

Mites Associated with Coleoptera

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ABSTRACT

The occurrence of mites associated with Coleoptera species was carried out at different locations of Egypt during three years (2009 - 2011). Thirty-eight mite species belonging to 2 orders, 4 suborders, 16 families and 29 genera were collected. Suborder Gamasida included 19 species of 12 genera and 6 families; suborder Actinedida of 12 species of 10 genera and 6 families; suborder Acaridida 6 species of 6 genera and 3 families and suborder Oribatida one species of one genus and one family.

Key Words: Survey, mites, Coleoptera.

INTRODUCTION

The extensive activities of the insect or mite symbionts have attracted the attention of several authors, the interrelationships between each of the associates could be endoparasitic, ectoparasitic, predacious, phoretic, exudate feeders and fungivorous. Insect and mites may be considered on one hand as a beneficial organism, when reducing the pest population; while on the other hand seem to be harmful when infesting useful insects. Predacious and parasitic mites constitute a group of considerably harmful actives towards both embryonic and postembryonic stages of their associates. Some species of the fungus feeders may introduce an obvious role in transmitting certain insect pathogens. On the contrary, others adversely affect the agricultural host plants by transmitting plant diseases. However, several researches have been directed towards controlling insect pests.

Coleopterans are one of the very important pests in many parts of the world causing serious damage to economic crops. Hunter and Rosario. (1988) reviewed the Mesostigmata associated with several insects. Also Lindquist *et al.* (1991), Sathiamma (1995), Hurst *et al.* (1997), Zawal (2002), Oliveira and Matos (2006) and Hassan *et al.* (2011) carried out several studies on the relationship between insects and mites.

MATERIALS AND METHODS

Various coleopterous insects' instars and stages in addition to their nests or cocoons were collected from different parts of Egypt during the three successive years 2009-2011. Collected small insects were put in small test tubes; while large ones were put in large test tubes, each of which containing small piece of cotton wool soaked in chloroform. Nests or cocoons of insects were placed in plastic bags. Organic manure and slaughter wastes, rabbits, rats and birds, sound plants and those attacked by insects, nests of

wild birds, sound or previously infested seeds of field crops and vegetables, flour from mills were; collected from different parts in Egypt and sent to the laboratory for experimentation. Mites were extracted by Tuligren funnels; while insect were directly examined with the aid of stereo-binocular microscope (Metwally 1976 and El- Naggar 1982).

The collected mites were cleared by using Nesbitt's fluid then mounted on glass slides for examination.

RESULTS AND DISCUSSION

Thirty eight mite species were found associated with various coleopterous insects instars infesting flour mills, grains and seeds of field and vegetable crops (mainly wheat, barley rice and legumes), bird nests, rabbits, rats, organic manure and slaughter wastes. These collected mites are:

Order Parasitiformes was represented by suborder Gamasida (Table 1) which included the six families; Uropodidae, Laelapidae, Ascidae, Macrochelidae, Ameroseiidae, Digamasellidae, and nineteen species.

Family Uropodidae was represented by the four species: (*Uroobovella marginata* Berlese which was collected from the three insect species; *R. ferrugines*, *T. squalid* and *P. bispinosus*; *Trichouropoda patavina* (Canstrini) was collected from one insect species *R. ferrugines*; *Rhynchopolus rhynchophori* Oliver was collected from three insect species *R. ferrugines*, *T. squalid* and *P. bispinosus*; *Percanstrini egypti* El-Beshlawy & Allam was collected from one insect species *R. ferrugines*).

Family Laelapidae was represented by four species; *Hypoaspis Sardou* Berlese was collected from *E. chrysomelina*; *Laelaps astronemicus* (Koch) was associated with the two insect species *T. squalid* and *P. cupria*; *Androlaelaps casalis* (Berlese) was

Table (1): Mites in association with Coleoptera (mite family, species and insect host)

		Mite		Host insect species	
Sub order	Family	Species			
Gamasida	Uropodidae	<i>Uroobovella marginata</i> Berlese		<i>Rhychophorus ferrugines</i> (Oliv.) <i>Tropinata squalid</i> Scopoli <i>Pentodon bispinosus</i> Kuster	
		<i>Trichopoda patavina</i> (Canestrini)		<i>Rhychophorus ferrugines</i> (Oliv.) <i>Rhychophorus ferrugines</i> (Oliv.)	
		<i>Rhynchopolus rhynchophori</i> Oliver		<i>Tropinata squalid</i> Scopoli <i>Pentodon bispinosus</i> Kuster	
		<i>Percanstrini egypti</i> El-Bishlawy & Allam		<i>Rhychophorus ferrugines</i> (Oliv.)	
		<i>Hypoaspis sardou</i> Berlese		<i>Epilachnach rysomelina</i> (Fab.)	
		<i>Laelaspis stronemicus</i> (Koch)		<i>Tropinata squalid</i> Scopoli <i>Potosia cupria</i> Fab.	
	Laelapidae	<i>Androlaelap scasalis</i> (Berlese)		<i>Pentodon bispinosus</i> Kuster	
		<i>Androlaelaps egyptiacus</i> Hafez, El-Badry & Naser		<i>Sitophilus granaria</i> (L.)	
		<i>Proctolaelaps peygmæus</i> (Muller)		<i>Rhychophorus ferrugines</i> (Oliv.) <i>Oryzaephilus surinamensis</i> (L.) <i>Sitophilus oryzae</i> L.	
		Ascidae	<i>Proctolaelaps aegyptiaca</i> Nasr		<i>Rhychophorus ferrugines</i> (Oliv.) <i>Rhizopertha dominica</i> Fab. <i>Sitophilus oryzae</i> L.
			<i>Blattisocius dentriticus</i> (Berlese)		<i>Agrypnusnota donta</i> Latreille
			<i>Blattisocius tarsalis</i> (Berlese)		<i>Bruchusru fimanus</i> Boheman <i>Sitophilus granaria</i> (L.)
	Macrochelidae	<i>Macrocheles africanus</i> Hafez, El-Badry & Naser		<i>Pachnoda fuscata</i> Fab.	
		<i>Macrocheles sembelawani</i> Hafez, El-Badry & Naser		<i>Tropinata squalid</i> Scopoli	
		<i>Macrocheles muscadomesticae</i> (Scopoli)		<i>Agrypnusnota donta</i> Latreille	
	Amerosiidae	<i>Klemania plumosus</i> (Oud.)		<i>Epilachnach rysomelina</i> (Fab.)	
		<i>Klemania aegypticus</i> El-Badry		<i>Triboliumcon fusum</i> (Herbst) <i>Rhychophorus ferrugines</i> (Oliv.)	
	Digamasellidae	<i>Dendrolaelaps zaheri</i> Metwally & Mersal		<i>Callosobruchus chinensis</i> L. <i>Bruchuspis rum</i> L.	
		<i>Dendrolaelaps rasmii</i> Nasr & Mersal		<i>Carpophilus dimidiatus</i> (Fab.)	
	Chyletidae	<i>Cheyletus malaccensis</i> Oud.		<i>Trogoderma granarium</i> Ev.	
		<i>Cheletomorpha lepidopterorum</i> (Shaw)		<i>Palpspolych resta</i> (Forsskl)	
		<i>Acaropsellina docta</i> (Berlese)		<i>Tribolium castaneum</i> (Herbst)	
		<i>Hemicheyletia bakeri</i> (Ehara)		<i>Trogoderma granarium</i> Ev.	
		<i>Ker bakeri</i> Zaher & Soliman		<i>Rhizopertha dominica</i> Fab.	
		<i>Hemicheyletia</i> sp.		<i>Oligomerus ptilinoides</i> Wollaston	
		<i>Coccinella quinquepunctata</i> (L.)		<i>Coccinella undecimpunctata</i> (L.)	
	Tarsonemidae	<i>Daidalotarsonemus</i> sp.		<i>Rhychophorus ferrugines</i> (Oliv.) <i>Coccinella quinquepunctata</i> (L.)	
<i>Siteroptes serratesetae</i> Soliman & Kandeel			<i>Siteroptes</i> sp.		
Siteroptidae	<i>Siteroptes</i> sp.		<i>Coccinella quinquepunctata</i> (L.)		
	<i>Stigmaeus africanus</i> Gomaa & Soliman		<i>Pentodon bispinosus</i> Kuster <i>Rhychophorus ferrugines</i> (Oliv.)		
Acarophenacidae	<i>Acarophenax meropsi</i> Rakha & Kandeel		<i>Pentodon bispinosus</i> Kuster <i>Tribolium confusum</i> (Herbst) <i>Callosobruchus chinensis</i> L.		
	<i>Pyemotes herfsi</i> Oud.		<i>Sitophilus oryzae</i> L. <i>Sitophilus granaria</i> (L.)		
Acaridida	Acaridae	<i>Tyreophagus entomophagus</i> (Laboulbene)		<i>Oryzae philussurinamensis</i> (L.) <i>Potosia cupria</i> Fab.	
		<i>Lardoglyphus kono</i> i (Sasa and Asamema)		<i>Agrypnusnota donta</i> Latreille <i>Sitophilus granaria</i> (L.)	
		<i>Suidasia nesbitt</i> (Hughes)		<i>Tribolium castaneum</i> (Herbst)	
		<i>Caloglyphus</i> sp.		<i>Pachnoda fuscata</i> Fab. <i>Oligomerus ptilinoides</i> Wollaston	
	Glycyphagidae	<i>Glycyphagous domesticus</i> (Degeer)		<i>Bruchusru fimanus</i> Boheman	
Pyroglyphidae	<i>Dermatophagoides farin</i> (Hughes)		<i>Dermestes lardarius</i> (L.)		
Oribatida	Oppiidae	<i>Oppiella</i> sp.		<i>Rhychophorus ferrugines</i> (Oliv.)	

collected from *P. bispinosus*; *Androlaelaps egyptiacus* Hafez, El-Badry & Nasr was collected from *S. granaria*.

Family Ascidae was represented by four species: *Proctolaelaps peygmaeus* (Muller) was associated with the three insect species *R. ferrugines*, *O. surinamensis* and *S. oryzae*; *Proctolaelaps saegyptiaca* Nasr was associated with the three insect species *R. ferrugines*, *S. oryzae* and *R. dominica*; *Blattisocius dentriticus* (Berlese) was collected from *A. notadonta*; *Blatosciocius tarsalis* (Berlese) was associated with the two insect species *B. rufimanus* and *S. granaria*.

Family Macrochelidae was represented by three species: *Macrocheles africanus* Hafez, El-Badry & Nasr was associated with *P. fuscata*; *Macrocheles sembelawanii* was associated with *T. squalid*; *Macrocheles muscadomesticae* was collected from *A. notadonta*.

Family Amerosiidae was represented by two species: *Klemania plumosus* was associated with *E. chrysomelina*; *Klemania aegypticus* El-Badry was associated with *T. confusum*.

Family Digamasellidae was represented by two species: *Dendrolaelaps zaheri* Metwally & Mersal was associated with the three insect species *R. ferrugines*, *C. chinensis* and *B. pisum*; *Dendrolaelaps rasmii* Nasr & Mersal which was associated with *Carpophilus dimidiatus*.

Order Acariformes was represented by suborder Actinedida and Acaridida (Table 1): Suborder Actinedida included the six families; Chyletidae, Tarsonemidae, Siteroptidae, Stigmaeidae, Acarophenidae, and Pyemotidae and twelve mite species

Family Chyletidae was represented by six species these are *Cheyleitus malaccensis* Oud. which was associated with *T. granarium*; *Cheletomorpha lepidopterorum* (Shaw) was associated with *P. polychresta*; *Acaropsellina docta* (Berlese) was associated with *T. castaneum*; *Hemicheyletia bakeri* (Ehara) was associated with *T. granarium*; *Ker bakeri* was recorded with *R. dominica*; *Hemicheyletia* sp. was collected from *O. ptilinoides*.

Family Tarsonemidae was represented by the species *Daidalotarsonemus* sp. which was collected from the two insects *C. quinquepunctata* and *C. undecimpunctata*.

Family Siteroptidae included two species; *Siteroptes serratesetae* Soliman & Kandeel which was collected from *R. ferrugines*; *Siteroptes* sp. which was associated with *C. quinquepunctata*.

Family Stigmaeidae included the species *Stigmaeus africanus* Gomaa & Soliman which was collected from *P. bispinosus*.

Family Acarophenacidae included the species *Acarophenax meropsi* Rakha & Kandeel which was collected from *R. ferrugines*.

Family Pyemotidae was represented by the species, *Pyemotes herfsi* Oud. which was associated with four insects *T. confusum*, *C. chinensis*, *S. oryzae* and *S. granaria*.

Suborder Acaridida: It was represented by the three families: Acaridae, Glycyphagidae and Pyroglyphidae and six mite species.

Family Acaridae included four mite species *Tyreophagus entomophagus* (Laboulbene) was associated with the two insect species, *O. surinamensis* and *P. cupria*; *Lardoglyphus konoi* (Sasa & Asmema) was associated with the two insect species, *A. notadonta* and *S. granaria*; *Suidasia nesbitt* (Hughes) was associated with one insect species, *T. castaneum* and *Caloglyphus* sp. was associated with the insect species, *P. fuscata*.

Family Glycyphagidae was represented by the mite species, *Glycyphagous domesticus* (Degeer) which was collected from the two insect hosts, *O. ptilinoides* and *B. rufimanus*.

Family Pyroglyphidae was represented by the mite *Dermatophagoidea farinae* (Hughes) which was associated with one insect host, *D. lardarius*.

Suborder Oribatida was represented by the family Oppidae, and the species *Oppiella* sp. which was collected from one insect host species, *R. ferrugines*. The mites prefer attaching to specific parts of an insects body. Elytra and 3rd pair of legs were the area's most frequently occupied by the mites.

Many authors conducted several studies about the uropodid mites associated with insects. Athias-Binche (1985), Hunter and Rosario (1988), Karg (1989), Masan (1999) presented the demography and gave the illustrated monograph covering many species and families of Uropodina associated with insect.

Also, in Egypt, El-Bishlawy and Allam (2003), AbdElwahed (2006), Gomaa (2006), Al-Deeb *et al.* (2011) and Hassan *et al.* (2011), surveyed the uropodid mites and studied the relation between it and other insects. The uropodid mite species were found to be biological control agents against the coleopterans.

Similar results were obtained by Maareg and Saleh (1989), Kumar (1997), Fain (1998), Moser *et al.* (2010) and Hassan *et al.* (2011). They collected some ascid mites from several species of carabide beetles and other coleopterans.

The obtained result assured those of Maareg and Saleh (1989), Sathiamma (1995), Gwiazdowice (2000) and Hassan *et al.* (2011) who collected several

macrochelid mites from different insects. These mites were found beneath the elytra of the beetles as natural agents against insect pests.

Fain and Dufrene (1995) and Hurst *et al.* (1997), recorded the acarofouna associated with carbide beetles belonging to 21 species of 8 genera. Digamasellidae was represented by two species.

Oliveira *et al.* (2003) carried out the biocontrol potential of the mite species *Acarophenax lacunatus* (Cross & Krantz) (Prostigmata: Acarophenacidae). This mite species was noticed as egg parasite of *Rhizophorthera dominica*, *Tribolium castaneum* and *Oryza ephilussurinamensis*.

Barker (1993) recorded mites of 10 genera and one undescribed taxon of Pyemotidae on specimens of 10 genera of Coleoptera of farm-stored grain or grain residues. These mites were found under the wings or on the abdominal tergites or on external surfaces of beetles.

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