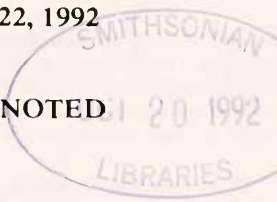


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ARTHROPOD PARASITES OF *COCCINELLA SEPTEMPUNCTATA* (COLEOPTERA: COCCINELLIDAE); WORLD PARASITE LIST AND BIBLIOGRAPHY¹

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ABSTRACT: The literature and recent North American collection records indicate that at least 16 species of insects (ca. 14 Hymenoptera from 6 families, and 2 Diptera from 2 families) and two ectoparasitic mites are known as parasites or hyperparasites of *Coccinella septempunctata*. Lists include names of actual parasites or hyperparasites, other names and synonymies, as well as misidentifications or improper host associations, and all are referenced to new collection data or bibliographic citations.

The sevenspotted ladybeetle, *Coccinella septempunctata* L., is an important predator of aphids in the Palearctic region. It became established in North America in 1973 (Angalet & Jacques, 1975; Larochelle 1979, Larochelle & Larivière, 1979), extended its distribution rather slowly at first (Hobeke & Wheeler, 1980), and then spread more rapidly south and west aided in part by humans (Angalet *et al.* 1979). By August 1986, its distribution included the eastern 2/3 of the United States and southern Canada (Schaefer *et al.* 1987). It has continued to spread and has now been recovered west of the Rocky Mountains in Utah due to natural spread and also it was intentionally released in California and Washington in 1988, with additional west coast releases in 1989 and 1990, and, with confirmed recoveries first in 1990, it is now present in all U.S. states (R. Flanders, USDA, APHIS, personal communication.). Because this species has been so successful in expanding its range and because it is a potentially beneficial agent in the biological control of aphids, we focused on the parasitic insects associated with *C. septempunctata*, especially those that might reduce the benefits gained from its presence in North America. Our initial efforts were to construct a world list of parasites of *C. septempunctata*. Beginning with the published (Richerson 1970) and unpublished supplemental works of J. V. Richerson (pers. comm.), published lists by Johnssen (1930) and Thompson (1943), published account of parasites in Asia by Semyanov (1986), and a very useful unpublished card catalog of parasites and hosts housed (but no

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longer updated) at the USDA, Systematic Entomology Laboratory, located at the U. S. National Museum, Washington, D.C., we updated (as of January 1992) the list of known arthropod parasites of *C. septempunctata*. Included are previously unpublished records of North American parasites in which we have keyed our source to the collector and provided collection data. All North American parasites were identified by Michael E. Schauff (USDA, Systematic Entomology Lab., Beltsville, MD). Included are some references in which authors cite other sources. The resulting world list of *C. septempunctata* parasites, stages attacked, and information sources is presented in Table 1. As many species appear in the literature under various names, Table 2 lists known synonymies and other name combinations that we believe refer to the same insect.

In our literature search we found that several published records of parasites attacking *C. septempunctata* are in error. These are listed in Table 3, along with our reasons for removing them from the current master list of parasitic arthropods.

In the bibliography, we include known abstracting journal citations regardless of whether we viewed the original article or not. These are referred to as: RAE — Review of Applied Entomology; BA — Biological Abstracts, and BNI — Biocontrol News and Information.

We hope that this compilation of parasitic arthropods associated with *C. septempunctata* will stimulate others to be alert for additional associations, especially in North America, where this beetle is a recent invader and most capable disperser. As it invades new geographic areas, the potential for new associations is great and in time we may see many new species added to this list of arthropod parasites.

TABLE 1. Parasitic arthropods associated with *Coccinella septempunctata* L.

TAXON	STAGE ATTACKED ^a	TYPE ^b	REFERENCE
ACARINA			
Podapolipodidae			
<i>Ectoparas</i> sp.	A	E	64
<i>Podapolipus</i> sp.	A	E	30
DIPTERA			
Phoridae			
<i>Phalacrotophora fasciata</i> (Fallén)	L,P	Pa	14, 15, 16, 17, 26, 30, 35, 44, 55, 57, 63, 70, 73, 76, 77, 83
<i>Phalacrotophora</i> sp.	L,P	Pa	31, 36, 70

TAXON	STAGE ATTACKED ^a	TYPE ^b	REFERENCE
Tachinidae			
<i>Medina luctuosa</i> Meigen	A	Pa	76, 77
HYMENOPTERA			
Braconidae			
<i>Dinocampus coccinellae</i> (Schrank)	A.L	Pa	1, 3, 6, 7, 8, 9, 10, 13, 16, 17, 18, 19, 22, 23, 24, 25, 26, 27, 28, 30, 31, 35, 36, 39, 41 42, 43, 44, 46, 47, 48, 49, 50, 51, 53, 54, 60a, 60b, 61, 65, 66, 68, 69, 70, 72, 75, 76, 77, 78, 79, 80, 81, 83, 84, 85, 86
Ichneumonidae			
<i>Metastenus townsendi</i> (Ashmead)	?	?	82
<i>Syrphoctonus tarsatorius</i> Panzer	?	H	17, 44
<i>Gelis melanocephalus</i> Schrank	?	?H	44
Unidentified species	?	?	4, 37
Eulophidae			
<i>Tetrastichus coccinellae</i> Kurdjumov	L.P	Pa	2, 3, 8, 12, 16, 22, 26, 30, 31, 35, 40, 45, 47, 56, 58, 61, 64, 70, 74, 76, 77, 83
<i>Tetrastichus epilachnae</i> Giard	L.P	Pa	38, 52, 62, 70
<i>Tetrastichus melanis</i> Burks	P	?	20, 72
<i>Tetrastichus</i> sp. (not <i>melanis</i>)	P	?	29
<i>Tetrastichus</i> sp.	?	?	8, 36
Encyrtidae			
<i>Homalotylus flaminus</i> (Dalman)	L.P	Pa	3, 17, 30, 31, 32, 33, 34, 35, 47, 58, 61, 64, 67, 70, 76, 77, 83
<i>Homalotylus terminalis</i> (Say)	L	Pa	21
<i>Homalotylus eytelweini</i> (Ratzburg)	L.P	H	15, 35, 44
<i>Homalotylus</i> sp.	L.P	Pa	4, 59, 70
Proctotrupidae			
<i>Lygocerus</i> sp. (via <i>H. flaminus</i>)	L	H	31
Pteromalidae			
<i>Pachyneuron solitarium</i> (Hartig)	L	H	64
<i>Pachyneuron syrphi</i> Ratzburg	?	H	58, 70
<i>Pteromalus</i> sp.	P	?	81
Unidentified sp.	?	?	35, 61

^a L = Larvae, P = Pupae, A = Adult, ? = Uncertain of life stage.

^b E = Ectoparasite, H = Hyperparasite, Pa = Parasite (= endoparasite or parasitoid),
? = Uncertain status.

TABLE 2. List of synonymies and other name combinations used for parasite species listed in Table 1.

Name and alternate names or synonymy and source or reference.

Medina luctosa Meigen 1824Other genera: *Degeeria*.Source: Herting, B. 1982. Catalogue of Palearctic Tachinidae (Diptera).
Stutt. Beitr. Naturkd. (A), 369, 228 pp.*Dinocampus coccinellae* (Schrank, 1802)Other genera: *Ichneumon*, *Perilitus*.Synonymy: *Bracon terminatus* Nees, 1811
Euphorus sculptus Cresson 1872
Centistes americana Riley 1888
Perilitus terminatus (Nees) 1812
Microctonus terminatus Wesmael 1835
Dinocampus terminatus Foerster 1862
Perilitus americanus Riley 1889Source: Cushman, R. A. 1922. The identity of *Ichneumon coccinellae*
Schrank (Hym.). Proc. Ent. soc. Wash. 24(9):241-242;
Marsh, 1979. (See entry no. 53)*Gelis melanocephalus* Schrank 1781Other genera: *Pezomachus*; *Hemimachus*, *Mutilla*, *Ichneumon*, *Cryptus*,
Hemiteles.Synonymy: *Ichneumon fasciatus* F. 1973*Hemiteles leuiventris* Gravenhorst 1829Source: Dalla Torre, C. G. De, 1901/1902. Catalogus Hymenopterorum.
Lipsiae, Sumptibus Guilelmi Engelmann.*Homalotylus eytelweini* (Ratzburg, 1852)Other spelling: *eitelweini* Ratzburg 1852

Source: Schauff, Mike (pers. comm. 3/90)

Homalotylus flaminus (Dalman) 1820Other genera: *Encyrtus*Synonymy: *Lepidaphycus bosqui* Blanchard 1936*Mendozaniella mirabilis* Brethes 1913

Source: Gordh, 1979 in Krombein & Hurd (See entry no. 39)

Homalotylus t. terminalis (Say, 1828)Other genera: *Serlion*Synonymy: *Eutelus? scymnae* Shimer 1869*Homalotylus obscurus* Howard 1885

Source: Gordh, 1979 (Same as above)

Phalacrotophora fasciata (Fallen, 1823)Other genera: *Trineura*, *Phora*, *Aphiochaeta*, *Phalacrotophora* (*Omatessara*).Synonymy: *Phora atricapilla* Curtis 1828Source: Borgmeier, T. 1968. Catalogue of the Phoridae of the world
(Diptera: Phoridae). Studia Entomol. 11(1-4): 1-366.*Syrphoctonus tarsatorius* (Panzer) 1809Other genera: *Bassus*.Synonymy: *Bassus exsultans* Gravenhorst 1829*B. insignis* Gravenhorst 1829*B. flavus* Desvignes 1862

- B. pulchellus* Desvignes 1862
B. indicus Cameron 1909
Homoporus flavitrochanterus Uchida 1956
 Source: Carlson, 1979 in Krombein & Hurd (See entry no. 39)
Tetrastichus coccinellae Kurdjumov 1912
 Synonymy: *T. scaposus* Thomson 1878
 Source: Domenichini, 1966 (See entry no. 12).
Tetrastichus epilachnae (Giard) 1896
 Other genera: *Lygellus*
 Synonymy: *Tetrastichus jablonowskii* Szelenyi 1940
 Source: Domenichini, 1966 (See entry no. 12).

TABLE 3. Species or names erroneously recorded as parasites of *Coccinella septempunctata* L.

HYMENOPTERAN TAXON	REFERENCE	JUSTIFICATION
Braconidae		
<i>Eucorystes</i> sp.	71	Improper host association. A parasite of <i>Agrilus viridis</i> L. (Buprestidae).
<i>Spathius</i> sp.	71	Improper host association. Parasite of larvae (Anobiidae, Ipidae, Cerambycidae) living under tree bark.
Eulophidae		
<i>Pediobius foveolatus</i> Crawford	5	Probably a misidentification of <i>Homalotylus</i> sp. Laboratory rearing shows <i>P. foveolatus</i> will only attack species in the Epilachninae (Coccinellidae), not other subfamilies (Schaefer, unpubl. data).
<i>Tetrastichus neglectus</i> Domenichini	11, 12, 70	Improper host association. Actually a parasite of <i>Chilocorus</i> , <i>Exochomus</i> and <i>Scymnus</i> and not of <i>Coccinella</i> despite reports to the contrary (ref. #12).
Pteromalidae		
<i>Pteromalinarum</i> sp.	35, 61	Improper interpretation of original Russian report ^a .

^a Relying on the interpretations of George Steyskal and E. E. Grissell (Systematic Entomology Lab., USDA, Beltsville, MD), we conclude that in the original article by Oglobin (in Russian), who recorded "Pteromalid'a" in italics, meaning simply a species of pteromalid (or the familiar form of the family). This should not have been italicized but in Russian is commonly done for the familiar form of family names. Johnsen confused the issue further by using the latinized, italicized form "*Pteromalinarum* sp.", meaning "of pteromalid." Therefore, *Pteromalinarum* is not a generic name and this notation should only be considered as "a species of pteromalid."

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* Contains parasite-host information which is erroneous, questionable, or which needs further verification.

** Represents recent North American collection records, previously unpublished.