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### Distribution of *Eutarsopolipus* (Acari: Podapolipidae) and *Crotalomorpha Camini* (Acari: Crotalomorphidae), Ectoparasites of *Stenolophus* (Coleoptera: Carabidae) in Michigan, U.S.A.

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**DISTRIBUTION OF *EUTARSOPOLIPUS* (ACARI: PODAPOLIPIDAE)  
AND *CROTALOMORPHA CAMINI* (ACARI: CROTALOMORPHIDAE),  
ECTOPARASITES OF *STENOLOPHUS* (COLEOPTERA: CARABIDAE)  
IN MICHIGAN, U.S.A.**

Robert W. Husband<sup>1</sup> and David O. Husband<sup>2</sup>

**ABSTRACT**

Three acarine parasites of *Stenolophus* spp are described from Michigan. *Eutarsopolipus elzingai* Husband (Acari: Podapolipidae), previously known from eastern Kansas, *Eutarsopolipus brevichelus* Husband and Husband, with one Michigan record, and *Crotalomorpha camini* Lindquist and Krantz (Acari: Crotalomorphidae), previously known from Kansas, Nebraska, Arkansas and Oklahoma, are widely distributed in Michigan as subelytral parasites of *Stenolophus comma* (Fabricius) (Coleoptera: Carabidae) and *Stenolophus lecontei* (Chaudoir), the seed corn beetle. *Eutarsopolipus elzingai* and *E. brevichelus* may occur occasionally on the same host beetle.

Mites in the family Podapolipidae (Acari: Tarsonemoidea) are parasites of insects, particularly Coleoptera. The family Podapolipidae was described by Ewing (1924). Previous records of the genus *Eutarsopolipus* in Michigan, all from carabid beetles, are: *myzus* group: *E. regenfussi* Husband and Swihart, from a single *Chlaenius pennsylvanicus* (Say) (Carabidae) collected in Cheboygan Co. and *E. davidsoni* Husband collected from *Chlaenius sericeus* (Forster) (Carabidae) in Barry, Cheboygan, Ingham, Luce and Macomb Counties; *acanthomus* group: *E. porteri* Husband from a single *Harpalus herbivagus* Say (Carabidae) collected in Kalamazoo Co.; *pterostichi* group: *E. fischeri* Husband from a single *Harpalus pennsylvanicus* (DeGeer) collected in Ingham Co.; *biunguis* group: *Eutarsopolipus brevichelus* Husband and Husband collected from a single *Stenolophus lecontei* (Chaudoir) (Carabidae). Groups of *Eutarsopolipus* were proposed by Regenfuss (1968) and modified by Husband and Macfarlane (1999).

Mites in the family Crotalomorphidae are parasites of stenolophine beetles (Carabidae). The family Crotalomorphidae was described by Lindquist and Krantz (2002). There are no previous records of Crotalomorphidae in Michigan.

The purpose of this paper is to present and discuss distribution in Michigan of the three subelytral acarine parasites of *Stenolophus comma* (Fabricius) and *S. lecontei*: *Eutarsopolopus elzingai* Husband, *E. brevichelus*, and *Crotalomorpha camini* Lindquist and Krantz, and to provide figures to distinguish the three species.

**METHODS AND MATERIALS**

More than 500 pinned Michigan *Stenolophus* beetles were borrowed from the A. J. Cook Arthropod Research Collection of Michigan State University and the University of Michigan Museum of Zoology Entomology Collection. *Stenolophus comma* and *S. lecontei* from Michigan were examined for subelytral parasitic mites. Beetles were placed in hot water for about 1/2 h in order to lift elytra without damaging pinned specimens. Mites were visually removed or washed

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from the beetles with 70% ethanol, mounted in Hoyer's mounting medium, placed on a heating tray and later ringed with Glyptal insulating paint. Mites were examined with the aid of a Zeiss (Jena, Germany) phase contrast microscope with an ocular micrometer. The terminology for mite structures used here follows Lindquist (1986).

## RESULTS

Adult females of the three species of subelytral parasites of *Stenolophus* are distinguished by the shape of the idiosoma for *C. camini*, an undivided plate C in *E. elzingai*, and divided plate C in *E. brevichelus* (Fig. 1). *Eutarsopolipus elzingai* has longer cheliceral stylets, dorsal gnathosomal, and coxal 3a setae in larval and adult females in comparison with the same structures in *E. brevichelus*. Setae *sc*<sub>1</sub> of male *E. elzingai* vary from microsetae to 3 micrometers while setae *sc*<sub>2</sub> is 8-12 micrometers in *E. brevichelus*. These structures are identified in Husband and Husband (2003) and Lindquist (1986).

Studies of distribution of crotalomorphid and podapolipid parasitic mites of *Stenolophus* tend to be restricted to investigations of relatively few specimens of *Stenolophus* (Lindquist and Krantz 2002, Husband and Husband 2003). The discovery of subelytral acarine parasites of *Stenolophus* from many areas of Michigan illustrates the wide distribution of these parasites in Michigan (Figs. 2-4). More than 500 pinned *Stenolophus* beetles that were collected in Michigan and stored in the University of Michigan Museum of Zoology and Michigan State University A. J. Cook Arthropod Research Collection were examined for acarine parasites. Three beetles had *C. camini*. *Eutarsopolipus elzingai* or *E. brevichelus* were found on 42 beetles and 8 beetles had both *E. elzingai* and *E. brevichelus*. We cannot conclude that the incidence of acarine parasitism noted in Michigan *Stenolophus* from Michigan museums applies to incidence of parasitism in *Stenolophus* existing in other museums. For example, 1 beetle with *C. camini* and 2 beetles with *E. elzingai* were found among only 10 *S. comma* borrowed from the Museum of Comparative Zoology of Harvard University, Massachusetts. Study of acarine parasitism of *Stenolophus* on a national scale is in progress.

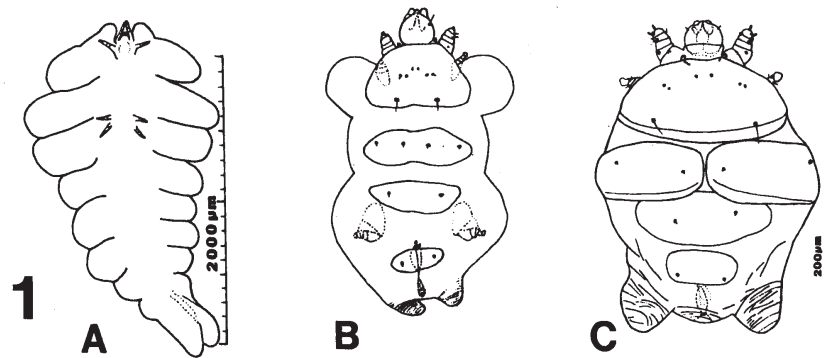


Figure 1. Adult females of heterostigmatine parasites of *Stenolophus* species (Carabidae) in Michigan. A. *Crotalomorpha camini* (Crotalomorphidae). B. *Eutarsopolipus elzingai* (Podapolipidae: *biunguis* group). C. *E. brevichelus* (Podapolipidae: *biunguis* group).

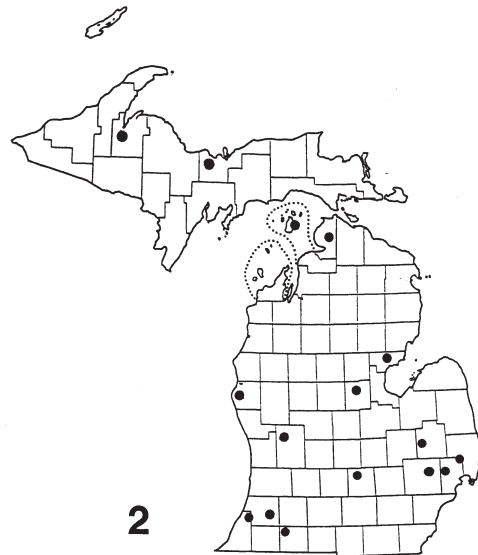


Figure 2. Distribution of *Eutarsopolipus elzingai*, a parasite of *Stenolophus comma* and *S. lecontei* in Michigan.



Figure 3. Distribution of *Eutarsopolipus brevichelus*, a parasite of *Stenolophus comma* and *S. lecontei* in Michigan.



Figure 4. Distribution of *Crotalomorpha camini*, a parasite of *Stenolophus comma* and *S. lecontei* in Michigan.

*Eutarsopolipus elzingai* was not recorded from Michigan prior to the present study. New distribution records in Michigan of this species, all from *S. comma* unless otherwise noted are: **Alger Co.**, Chatham, 6 July 1955, coll. W. A. Drew; **Arenac Co.**, 22 July 1950, coll. R. R. Dreisbach; **Baraga Co.**, 8 mi. S. L'Anse, Ford Forestry Center, 16 July 1964, coll. R. B. Willson; **Charlevoix Co.**, Beaver Island, 29 August 1922, coll. M. H. Hatch; **Emmet Co.**, 21 July 1929; **Ingham Co.**, East Lansing, 20 June 1940; **Kent Co.**, Sparta, 25 July 1970, coll. David Foley; **Lapeer Co.**, 28 June 1935; **Macomb Co.**, Washington, 27 July 1964, coll. R. Campbell; **Midland Co.**, Bluff Creek, 2 mi. west North Bradley, 15 July 1935, coll. A. L. Olson and L. K. Gloyd; **Oakland Co.**, Rochester, 7 August 1935, coll. S. Moore; **Oceana Co.**, Silver Lake Park, 27 July 1934, Coll. A. L. Olson and L. K. Gloyd; **St. Joseph Co.**, Mohny Lake, 10 July 1972, coll. N. M. Wells; **Van Buren Co.**, Paw Paw Lake, 6 July 1906, coll. E. Liljeblad from *S. lecontei* (Fig. 2).

*Eutarsopolipus brevichelus* was collected from *S. lecontei* in **Berrien Co.**, Harbert Dunes, Michigan, 25 July 1917 by A. W. Andrews (Husband and Husband 2003).

New Michigan distribution records of *E. brevichelus* all from *S. comma*, are: **Alger Co.**, Chatham, 6 July 1955, coll. W. A. Drew; **Allegan Co.**, Allegan, 17 June 1959, coll. G. C. Eickwort; **Arenac Co.**, 22 July 1950, coll. R. R. Dreisbach; **Baraga Co.**, 8 mi. S. L'Anse, Ford Forestry Center, 16 July 1964, coll. R. B. Willson; **Charlevoix Co.**, Beaver Island, 29 August 1922, coll. M. H. Hatch; **Cheboygan Co.**, Univ. of Mich. Douglas Lake Bio. Stn., 12 July 1961; **Grand Traverse Co.**, Pere Marquette State Forest, Lake Dubonnet Campground, 13 July 1984, coll. M. and A. O'Brien; **Huron Co.**, Sand Point, 25 June 1922, coll. R. F. Hussey; **Kalamazoo Co.**, Mich. State Univ. Gull Lake. Bio. Stn., 6 July 1957, coll. R. L. Fischer; **Kent Co.**, Sparta, 25 July 1970, coll. David Foley; **Lapeer Co.**, Lapeer, 28 June 1935; **Macomb Co.**, Washington, 27 July 1964, coll. R. Campbell and east of Memphis, 21 July 1963, coll. C. Brivio; **Midland Co.**, Bluff Creek, 2 mi. west North Bradley, 15 July 1935, coll. A. Olson and L. K. Gloyd; **Oakland Co.**, Rochester, 7 August 1935, coll. S. Moore; **Oceana Co.**, Pentwater, 18 July 1916; **Schoolcraft Co.**, Germfask, 27 July 1964, coll. R. B. Willson (Fig. 3).

Both *E. elzingai* and *E. brevichelus* were found under the elytrae of individual specimens of *S. comma* from Alger, Arenac, Charlevoix, Kent, Lapeer, Macomb, Midland and Oakland Counties.

Previous records of *C. camini* are from *S. lecontei* or *Stenolophus* sp. from eastern Kansas and Nebraska, northern Oklahoma and Western Arkansas (Lindquist and Krantz 2002 and Husband and Husband 2003). *Crotalomorpha camini* is also known to occur in Lake and Porter Counties in northwest Indiana (unpublished data collected by the authors). We collected *C. camini* ex *S. lecontei* in **Dickinson Co.**, Floodwood, 18 July 1915, coll. A. W. Andrews, ex *S. comma*, **Roscommon Co.**, 29 June 1946, coll. R. R. Dreisbach, and **Kent Co.**, Alto, 12 July 1937, coll. unknown (Fig. 4).

### DISCUSSION

The first reference to a subelytral acarine parasite of American *Stenolophus* (*Agonodorus*) was by Krantz (1970). Krantz's illustration of Crotalomorphidae was based on an unpublished drawing by Joseph Camin, and the species was later described as *C. camini*. The parasite is found in northern and southern Michigan on *S. lecontei* and on *S. comma*.

The second acarine parasite to be described from American *Stenolophus* was first collected in Lawrence, Kansas from *S. lecontei* by R. E. Beer in May 1959 and in Manhattan, Kansas from *S. comma* by P. A. Nickel and R. J. Elzinga in 1968 (Husband, 1998). These mites were sent for analysis to Hans Regenfuss in Germany but Regenfuss died before completing a description of these mites. They were later described as *E. elzingai*. In the process of trying to find a longer series of *E. elzingai* from areas other than eastern Kansas and from additional species of *Stenolophus*, a third subelytral acarine parasite, *E. brevichelus*, was discovered.

Regenfuss (1972) discussed the distribution of podapolipid parasites under the elytrae of carabid beetles and divided the available loci into niches occupied by different species of podapolipid mites. To date we have not been able to discover whether *E. elzingai* and *E. brevichelus* occupy different loci on the same beetle. All specimens of *C. camini* (1-6 per beetle) have been from the under surface of elytrae and all are physogastric females.

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