Welbourn, W. C. and O. P. Young. 1988. Mites parasitic on spiders, with a description of a new species of *Eutrombidium* (Acari, Eutrombidiidae). J. Arachnol., 16:373-385.

MITES PARASITIC ON SPIDERS, WITH A DESCRIPTION OF A NEW SPECIES OF *EUTROMBIDIUM* (ACARI, EUTROMBIDIIDAE)

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ABSTRACT

A new species of *Eutrombidium* is described from larvae parasitizing 38 *Ceraticelus emertoni* (O. Pickard-Cambridge) (Araneae, Linyphiidae) and one *Oxyopes salticus* Hentz (Araneae, Oxyopidae) collected in Mississippi. Most host individuals (89%) were parasitized by only one larva, but as many as nine larvae were attached to one host. Adult and immature hosts of both sexes were parasitized. All larval mites were attached to the lateral molt sutures, mostly on the posterior prosoma. A review of the literature reveals 30 records of mite ectoparasitism of spiders among eight mite genera from five continents. Six additional records are reported herein. Two species listed as spider parasites, *Allothrombium metae* Boshell & Kerr (Acari, Trombidiidae) and *Copriphis bristowi* Finnegan (Acari, Laelapidae), are transferred to *Clinotrombium* and *Ljunghia*, respectively.

INTRODUCTION

Larvae of the cosmopolitan genus *Eutrombidium* Verdun (Acari, Eutrombidiidae) parasitize a variety of Orthoptera (Welbourn 1983), whereas the active postlarval instars of at least one species, *E. locustarum* (Walsh), are predators of orthopteran eggs (Severin 1944). Of the 17 nominate species listed by Thor and Willmann (1947), 14 were known from only the postlarval instars. Since then, three additional species have been described from orthopterans. Numerous species remain to be described worldwide.

There are currently three available names for species of *Eutrombidium* in North America: *E. locustarum, E. magnum* (Ewing), and *E. corticis* (Ewing). Examination of the type of *Ottonia trombidioides* Banks indicates this species should be placed in *Eutrombidium*, *E. trombidioides* (Banks), new combination. *Eutrombidium corticis* should be placed in the Trombidiidae, possibly in the genus *Allothrombium* (Berlese). Two of the remaining three species, *E. magnum* and *E. trombidioides*, are known only from postlarval instars and need to be redescribed on the basis of reared larvae to determine their relationships with the

other named species. All North American larvae reported in the literature have been (mis-) identified as either *E. trigonum* (Hermann) or *E. locustarum*. *Eutrombidium trigonum* is an European species and its presence in North America has not been verified. *Eutrombidium locustarum* larvae have been reported from North American orthopterans representing more than 35 genera in four families (Welbourn 1983; Rees 1973; Huggans and Blickenstaff 1966).

Examination of spiders collected in west central Mississippi revealed larvae of an undescribed species of *Eutrombidium* attached to two different spider species. The absence of previous reports of this mite genus parasitizing spiders and the inadequacy of larval characters used in earlier descriptions justifies our new generic diagnosis and description of the new species. A summary of the biology of this species and a survey and discussion of the general phenomenon of mite parasitism of spiders is also presented.

TAXONOMY

All measurements are in micrometers (μm) unless otherwise noted. Terminology generally follows Welbourn and Young (1987) and Robaux (1974).

Genus *Eutrombidium* Verdun

Eutrombidium Verdun 1909. Soc. Biol. 67:244; Type species: *Trombidium trigonum* Hermann 1804.

Diagnosis.—Larva: Coxal field I with seta 1a nude; coxal fields I, II and III each with thickened and bifid seta, 1b, 2b and 3b respectively; fnTr = 1-1-1; fnFe = 6-5-4; fnGe = 4-2-2; fnTi = 6-5-5; fsol = I (0-2-2-1), II (0-1-2-1), III (0-1-0-0); f*zeta* = 2-1-0 or 2-0-0; famulus on tarsus leg I distal to *omega*; palpal femur and genu each with a minute dorsal or lateral seta; one of three setae (in addition to palpal tibial claw) on palpal tibia spinelike or hypertrophied; palpal tibial claw bifurcate; *sc*1 hypertrophied. Deutonymph and Adult: Dorsal idiosomal setae setiform; posterior idiosoma with pygosomal plate; palpal tibia with two rows of dorsal spines and one to four large ventral spines.

Eutrombidium lockleii, new species

Type data.—Holotype (AL-3280) and 55 paratypes ex *Ceraticelus emertoni* (O. Pickard-Cambridge) (Araneae, Linyphiidae) from Mississippi, Sunflower Co., 8 km SSW Indianola, in field dominated by coastal bermuda grass, collected by D-Vac suction method, 19 July 1984, T. C. Lockley. Two additional paratypes from same locality and date ex *Oxyopes salticus* Hentz (Araneae, Oxyopidae). The holotype and four paratypes will be deposited in the United States National Museum, two paratypes each will be sent to the following institutions: Field Museum of Natural History, Chicago; Canadian National Collection, Ottawa; British Museum (Natural History), London; Muséum National d'Histoire Naturelle, Paris; South Australian Museum, Adelaide; University of Michigan Museum of Zoology, Ann Arbor. The remaining paratypes will reside in the Acarology Laboratory, The Ohio State University, Columbus.

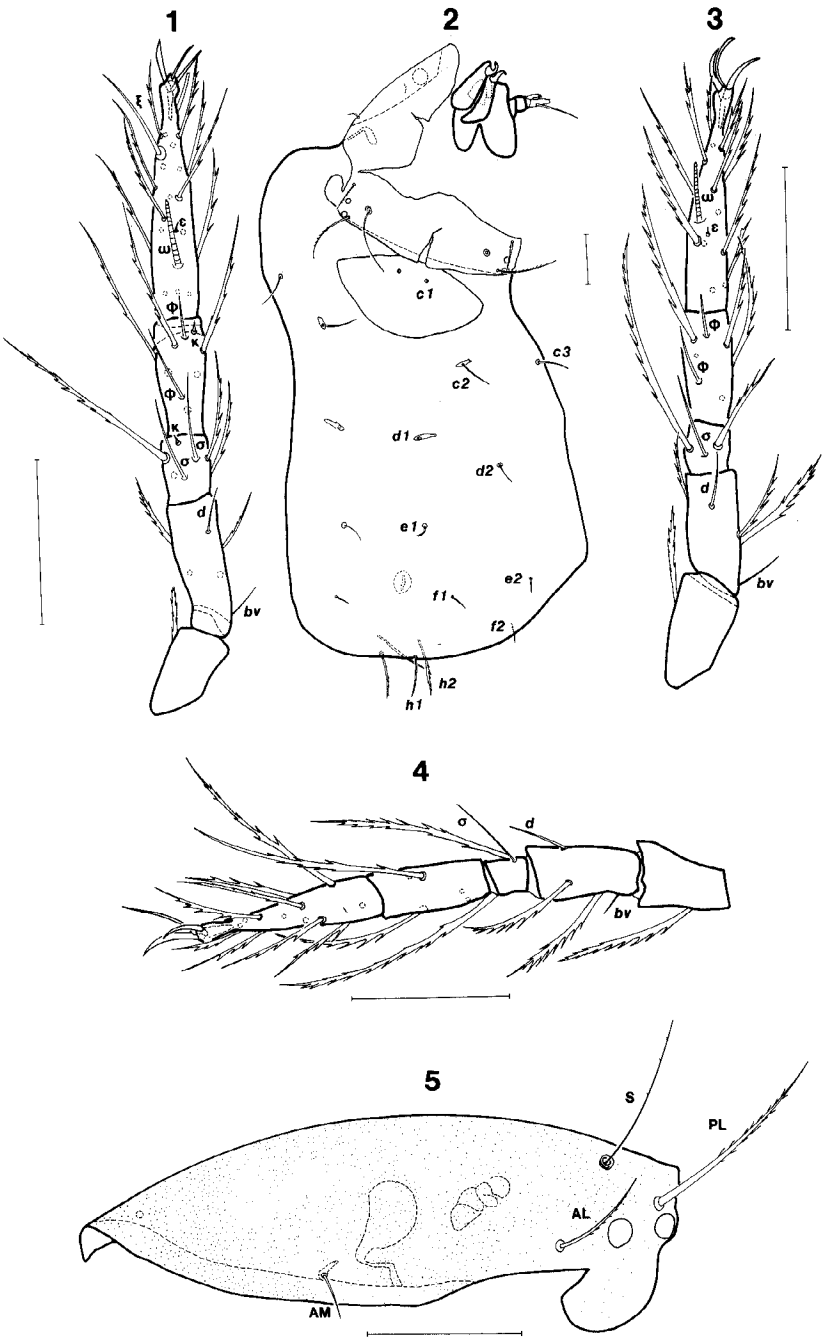
Diagnosis.—Larva with eyes and ocular sclerites incorporated into prodorsal sclerite; genu, legs I, II and III, each with at least one very long barbed seta; palpal tibial claw bifurcate distally and with basal knob; palpal tarsus with one very long barbed seta; lophotrix and scopa on tarsus leg III undeveloped; tarsus leg II without subterminal eupathid.

Description.—Larva: *Idiosoma* (Figs. 2, 6). Holotype partially engorged. Due to distortion during mounting no size measurements were made; unmounted specimens ranged from 200 (unengorged) to 700 (engorged); eyes 2/2 incorporated into prodorsal sclerite, anterior eye smaller. Prodorsal sclerite and scutellum occupy most of the dorsal idiosoma in unengorged specimens, displacing dorsal idiosomal setae posteriorly and ventrally. Setal rows C and D each with three pairs of setae, rows E and F each with two pairs of setae; H and PS rows each with one pair of setae. Setae *c*1 on scutellum; *c*2 and *d*1 each set on narrow sclerites. Idiosomal setae (Figs. 1, 3) *c*1 (59-71), *d*1 (50-63) longer than setae in rows E (13-29), F (13-20), and setae *c*2 (33-39), *c*3 (29-38), *d*2 (19-22), *d*3 (18-23); H and PS setae long, 38-51 and 56-67, respectively. Cupules and supracoxal seta (*e*l) absent. One pair of closely associated, branched intercoxal setae between coxae III; two pairs of preanal setae.

Prodorsal Sclerite (Figs. 2, 5, 6): Punctate without striae, anterior margin convex, posterior margin slightly concave; PL > S > AL > AM; SB < PW; trichobothridial bases anterior to PL setal bases; trichobothria flagellate, with setules. Scutal measurements of holotype with mean, range and number of paratypes measured given within parentheses: AM 14 (14, 11-17, 19), AA - (61, 58-64, 10), AW - (85, 72-93, 5), AL 33 (33, 28-36, 21), PL 70 (68, 63-72, 22), AP 35 (37, 35-41, 28), SB 139 (131, 123-138, 9), S 72 (65, 56-72, 21), PSB 31 (28, 21-36, 12), ASB - (116, 111-119, 2), SD - (138, 132-145, 2), PW (excluding ocular sclerites) - (186, 172-193, 7). Scutellum: HS 85 (82, 75-90, 26), LSS 175 (166, 157-175, 21), *c*1 - (65, 59-71, 14), SS 33 (35, 30-40, 28). Because of distortion of prodorsal sclerite, PS measurement was not made.

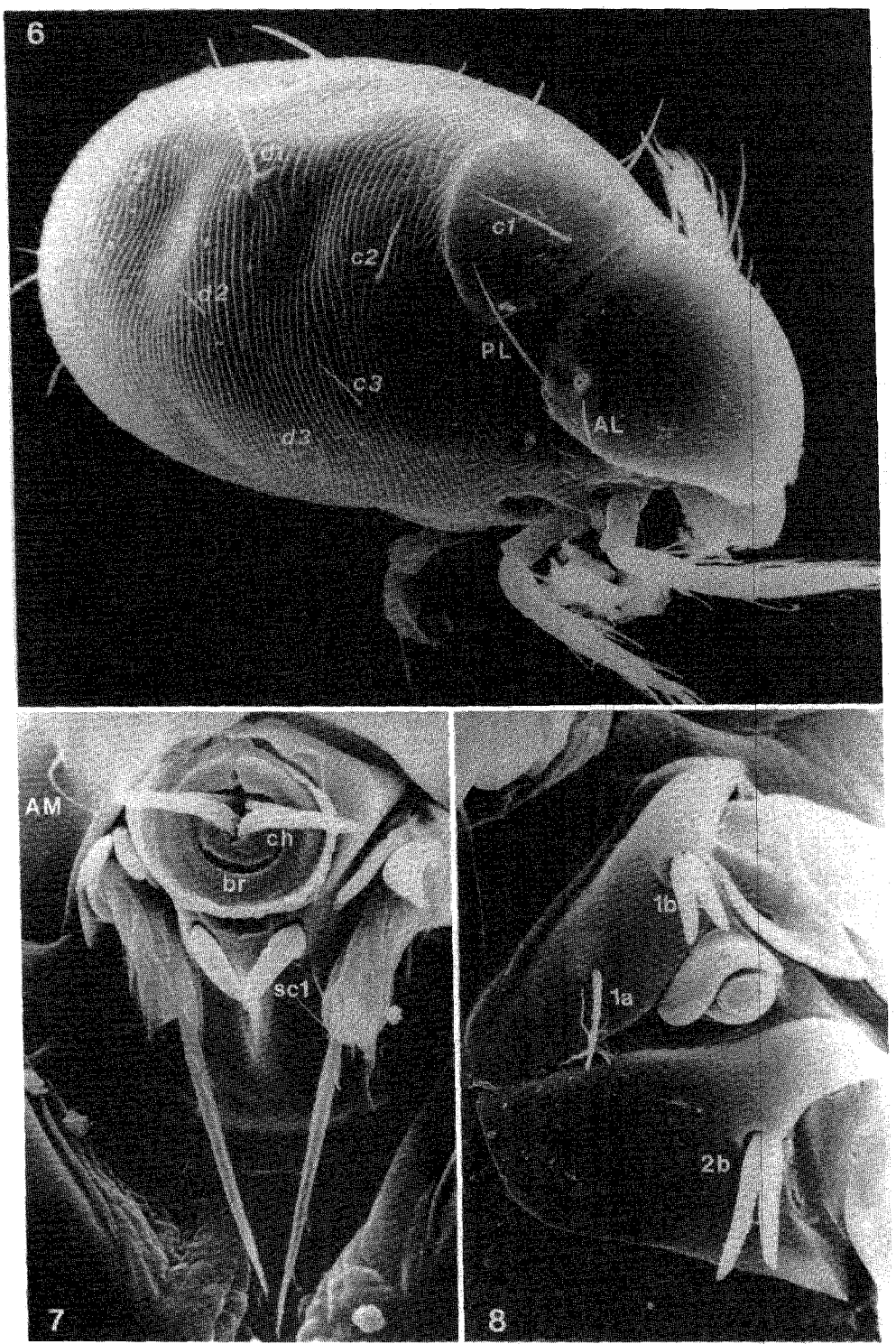
Gnathosoma (Fig. 7): Palpal setal formula N-N-NNS2-7NB *omega* (palpal trochanter absent); palpal tibial claw with two distal prongs and basal knob; adoral setae (*or*l) nude, subcapitular setae (*sc*l) hypertrophied; palpal supracoxal setae (*e*) absent; cheliceral blade (ch) with single ventral tooth, surrounded by buccal ring (br).

Legs (Figs. 1, 3, 4): Femora undivided, six segments beyond the coxal field; pretarsus legs I and II with paired claws and clawlike empodium; pretarsus leg III with normally developed antiaxial claw and claw-like empodium, but with paraxial claw twice as long as antaxial claw. Measurements of holotype with positions of specialized setae given as a ratio of the segment length. Mean, range, and number of paratypes measured given in parentheses. *Leg I* 200 (196, 188-204, 25); coxal field (Fig. 8) with two setae, one nude 27 (30, 26-36, 13) and other thickened and bifid 19 (18, 17-19, 14); trochanter 1B; femur 6B, *bv* and *d* setae nude; genu 4B with one seta much longer than others 63 (70, 62-78, 15), two *sigma* 25 (24, 20-28, 18) and 23 (21, 20-26, 18) at 0.32 (0.35, 0.26-0.47, 25) and 0.57 (0.57, 0.47-0.72, 25), respectively, microseta k 2 (2, 1-2, 14) at 0.84 (0.84, 0.78-0.90, 14); tibia 6B, two *phi* 22 (19, 15-24, 20) and 16 (14, 11-17, 20) at 0.32 (0.33, 0.26-0.37, 25) and 0.81 (0.80, 0.77-0.84, 25), respectively, k 3 (2, 1-3, 8) at 0.91 (0.87, 0.84-0.89, 8); tarsus 18B, *omega* 22 (20, 17-23, 22) at 0.21 (0.25, 0.19-0.38, 25), famulus 3 (2, 1-3, 22) at 0.43 (0.40, 0.36-0.45, 22), two eupathidia 31



Figs. 1-5.—*Eutrombidium lockleii*, new species: 1, holotype leg I; 2, dorsal view of holotype; 3, holotype leg II; 4, holotype leg III; 5, lateral view of paratype prodorsal sclerite. Scale bar 50 μm. See text for explanation of symbols.

(30, 25-34, 24) and 13 (14, 11-15, 12) at 0.68 (0.70, 0.68-0.77, 25) and 0.86 (0.87, 0.83-0.91, 22), respectively. *Leg II.* 190 (184, 173-192, 24); coxal field (Fig. 8) with one thick, bifid seta 19 (20, 19-22, 14); trochanter 1B; femur 5B, *bv* and *d* setae nude; genu 2B with one seta very long 68 (68, 62-76, 12), *sigma* 17 (21, 15-27, 17)



Figs. 6-8.—*Eutrombidium lockleii*, new species: 6, Scanning electron microscope (SEM) micrograph of engorged paratype (300x); 7, SEM micrograph of ventral gnathosoma (1250x); 8, SEM micrograph of coxal fields legs I and II (1250x). See text for explanation of symbols.

at 0.36 (0.36, 0.28-0.48, 25), k 2 (2, 2-3, 13) at 0.80 (0.75, 0.70-0.81, 10); tibia 5B, two *phi* 15 (16, 13-21, 19) and 12 (12, 10-14, 14) at 0.35 (0.34, 0.29-0.39, 25) and 0.78 (0.78, 0.70-0.82, 24), respectively; tarsus 14B, *omega* 18 (18, 17-21, 25) at 0.41 (0.42, 0.39-0.45, 25), famulus 1 (1, 1-2, 6) at 0.35 (0.36, 0.32-0.40, 6), without eupathid. *Leg III.* 173 (172, 165-192, 23); coxal field with one thick bifid seta 18 (18, 16-20, 13); trochanger 1B; femur 4B, *bv* and *d* setae nude; genu 2B with both setae very long 64-83 (62-79, 56-89, 24), *sigma* 25 (21, 17-27, 18) at 0.38 (0.38, 0.29-0.49, 24); tibia 5B, tarsus 13B, scopa and lophotrix undeveloped.

Etymology.—The specific epithet is from the collector's name, T. C. Lockley.

Taxonomic discussion.—Despite the lack of systematic work on North American *Eutrombidium*, *E. lockleii* can be easily distinguished from other *Eutrombidium* in having the ocular sclerites fused into a prodorsal sclerite, eyes on prodorsal sclerite, long barbed seta on palpal tarsus, undeveloped lophotrix and scopa on tarsus leg III, and by the short, rounded idiosoma. It is difficult to assess the relationships of this species with other members of the genus when only six of the 20 named species are known from the larval instar. Only the discovery of the postlarval instars of this species and rearing of additional *Eutrombidium* species will allow the relationship of this unusual species to be clarified.

SUMMARY OF BIOLOGY

All 58 specimens of *E. lockleii* were obtained from one field 8 km SSW of Indianola, Sunflower Co., Mississippi. This 8 ha hayfield was bordered on the east by a 100 ha fallow pasture, on the north by a 40 ha cotton field, on the west by a deciduous tree-lined wet slough, and on the south by a seasonally dry slough. Coastal bermuda grass predominated, with *Erigeron strigosus* Muhl. ex. Willd. (Compositae) the most abundant flowering plant during the sampling period. This field is the same as Site #2 of Young and Welbourn (1987), where another new species of mite was discovered attached to tarnished plant bugs (Welbourn and Young 1987).

During the period of 12 July to 3 September 1984, 10 vacuum samples were collected weekly at this site, each sample representing 25 row-feet. From these collections, 1530 *Ceraticelus emertoni* were obtained. Thirty-eight individuals of this species possessed attached larvae of *Eutrombidium lockleii* (Fig. 9). These collections also contained 208 *Oxyopes salticus*, of which one individual had two attached larvae of *E. lockleii*. Most specimens of *E. lockleii* were obtained on 19 July 84, when 35 of 365 *C. emertoni* had mites attached (9.6% parasitization rate).

The average body length of *C. emertoni* adults was ca. 1.5 mm, and the average body length of unengorged *E. lockleii* was ca. 0.2 mm, though some engorged specimens that were still attached exceeded 0.7 mm and were as long as the host prosoma. Multiple attachments did occur, as three spiders were obtained with two mites each, one spider with six mites, and one spider with nine mites attached. Adult and penultimate male and female spiders, as well as small and large immatures, were obtained with attached mites. Two-thirds of the hosts, however, were immature spiders.

An analysis of the location of attachment of 56 larval *E. lockleii* on 40 *C. emertoni* indicated that all mites were attached along the lines of exuvial

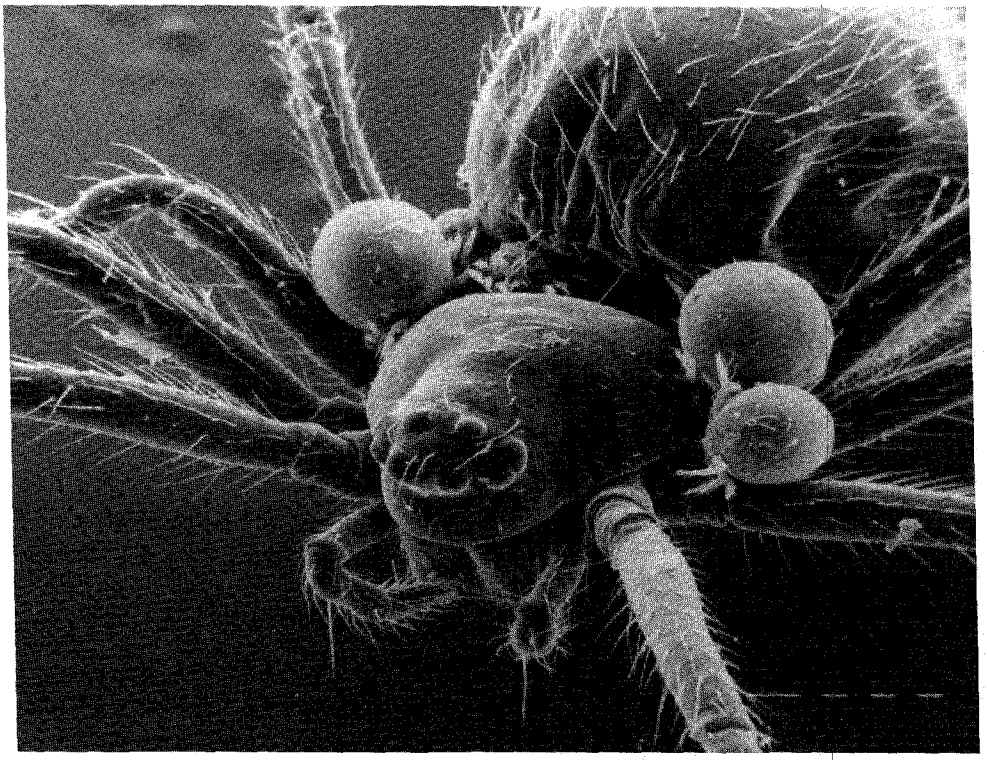


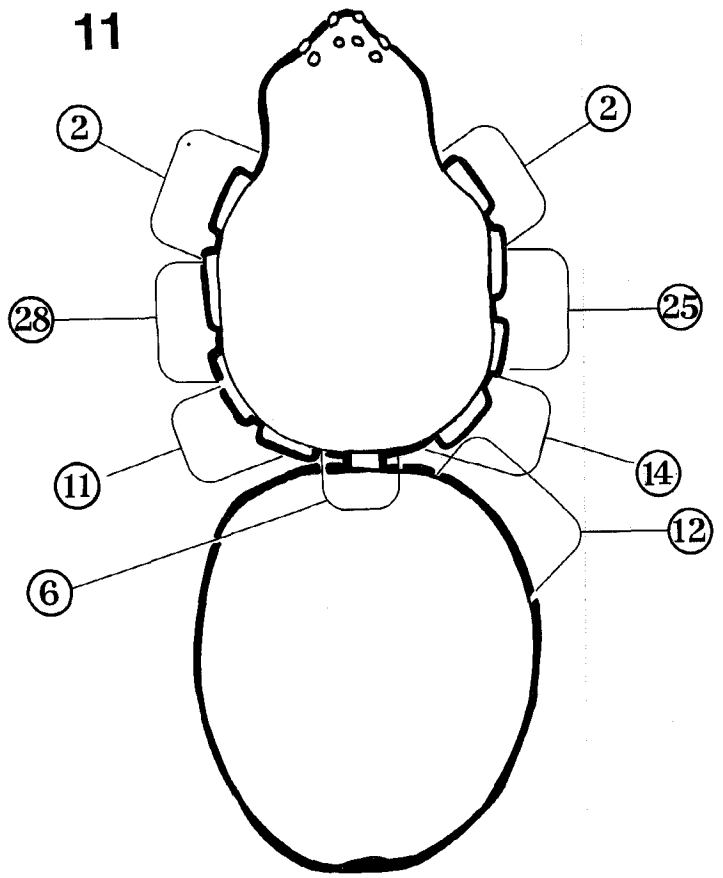
Fig. 9.—SEM micrograph of three larval *Eutrombidium lockleii* new species attached to prosoma of *Ceraticelus emertoni* (550x).

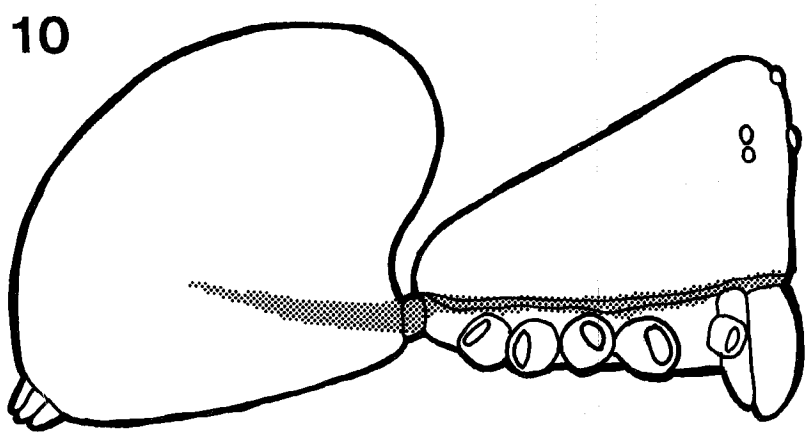
separation (molt sutures) (Fig. 10). This area on each side of the prosoma is also known as the pleuron, a soft and flexible region that allows the stiff carapace and sternum to move in relation to each other (*sic* "pleurae"; Foelix 1982). More than three-fourths of the mites were located in the median and posterior regions of the pleura (Fig. 11). Attachment to the pleura may be due both to relative ease of cheliceral penetration and to enhanced survivability during host molt.

SURVEY OF PARASITIC MITES ON SPIDERS

Spiders have a variety of parasites, with most internal forms in the insect orders Diptera, Hymenoptera, and Neuroptera (Eason et al. 1967). Other internal parasites include nematodes which, while rare, are present in a wide range of spiders (Poinar 1985). Mites, on the other hand, are found on the external surfaces and not all are parasitic. While relatively common on certain species (e.g., Parker and Roberts 1974), few mites are reported from spiders in general, perhaps due to difficulties in mite identification. The most frequently encountered mites are phoretic forms, which are usually deutonymphs of the mite suborder Astigmata and are not considered here.

Parasitic mites on spiders are reported infrequently, with most species protelean parasites of the prostigmatic cohort Parasitengona. Mites of one mesostigmatic genus have been reported as obligate parasites of spiders. Table 1 summarizes 38 records of parasitic mites associated with spiders of at least 18 families.





Figs. 10, 11.—Diagramatic views of *Ceraticelus emertoni*: Lateral, stippled area is the line of ecdysial separation, attachment area for most larvae of *Eutrombidium lockleii*, new species; dorsal circled numbers represent the percentage of mite attachments to each region.

The Trombidiidae account for 16 of the 32 protelean spider parasites, with 11 records of the Holarctic genus *Trombidium* (Fabricius) on European and North American spiders. Welbourn (1983) reported mites of 10 nominant species from 43 hosts and another 28 hosts with larvae of undetermined *Trombidium* species. Of these 71 host records, only four were spiders, suggesting that they are accidental hosts for these mites. All records of *Trombidium* from spiders involve ground strata forms which are more likely than arboreal forms to come in contact with the unengorged mite larvae.

Mites of two other closely related trombidiid genera have also been associated with spiders. In *Allothrombium*, adults of *A. lerouxi* Moss were reported to attack and kill a *Trochosa pratensis* (Emerton) (= *T. terricola* Thorell) spider in Canada (Moss 1960). The larvae of *Allothrombium* are most often reported from aphid hosts, but there are several records of other arachnid hosts including one from a spider. A second genus, *Clinotrombium* (Southcott), has two of three named species of mites reported as parasites of spiders in Australia (Southcott 1986). Michener (1946) reported *Allothrombium metae* Boshell and Kerr parasitizing *Pirata* spiders in Panama. Examination of Michener's reared specimens indicates that *A. metae* should be transferred to *Clinotrombium*, based on the position of the prodorsal trichobotria and PL setae [= *Clinotrombium metae* (Boshell and Kerr) *new combination*].

The second most reported group of mites parasitic on spiders is the Erythraeidae, accounting for 14 of the 32 records. Nearly half of these records are larvae of the cosmopolitan genus *Leptus* (Latreille). This genus contains approximately 90 named species whose larvae parasitize a wide variety of insect and arachnid hosts. Welbourn (1983) listed 78 arthropod hosts of 30 named *Leptus* species, and an additional 55 hosts of unidentified *Leptus*. From those 133 host records, only three species, *L. hidakai* Kawashima, *L. atticolus* Lawrence and *L. gifuensis* Kawashima, are known from spiders. *Leptus atticolus* and *L. gifuensis* are known only from the type hosts (spiders) in South Africa and Japan, respectively. *Leptus hidakai* was found on a spider as well as on opilionids in Japan (Kawashima 1958). Additional collecting and study is needed to determine if these *Leptus* species are restricted to spiders. The unidentified erythraeid, possibly *Leptus*, on *Diaea* sp. (Thomisidae) from New Zealand was pictured by Forster and Forster (1973) and represents the first record from New Zealand. While most protelean parasites are associated with ground-dwelling spiders, *Leptus* has been found on both aerial and ground-dwelling forms. Two species of *Charletonia* (Oudemans), *C. aranea* Southcott and *C. miyaxakii* (Kawashima), are known only from spiders in India and Japan, respectively, and two new records for the U.S.A. are listed in Table 1. All other species of *Charletonia* are primarily parasites of Orthoptera and other insects. *Lasioerythraeus* Welbourn and Young is a widespread genus in the New World which primarily parasitizes hemipterans, with one record from an immature spider in Mississippi (Young and Welbourn 1987). The new records from Chile (Table 1) represent the southernmost records for the genus.

The mesostigmatic family Laelapidae is a large and diverse group which includes free-living predators, arthropod and vertebrate parasites, and nest associates. Mites of the genus *Ljunghia* (Oudemans) are obligate parasites (non-protelean) of mygalomorph spiders in Indonesia and Australia (Domrow 1975). While all instars can be found on the host, their habits are unknown. This genus

Table 1.—Parasitic mites on spiders.

Parasite	Host	Country	Reference
PROSTIGMATA			
Erythraeidae			
Charletonia aranea Southcott	Araneae	India	Southcott 1966
C. miyazakii (Kawashima)	*Theridion* sp. (Theridiidae)	Japan	Kawashima 1958
C. sp.	Araneae	USA(IL)	NEW
	Philoponella oweni (Chamberlin) (Uloboridae)	USA(AZ)	NEW
Lasioerythraeus johnstoni Welbourn & Young	Linyphiidae	USA(MS)	Young & Welbourn 1987
L. sp.	Cybaeinae (imm.) (Agelenidae)	Chile	NEW
	Anyphaenidae (imm.)	Chile	NEW
Leptus atticolus Lawrence	*Saitis* sp. (Salticidae)	South Africa	Lawrence 1940
L. gifuensis Kawashima	*Lycosa* sp. (Lycosidae)	Japan	Kawashima 1958
L. hidakai Kawashima	*Chiracanthium* sp. (Clubionidae)	Japan	Kawashima 1958
L. ignotis (Oudemans)	*Pachygnatha clercki* Sundeval (Araneidae)	England	Parker 1962
L. sp.	*Pardosa* sp. (Lycosidae)	USA(CT)	Sorkin 1982
	Philodromus imbecillus Keyserling (Philodromidae)	USA(TX)	Cokendolpher et al. 1979
Undetermined genus	*Diaea* sp. (Thomisidae)	New Zealand	Forster & Forster 1973
Trombidiidae			
Allothrombium fuliginosum (Hermann)	*Lycosa amentata* (Clerck) (Lycosidae)	England	Parker 1965
Clinotrombium antares Southcott	Linyphiidae	Australia	Southcott 1986
C. bellator Southcott	Salticidae (imm.)	Australia	Southcott 1986
C. metae (Boshell & Kerr) (New Comb.)	*Pirata* sp. (Lycosidae)	Panama	Michener 1946
Trombidium poriceps (Oudemans)	*Araneus diadematus* Clerck (Araneidae)	Switzerland	André 1931
	Dolomedes fimbriatus Clerck (Pisauridae)	Netherlands	Oudemans 1912
	Linyphia sp. (Linyphiidae)	Netherlands	Oudemans 1897
	Nuctenea umbratica (Clerck) (Araneidae)	Switzerland	André 1931
	Zygiella x-notata (Clerck) (Araneidae)	Switzerland	André 1931
T. sp.	Araneae	Canada	Welbourn 1983
	Agelenopsis sp. (imm.) (Agelenidae)	USA(ME)	NEW
	Tegenaria domesticus (Clerck) (Agelenidae)	USA(ME)	NEW
	Clubiona moestra Banks (Clubionidae)	Canada	Welborun 1983
	Pardosa hortensis (Thorell) (Lycosidae)	Spain	Parker & Roberts 1974

	Phrurolithus minimus (Koch) (Clubionidae)	Spain	Parker & Roberts 1974
undetermined genus	*Neostothis gigas* Vellard (Barychelidae)	Brasil	Vellard 1934
Eutrombidiidae			
Eutrombidium lockleii, n.sp.	*Ceraticelus emertoni* (Cambridge) (Linyphiidae)	USA(MS)	NEW
	Oxyopes salticus Hentz (Oxyopidae)	USA(MS)	NEW
MESOSTIGMATA			
Laelapidae			
Ljunghia bristowi (Finnegan) (New Comb.)	*Liphistius malayanus* Abraham (Liphistiidae)	Malaysia	Finnegan 1933
L. hoggi Domrow	*Aganippe subtristis* Pick.-Camb. (Idiopidae)	Australia	Domrow 1975
L. pulleini Womersley	*Selenocsomia stirlingi* Hogg (Theraphosidae)	Australia	Womersley 1956
	Aname sp. (Nemesiidae)	Australia	Domrow 1975
L. rainbowi Domrow	Araneae	Australia	Domrow 1975
L. selenocsomiae Oudemans	*Selenocsomia javanensis* (Walck.) (Theraphosidae)	Indonesia (Sumatra)	Oudemans 1932

was reviewed by Domrow (1975), where he also redescribed *L. selenocosmiae* Oudemans from Indonesia. Another mesostigmatic mite from spiders originally named *Copriphis* (*Pelethiphis*) *bristowi* Finnegan from Malaysia was placed initially in the Eviphididae. Comparison of Finnegan's 1933 description with those of Oudemans (1932) and Domrow (1975) indicates that *C. bristowi* is close to *L. selenocosmiae* and should be transferred to *Ljunghia* [= *Ljunghia bristowi* (Finnegan) *new combination*].

ACKNOWLEDGMENTS

We appreciate the field and laboratory assistance of T. C. Lockley. Figures 1-5 were inked by P. Brown, Figs. 10 and 11 were prepared by T. C. Lockley. Scanning electron microscope micrographs were prepared by William E. Styre, Ohio State University Agricultural Research Development Center, Wooster, Ohio. Identification of the type host for the newly described species was provided by S. E. Riechert, with some spiders listed in Table 1 identified by N. Platnick, L. Sorkin, and D. T. Jennings. We thank B. M. O'Connor and D. R. Smith (Univ. of Michigan Museum of Zoology) for the *Charletonia* from an Arizona spider, and N. Platnick (Amer. Mus. Nat. Hist.) for the loan of Michener's Panama specimens. Travel funds for W. C. Welbourn to study Banks' material in the Museum of Comparative Zoology (Harvard University) were provided by NSF Grant BSR-8401206. The manuscript also benefited from the reviews of G. L. Bernon, W. A. Bruce, J. C. Cokendolpher, D. E. Johnston, E. E. Lindquist, J. C. Moser, and L. Sorkin.

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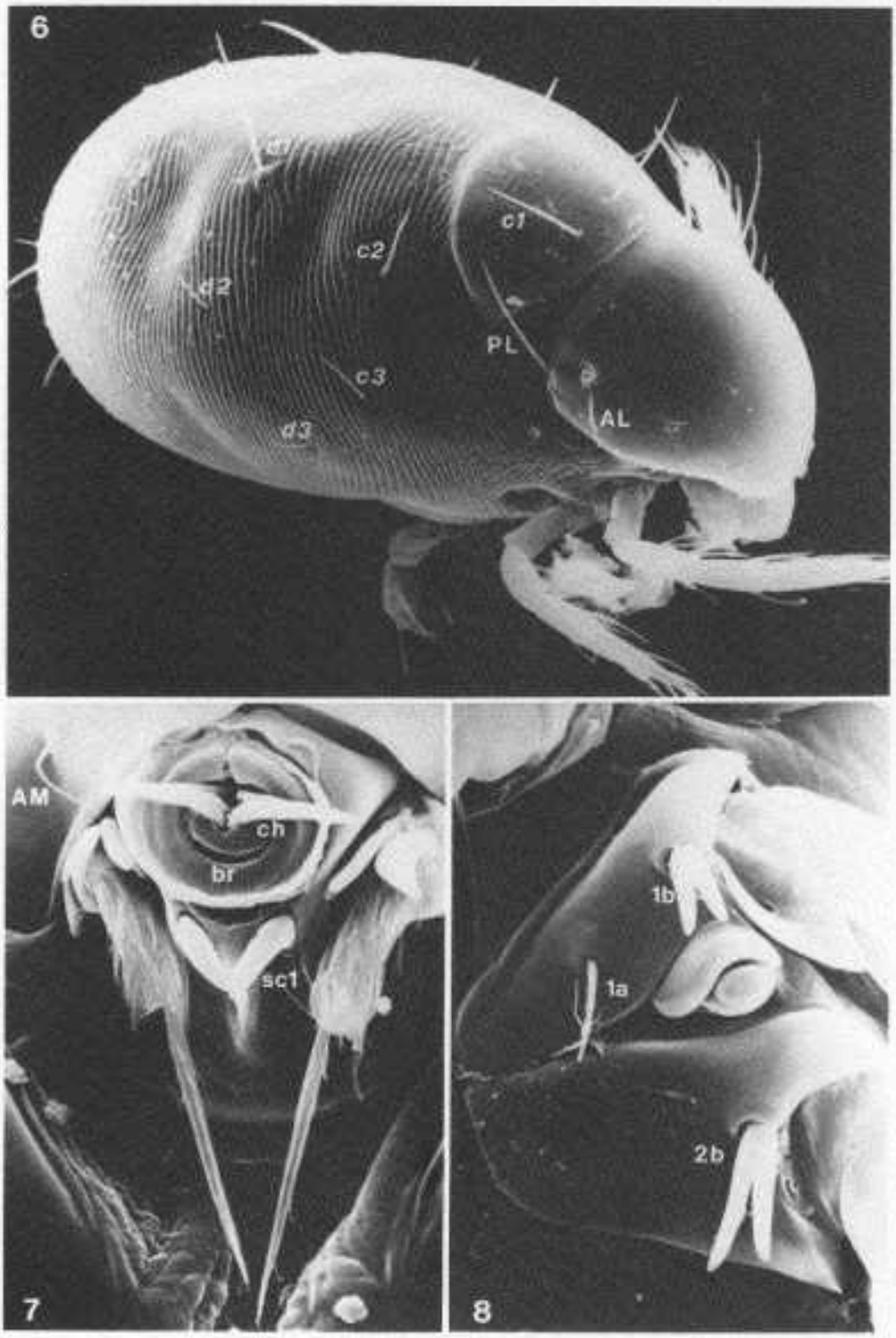
Manuscript received October 1987, revised June 1988.



Figs. 6-8.—*Eutrombidium lockleii*, new species: 6, Scanning electron microscope (SEM) micrograph of engorged paratype (300x); 7, SEM micrograph of ventral gnathosoma (1250x); 8, SEM micrograph of coxal fields legs I and II (1250x). See text for explanation of symbols.

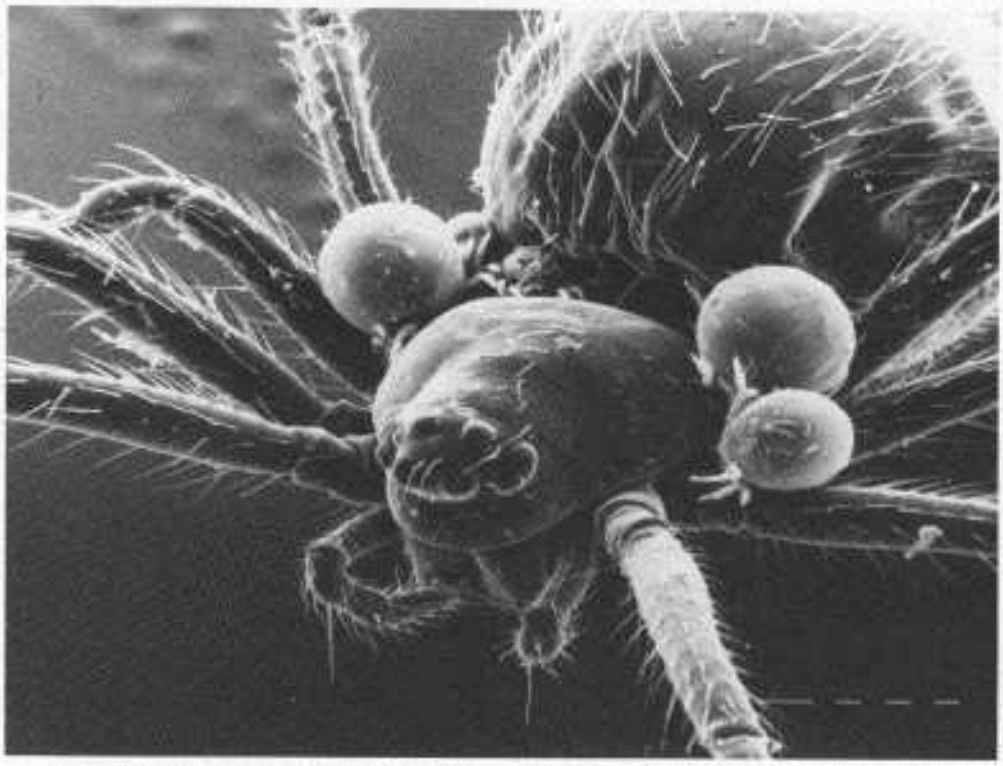


Fig. 9.—SEM micrograph of three larval *Eutrombidium lockleii* new species attached to prosoma of *Ceraticelus emertoni* (550x).

separation (molt sutures) (Fig. 10). This area on each side of the prosoma is also known as the pleuron, a soft and flexible region that allows the stiff carapace and sternum to move in relation to each other (*sic* "pleurae"; Foelix 1982). More than three-fourths of the mites were located in the median and posterior regions of the pleura (Fig. 11). Attachment to the pleura may be due both to relative ease of cheliceral penetration and to enhanced survivability during host molt.

SURVEY OF PARASITIC MITES ON SPIDERS

Spiders have a variety of parasites, with most internal forms in the insect orders Diptera, Hymenoptera, and Neuroptera (Eason et al. 1967). Other internal parasites include nematodes which, while rare, are present in a wide range of spiders (Poinar 1985). Mites, on the other hand, are found on the external surfaces and not all are parasitic. While relatively common on certain species (e.g., Parker and Roberts 1974), few mites are reported from spiders in general, perhaps due to difficulties in mite identification. The most frequently encountered mites are phoretic forms, which are usually deutonymphs of the mite suborder Astigmata and are not considered here.

Parasitic mites on spiders are reported infrequently, with most species protelean parasites of the prostigmatic cohort Parasitengona. Mites of one mesostigmatic genus have been reported as obligate parasites of spiders. Table 1 summarizes 38 records of parasitic mites associated with spiders of at least 18 families.