius swirskii</i> Athias-Henriot	<i>P. domesticus niloticus</i>	Nests	16
	<i>Neoseiulus barkeri</i> Hughes	<i>Pern</i> , <i>Pernis apivorus</i>	Manure	6
		Egyptian kestrel, <i>Falco tinnunculus rupicolaeformis</i>	Manure	6
	<i>Typhlodromus</i> (A.) <i>transvaalensis</i> (Nesbitt)	<i>P. domesticus niloticus</i>	Nests	1, 9, 10, 16
	<i>T. (T.) athiasae</i> Porath and Swirski	<i>P. domesticus niloticus</i>	Nests	10
Urodynychidae	<i>Uroobovella</i> sp.	<i>S. camelus</i>	Manure	6
		<i>P. cristatus</i>	Manure	6
Uropodidae	<i>Uropoda</i> sp.	<i>G. gallus domesticus</i>	Manure	1

* 1- Maadi, Cairo; 2- Haram, Giza; 3- Faisal, Giza; 4- Baleiana, Sohag; 5- Marioteia, Giza; 6- Animal Zoo, Giza; 7- Aiyat, Beni Suef; 8- Mansoura, Dakahleiya; 9- Beheira; 10- Helwan; 11- Minya; 12- Kafr Elsheikh; 13- Badrasheen, Giza; 14- Kous, Qena; 15- Mansheiyet Elbakri, Cairo; 16- Etai Elbaroud, Beheira; 17- Fayoum.

Slovakia. Interestingly, Rezk (2000) recorded this mite inhabiting dried dates and highlighted its predatory efficiency against two astigmatid mites, *Tyrophagus putrescentiae* (Acaridae) and *Blomia freeman* (Glycyphagidae).

***Blattisocius tarsalis* (Berlese, 1918)**

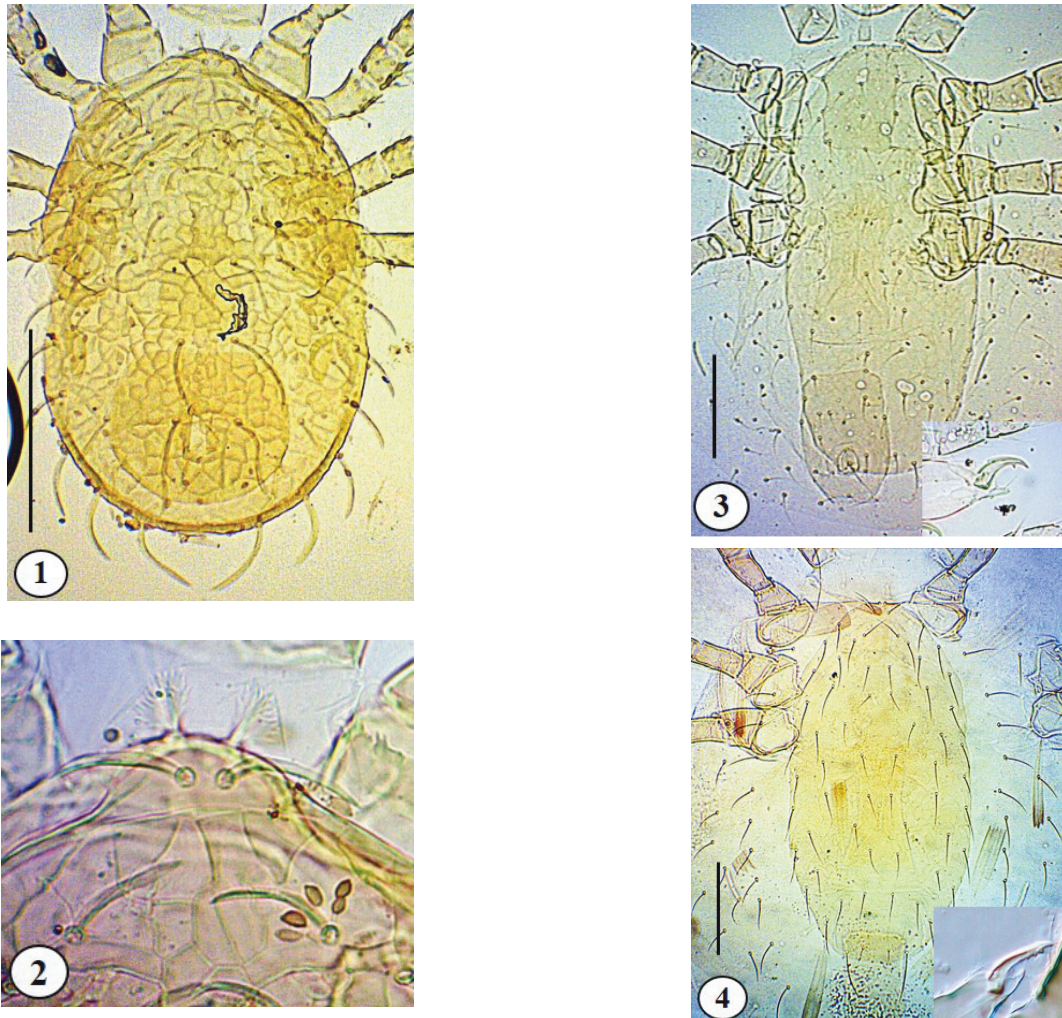
Blattisocius tarsalis was collected from nests of the cattle egret, *Bubulcus ibis*; house sparrow, *Passer domesticus niloticus*; and domestic pigeon, *Columba livia domestica* (Table). This species was also reported from bird nests of the orders Columbiformes, Passeriformes, and Psittaciformes in Slovakia (Fend'a, 2010). Feeding habits and various preys of *B. tarsalis* were documented by de Moraes et al. (2015). To easily separate between the two species of *Blattisocius* reported in the present work, *keegani* and *tarsalis*, the

former has the movable digit of chelicera with only one tooth and with dorsal setae shorter (Figure 3), while the latter has it with three teeth and dorsal setae distinctly longer (Figure 4).

Family Laelapidae

***Androlaelaps casalis* (Berlese, 1887)**

Fend'a and Schniererová (2004) recorded *A. casalis* as a facultative hematophagous of birds. They reported this mite in association with the reed warbler, *Acrocephalus scirpaceus* (Hermann) (Passeriformes). *A. casalis* is reported herein from several hosts and habitats (Table). It can be identified morphologically from other species reported in the present work by its ovoid body shape (Figure 5), enlarged genital shield extending posteriorly close to the anal shield (Figure 6), and its long thick pilus dentilis in the fixed digit of chelicera.



Figures 1–4. *Kleemannia nova* Nasr & Abou-Awad, 1986: 1- General view of dorsum; 2- close-up of anterodorsal area showing the fan-like vertical setae; 3. *Blattisocius keegani* Fox, 1947, dorsal view, and the one-toothed movable digit of chelicera (bottom right); 4- *Blattisocius tarsalis* (Berlese, 1918), dorsal view, and the tridentate movable digit of chelicera (bottom right). Scale bars = 100 µm.

Family **Macrochelidae**

***Macrocheles merdarius* (Berlese, 1889)**

Mites of the family Macrochelidae are predators of dipterous flies, especially the house fly, *Musca domestica*. They can be identified morphologically by having recurved peritremes, and by the presence of accessory sclerites on lateral margins of the genital shield (Figure 7). In the present study, only one species, *M. merdarius*, was reported from chicken manure.

Family **Melicharidae**

***Proctolaelaps pygmaeus* (Müller, 1859)**

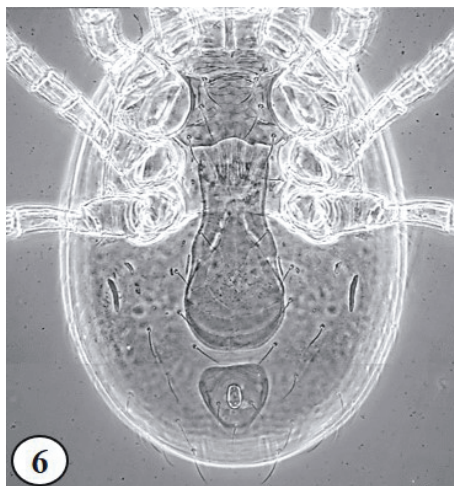
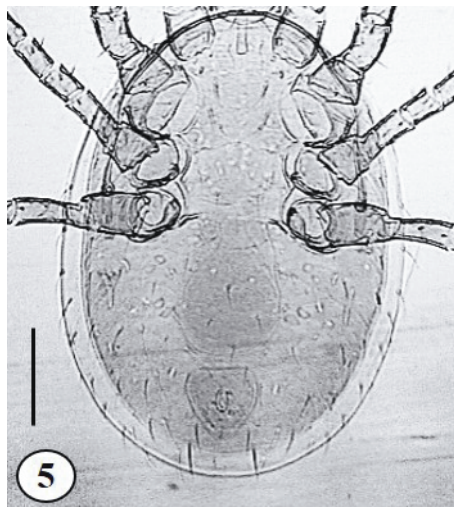
Proctolaelaps Berlese, 1923 is one of the most common genera recorded from the nests of birds (Halliday et al., 1998). Fend'a et al. (1998) recorded *Proctolaelaps pygmaeus* (Müller) from the nests of birds in Slovakia. In searching for potential predators to control *D.*

gallinae in the Netherlands, Faraji (2011) recorded a new species of *Proctolaelaps* inside the nest of the European starling, *Sturnus vulgaris* Linnaeus (Passeriformes). Few individuals of *P. pygmaeus* are reported here from the nests and manure of domestic pigeons, chickens, and Egyptian geese in one locality in the Sohag governorate (Figure 8).

Family **Macronyssidae**

***Ornithonyssus bacoti* (Hirst, 1913)**

Ornithonyssus bacoti (Hirst), commonly called the rat mite, has been involved in several human diseases such as murine typhus, rickettsial pox, tularemia, and plague (Baker et al., 1956). In Egypt, Salman and Ali (1979) reported *O. bacoti* in high numbers infesting rats, emphasizing its feeding habit as an obligatory blood-sucking parasite of vertebrates. This species was reported only from manure of turkey birds in Giza (Table).



Figures 5–8. *Androlaelaps casalis* (Berlese, 1887): 5- general view of dorsum; 6- ventral side; 7- *Macrocheles merdarius* (Berlese, 1889), general body shape and the opened cheliceral digits (bottom right); 8- *Proctolaelaps pygmaeus* (Müller, 1859), dorsal view and focus on the chelicera (bottom right). Scale bars = 100 µm.

Ornithonyssus bursa (Berlese, 1888)

The tropical fowl mite, *Ornithonyssus bursa* (Berlese), is a common associate of birds and can harm humans in areas with high bird populations (Denmark and Cromroy, 2012). These two macronyssid species, *O. bacoti* and *O. bursa*, are very close morphologically; however, a few different morphological characteristics are present. The former has distinctly longer dorsal setae (Figure 9), sternal shield entirely with network-like striations (Figure 10), and opisthogastric area surrounding anal shield hypertrichous (Figure 11), while the latter has dorsal setae shorter (Figure 12), sternal shield with only transverse parallel striations (Figure 13), and opisthogastric hypotrichous (Figure 14).

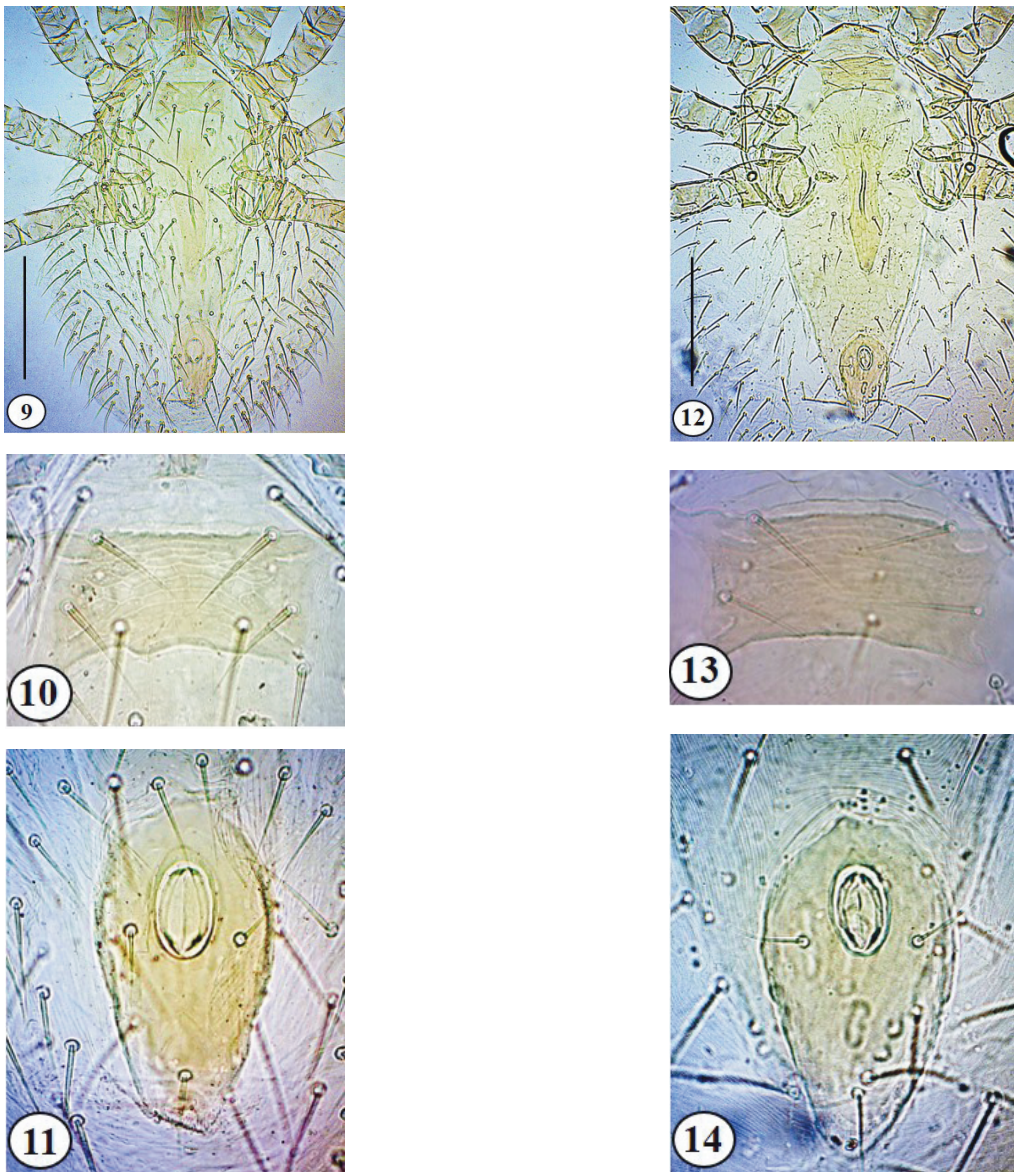
Steatonyssus longipes Radovsky & Yunker, 1963

The species *Steatonyssus longipes* Radovsky & Yunker was previously described as a new species from the Egyptian slit-faced bat, *Nycteris thebaica* Geoffroy (Chiroptera: Nycteridae). In the present survey, it is first recorded from various bird hosts and localities in Egypt, with higher abundance in the nests of the house sparrow at eight different localities (Figures 15–17).

Family Dermanyssidae

Dermanyssus gallinae (De Geer, 1778)

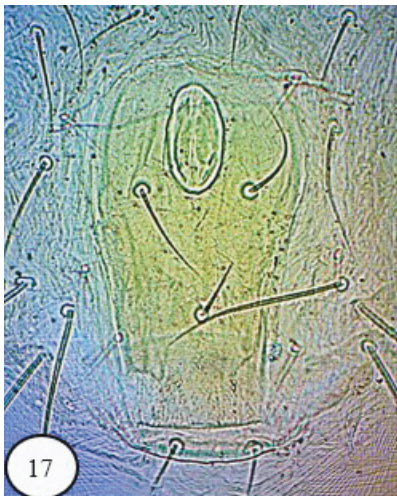
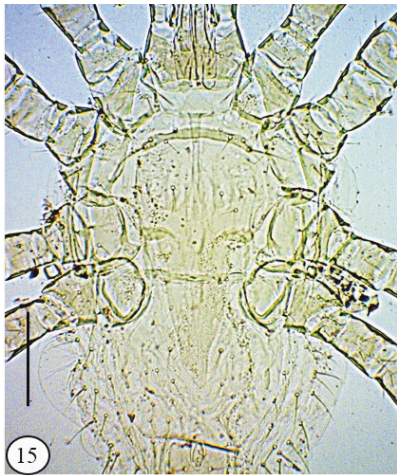
The poultry red mite, *Dermanyssus gallinae* (De Geer), is an ectoparasite with enormous epidemiological and economical importance to the poultry industry



Figures 9–14. Morphological differences between *Ornithonyssus bacoti* (Hirst, 1913): 9- general body shape, 10- sternal shield, 11- anal shield, and *Ornithonyssus bursa* (Berlese, 1888): 12- general view, 13- sternal shield, 14- anal shield. Scale bars = 150 µm.

worldwide. It feeds on blood, downgrades egg quality, causes anemia in birds, and transmits several human and animal diseases. Identification of *D. gallinae* can be quite problematic for scientists not familiar with mite morphology and terminology. Moreover, this species may easily be confused with other macronyssid mites of the genera *Ornithonyssus* and *Steatonyssus*, which often share

the same hosts and habitats. *D. gallinae* can be identified by having the idiosoma broadly rounded posteriorly (Figure 18), cheliceral digits whip-like, sternal shield wider than long, and bearing two pairs of sternal setae (Figure 19); the genital shield is broadly rounded posteriorly, and with one pair of setae and a pair of epigynal pores. The anal shield has only three anal setae (Figure 20).



Figures 15–20. *Steatonyssus longipes* Radovsky & Yunker, 1963: 15- general view, 16- sternal shield, 17- anal shield. *Dermanyssus gallinae* (De Geer, 1778): 18- general body shape, 19- close-up to the gnathosoma showing the whip-like chelicerae, 20- anal shield. Scale bars = 100 μ m.

Family Phytoseiidae

Most of the phytoseiid mites reported in the present study were separated from the nests of the house sparrow (Table), a passerine host. This finding agrees with that of Fend'a (2010), who collected 26 phytoseiid mite species from the nests of passerine birds in Slovakia. Makarova et al. (2010) also reported one phytoseiid species from a passerine nest in Russia. However, a few individuals are reported from the manure under pern and Egyptian kestrel in the Animal Zoo of the Giza governorate. Phytoseiid mites are cosmopolitan predators of plant pest mites, and their occurrence with birds is questionable. Mite presence could be accidentally due to direct contact between the nests and the plant canopy. *Amblyseius swirskii* Athias-Henriot, 1962, a potential predatory mite used for the biological control of spider mites and some insects, was recorded in very low populations inside the nest of *P. domesticus niloticus*. A single individual of *Neoseiulus barkeri* Hughes, 1948 was reported inhabiting manure of Egyptian kestrel. However, the unexpected presence of *Typhlodromus* (*Anthoseius*) *transvaalensis* (Nesbitt) and *T. (Typhlodromus) athiasae* Porath & Swirski in high numbers in the house sparrow nests means the type of relationship needs further investigation.

Superfamily Uropodoidea

In the present survey, a few specimens of the genera *Uroobovella* (Urodinychidae) and *Uropoda* (Uropodidae) were reported from the manures of peacock, ostrich, and chicken in the Animal Zoo of the Giza governorate. Unfortunately, the mites could not be further identified to the species level because of the poor status of specimens. Maareg and Saleh (1989) also reported the earthworm uropodid mite, *Fuscuropoda agitans* (= *Uropoda agitans*)

while studying the seasonal occurrence of invertebrates inhabiting chicken manure in the Alexandria governorate. The relationship between uropodid mites and their bird hosts still needs further research.

Like other blood-feeding arthropods, mites adversely affect birds by causing anemia, feather loss, weakness, and decrease of egg production. Furthermore, mites could be reservoirs and transmitters of several bacterial and viral diseases, which may also have bad effects on humans. Thus, it is important to study the ectoparasitic mite fauna associated with birds to control these mites that greatly impact our communities. In Egypt, acaricides are frequently used to control the poultry red mite *D. gallinae*, being the most common parasitic mite that attacks laying hen farms (Eladl et al., 2017). However, acaricide products have shown some limitations because of resistance development in mites. On the other hand, a natural extract of neem seed was evaluated in a field study against *D. gallinae*, resulting in high mortality rates when mites came in direct contact with the product (Abdel-Ghaffar et al., 2008). In conclusion, although the present work reports 16 mite species collected from Egyptian birds and their nests, the fauna remains undiscovered. We hope this study encourages more research in Egypt than currently exists, thereby enhancing knowledge about the environmental significance of bird mites and developing more control strategies.

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