

spider may not feed to any extent on pests such as the larvae of the sorghum webworm, and may not be sufficiently effective to prevent damage by the greenbug.

LITERATURE CITED

- Bailey, C. L., and H. L. Chada. 1968. Spider populations in grain sorghums. *Ann. Entomol. Soc. Amer.* 61:567-71.
- Dondale, C. D. 1956. Annotated list of spiders (Araneae) from apple trees in Nova Scotia. *Can. Entomol.* 88:697-700.
- Eikenbary, R. D., and R. C. Fox. 1968. Arthropod predators of the Nantucket pine tip moth, *Rhyacionia frustrana*. *Ann. Entomol. Soc. Amer.* 61:1218-21.
- Peck, W. B., and W. H. Whitcomb. 1967. An adaptable method for rearing spiders and cannibalistic insects. *Turtax News.* 45:242-4.
- Warren, L. O., W. B. Peck, and M. Tadic. 1967. Spiders associated with the fall webworm, *Hyphantria cunea* (Lepidoptera: Arctiidae). *J. Kans. Entomol. Soc.* 40:382-95.
- Whitcomb, W. H. 1967. Field studies on predators of the second instar bollworm, *Heliothis zea* (Boddie) (Lepidoptera: Noctuidae). *J. Ga. Entomol.* 2:113-8.
- Whitcomb, W. H., and K. Bell. 1964. Predaceous insects, spiders and mites of Arkansas cotton fields. *Arkansas Agr. Exp. Sta. Bull.* 690. 84 p.
- Whitcomb, W. H., H. Exline, and R. C. Hunter. 1963. Spider of the Arkansas cotton fields. *Ann. Entomol. Soc. Amer.* 56:653-9.

6148 6

A NEW GENUS OF ALLODECTINE FEATHER MITES FROM HUMMINGBIRDS¹

CHONG K. PARK² AND WARREN T. ATYEO³

ABSTRACT

Schizodectes, new genus, with *Proctophyllodes* (*P.*) *fenestralis* Trouessart, 1885, as type species, is established and a new species, *S. hiterminalis* is described.

When the subfamily Alloodectinae was established (Park and Atyeo, 1971b), we were aware that Trouessart (1885) had described a bizarre species, *Proctophyllodes* (*P.*) *fenestralis*, from a South American hummingbird. The advisability of including this species in the original alloodectine paper was debated, but it was not until the recent discovery of a species related to *P. fenestralis* that we were sufficiently confident that both should be placed in the Alloodectinae.

¹ Acarina: Proctophyllodidae. Research supported in part by the Smithsonian Research Foundation and the National Science Foundation (GB-15105). Received for publication January 12, 1972.

² Division of Birds, National Museum of Natural History, Smithsonian Institution, Washington, D. C. 20560.

³ Department of Entomology, University of Georgia, Athens, Georgia 30601.

Except for the opisthosomata of the males, these two species are nearly identical to species of *Allodectes*. The specialized modifications of the male opisthosoma include widely separated terminal lobes, enlarged setae l_5 , and the unique positioning of setae *pa*e, each inserted on a ventral protuberance which may extend into the terminal cleft. *Allodectes* males have the opisthosomata tapering behind legs IV, setae d_3 enlarged, terminal lamellae small or rudimentary, and setae *pa*e laterally inserted. Further comparisons between the males of *Allodectes* and **Schizodectes**, new genus, must include the genital regions and associated setae.

Atyeo and Gaud (1971) recognized that the setae associated with the genital region and coxae IV were often difficult to homologize. The males of *Allodectes* and **Schizodectes** are good examples of two conditions in which the homologs can be determined. In the *Allodectes* males, the genital organ is situated approximately at the level of trochanters III, and immediately posterior to a transverse apodeme formed by the anterior epimerites of legs IV. The pair of setae anterior or lateral to the genital arch and the pair directly posterior are respectively, c_1 and c_2 . A third pair of setae inserted on or near the mesal terminations of the posterior epimerites of legs IV is of coxal origin and can be designated as cx_4 or c_3 . On the other hand, the genital organ in **Schizodectes** males is more posteriorly situated approximately at the level of the anterior articulations of legs IV and mesally to the posterior epimerites of legs IV. If chaetotaxal signatures were assigned according to the earlier system of Atyeo and Gaud (1966), the setae anterior to the genital arch would be c_1 , those lateral c_2 , and those posterior c_3 . In comparing *Allodectes* and **Schizodectes** species, however, the setae directly posterior to the genital arch in both groups would be homologous structures, that is, setae c_2 . The most anterior pairs in *Allodectes* and **Schizodectes** are obviously setae c_1 , and the remaining pair must be setae cx_4 or c_3 —on the inner margins of coxae IV in *Allodectes* and on the anteromesal terminations of the posterior epimerites of legs IV in **Schizodectes**. The juxtapositioning of the genital setae, coxal setae cx_4 , the genital organ and discs is explainable. In the *Allodectes*-**Schizodectes** complex it is possible to think that setae c_1 and cx_4 are relatively stable in position and that a structural unit composed of the genital organ, genital discs and setae c_2 has varying positions. In *Allodectes* the unit is anteriorly situated between setae c_1 and distant from setae cx_4 ; in **Schizodectes** the unit is more posteriorly situated, distant from setae c_1 and between the coxal setae of legs IV.

Before comparing the two species assigned to the genus **Schizodectes**, unique structures of *S. fenestralis* should be discussed. The males of this species have large posterolateral flanges, each of which represents an expansion of the lateral body wall and is bent sharply ventrad to cover the base of a lamella and the insertions of the anal and external postanal setae. One of our study specimens has a flange exposed so the structure could be easily examined. As illustrated in

figure 3, the posterior margin is cleft, the outer margin of the cleft has developed as a small hook, and a seta is dorsally inserted on the inner margin. This seta, the lateral member of the fourth row of dorsal hysterosomal setae (l_4) now positioned away from the opisthosomal margin, tends to support the idea that the opisthosoma has been expanded laterally rather than developed as simple outgrowth from the body wall. It would appear that the flanges could serve as a pair of claspers to hold the tritonymph or adult female during copulation.

The males of *S. fenestralis* and *S. hiterminalis*, new species, appear similar in that both have large and widely separated terminal structures forming a large terminal cleft. However, in *S. fenestralis*, this appearance is due to the short lobes bearing large leaflike lamellae; in *S. hiterminalis*, the bilobed condition is not dependent on lamellar development but on the lengthening of structures bearing the posterior setae. The terminus of each has evolved toward the same type of functional unit, but through different types of modifications. In *S. fenestralis*, setae pa_1 and d_5 are inserted near the same level, and l_4 and l_5 are inserted at another level; these two levels are close together. In *S. hiterminalis*, there has been an increase in the distance between the two groups of setae as a result of an increase in the lobe length.

To broaden the concept of the subfamily Allodectinae and to include *Schizodectes*, the new definition would be: Proctophyllodid mites with well-developed dorsal and ventral shields, with setae sR on trochanters III long spiculiform (not hairlike). Idiosomal dorsum with all setae present except vi , rarely ve ; setae d_2, l_2, d_3, l_3, l_4 in linear arrangement along margins of hysterosomal shield; male with one pair of long terminal setae (d_5 in *Allodectes*, l_5 in *Schizodectes*) and with metapodosomal shields present. Idiosomal venter with well-developed coxal shields; epimerites I parallel (not connected); female with large pregenital apodeme weakly connected to shortened epimerites of posterior legs. Legs with femorogenua articulation partially fused; legs IV slightly enlarged in males; with tarsi IV having hooklike dorsodistal extension in males; solenidia σ_1 on genua I and III present; σ_1 longer than σ_3 on legs I; setae ba, s, p, q absent; setae wa, la, va approximate on tarsi I-II. Restricted to birds of the Trochilidae.

Family Proctophyllodidae

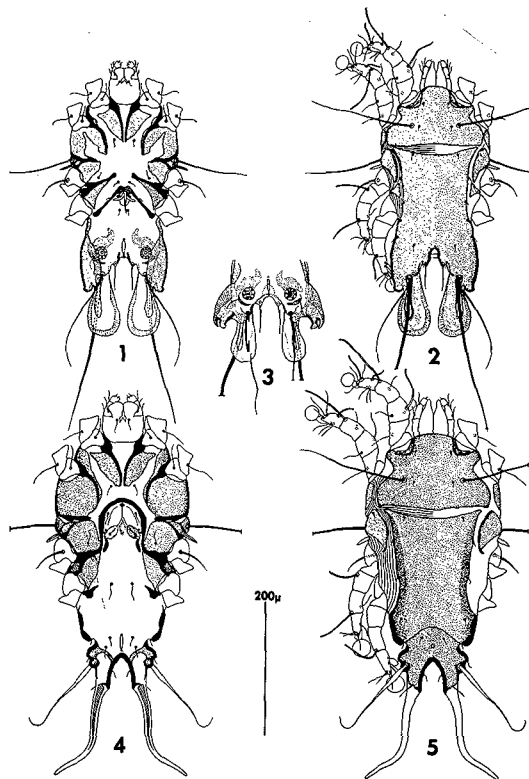
Subfamily Allodectinae

Schizodectes, new genus

Type species: *Proctophyllodes* (*P.*) *fenestralis* Trouessart, 1885.

Derivation: Contraction of *schizo*, cleave, split + *Allodectes*; masculine.

Diagnosis: Allodectine mites restricted to the Trochilidae. Males with gnathosoma and prosoma as in *Allodectes*; hysterosoma more or less parallel sided; terminus with broad cleft formed by lobar extensions or extensive lamellae; genital organ between anterior articulations of



FIGS. 1-5. *Schisodectes fenestratis* (Trouessart): ventral and dorsal aspects of male (1, 2), exposed opithosomal flanges (3), ventral and dorsal aspects of female (4, 5).

legs IV; setae cx_4 ($=c_3$ of authors) lateral to genital organ and between levels of setae c_1 and c_2 ; setae pa_e inserted on ventral protuberances, often directed into terminal cleft; setae a posterolateral to adanal discs; setae d_5 small, l_5 greatly enlarged; adanal discs with several heavily sclerotized papilliform dentations. Female similar to *Allodectes*.

Schizodectes fenestralis (Trouessart), new combination

Figs. 1-5

Proctophyllodes (*P.*) *fenestralis* Trouessart, 1885, Bull. Soc. Etud. Sci. Angers, 14:77-78.

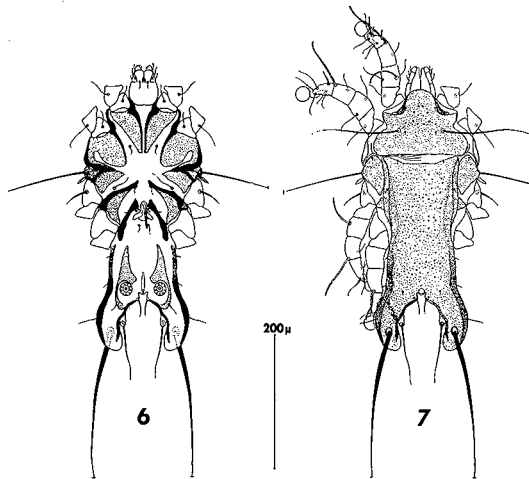
Proctophyllodes fenestralis, Poppe, 1888, Abh. Naturwiss. Ver. Bremen, 10:224.

Alloptes fenestralis, Canestrini and Kramer, 1899, Tierreich, 7:110; Vitzthum, 1922, Arch. Naturgeschichte, A, 88(5):53; Radford, 1953, Parasitol., 42(3, 4):213; Radford, 1958, Revt. brs. Entomol., 8:143; Atyeo and Braasch, 1966, Bull. Univ. Nebraska St. Mus., 5:313.

MALE (lectotype). Length, 406μ (including terminal lamellae); width, 165μ . Propodosomal shield 90μ in length, 145μ in width; without lacunae; external scapular setae separated by 70μ , internal scapular setae by 45μ . Scapular shields present. Hysterosomal shield 280μ in length, 132μ in width; without lacunae; with metapodosomal shields; terminal cleft 119μ in length. Ventral idiosoma with epimerites I free; coxal fields I-IV open; genital organ 33μ in length, extended to level of setae c_2 ; adanal disc 19μ in diameter, separated center-to-center by 65μ , with seven papilliform dentations; anal shields weakly sclerotized, not extended rostrad to level of posterior articulations of legs IV. Setae: sh , $23\mu \times 3\mu$, blade-like; d_5 , 48μ in length, simple; l_5 , approximately 320μ in length; d_2 and d_4 in trapezoidal arrangement; d_4 nearly at level of l_5 ; sR , $43\mu \times 2\mu$. Tarsi IV not extended to level of setae pa_e ; solenidion ϕ on tibia IV shorter than ϕ on tibia III; σ_1 subequal to ϕ on leg III.

FEMALE (paralectotype). Length, 430μ (excluding terminal appendages); width, 210μ . Propodosomal shield 114μ in length, 172μ in width; without lacunae; external scapular setae separated by 90μ , internal scapular setae by 60μ . Scapular shields present. Hysterosomal shield 271μ in length, 145μ in width; with lacunae; terminal cleft inverted V-shaped, 45μ in length; terminal lobes freely articulated to anterior opisthosoma; terminal appendages arising at apices of lobes. Ventral idiosoma with epimerites I free. Setae: sh , $26\mu \times 5\mu$, blade-like; d_5 , 26μ in length; l_5 , 156μ in length; d_2 and d_4 in trapezoidal arrangement; pa_i inserted at level of midlength of terminal cleft; sR , $48\mu \times 3\mu$; solenidion ϕ on tibia IV subequal to ϕ on tibia III; σ_1 slightly shorter than ϕ on leg III.

TYPE DATA. From *Coeligena* ($=$ *Helianthea*) *bonapartei* (Boissoneau), 1840: ♂ lectotype, 1 ♂, 2 ♀ paralectotypes, Nouvelle



FIGS. 6-7. *Schizodectes hiterminalis*, new species: ventral and dorsal aspects of male (6, 7).

Granada, no other data known. The types are deposited in the Trouessart Collection, Paris.

ADDITIONAL MATERIAL. From *C. bonapartei*: 7 ♂♂, 1 ♀, Bogotá Collection, Colombia, other data unknown.

REMARKS. The original assignment of this species to the subgenus *Proctophyllodes* is obvious from illustrations. The large terminal lamella-like extensions of the male are typical for many of the known species of *Proctophyllodes* in 1885. In Trouessart's slide, there appeared to be a thin layer of air trapped between the large posterior setae and the dorsal surfaces of the lamella-like extensions; this apparent aberration created a clear area or *fenestra*. When the specimens were remounted, the clear area was still present, but it could be seen that an area of each lamella-like extension immediately ventral to setae l_5 was uniquely thinned and unpigmented thus creating a broad, shallow groove in which the proximal portion of these setae would lie. Although retained in *Alloptes*, the affinities of this species with *Pterodectes*

(*s. l.*) rather than with *Proctophylloides* or *Alloptes* was mentioned by Atyeo and Braasch (1966). Since 1966, the family Proctophylloidae (*s. l.*) has been reviewed and new subfamilies created, including Pterodectinae and Alloedectinae (Park and Atyeo, 1971a, 1971b).

HOST RANGES. For *C. bonapartei*: "Temperate zone of the western slopes of the Eastern Andes of Colombia" (Peters, 5:101).

Schizodectes hiterminalis, new species

Figs. 6-7

MALE (holotype). Length, 432 μ ; width, 182 μ . Propodosomal shield 100 μ in length, 145 μ in width; with several lacunae; external scapular setae separated by 67 μ , internal scapular setae by 48 μ . Scapular shields present. Hysterosomal shield 290 μ in length, 140 μ in width; with lacunae; with metapodosomal shields; terminal cleft 87 μ in length. Ventral idiosoma with epimerites I free; coxal fields I-IV open; genital organ 40 μ in length, extended to level of setae c_3 ; adanal discs 20 μ in diameter, separated center-to-center by 55 μ ; anal shields extended rostrad to level of posterior articulations of trochanters IV. Setae: sh , 23 $\mu \times 4\mu$, blade-like; d_5 , 30 μ in length, simple; l_5 , approximately 355 μ in length; d_2 and d_4 in trapezoidal arrangement; d_4 nearly at level of l_3 ; sR , 44 $\mu \times 2\mu$. Tarsi IV not extended to level of setae pa_2 ; solenidion ϕ on tibia IV shorter than ϕ on tibia III; σ_1 shorter than ϕ on leg III.

FEMALE. Unknown.

TYPE DATA. From *Phaethornis superciliosus muelleri* Hellmayr, 1911: δ holotype, Belém, Pará, Brazil, April 5-9, 1963, P. S. Humphrey. From *P. a. anthophilus* (Bourcier), 1843: 1 δ paratype, Petrólea, Norte del Santander, Colombia, July 19-29, 1943, M. A. Carriker, Jr. The holotype is deposited in the National Museum of Natural History; the paratype is deposited in the University of Georgia.

REMARKS. The name *hiterminalis* is given referring to the broad terminus of the male of this species (*hio*, broad + *terminalis*).

HOST RANGES. For *P. superciliosus muelleri*: "Northern Brazil south of the Amazon from the right bank of the Tapajóz to the vicinity of Belém (Peters, 5:10). For *P. a. anthophilus*: "Tropical zone of northern Colombia and western Venezuela" (Peters, 5:11).

LITERATURE CITED

- Atyeo, Warren T., and Norman L. Braasch. 1966. The feather mite genus *Proctophylloides* (Sarcoptiformes: Proctophylloidae). Bull. Univ. Nebraska St. Mus., 5:1-354.
- Atyeo, Warren T., and J. Gaud. 1966. The chaetotaxy of sarcoptiform feather mites (Acarina: Analgoidea). J. Kansas Entomol. Soc., 39:337-346.
- . 1971. Comments on nomenclatural systems for idiosomal chaetotaxy of sarcoptiform mites. J. Kansas Entomol. Soc., 44:414-419.
- Canestrini, G., and P. Kramer. 1899. Demodicidae und Sarcoptidae. Das Tierreich, 7:107-193.
- Park, Chong K., and Warren T. Atyeo. 1971a. A generic revision of the

- Pterodectinae, a new subfamily of feather mites (Sarcoptiformes: Analgoidea). Bull. Univ. Nebraska St. Mus., 9(3):39-88.
- . 1971b. The species of a new subfamily of feather mites, the Alloedectinae (Acarina: Proctophyllodidae). Redia, in press.
- Peters, James Lee. 1945. Check-list of birds of the world, 5:1-306. Harvard Univ. Press, Cambridge.
- Poppe, S. A. 1888. Über parasitische Milben. Abh. Naturwiss. Ver. Bremen, 10:205-240.
- Radford, Charles D. 1953. The mites (Acarina: Analgesidae) living on or in the feathers of birds. Parasitology, 42(3, 4):199-230.
- . 1958. The host-parasite relationships of the feather mites (Acarina: Analgesoidea). Revt. hrs. Entomol., 8:107-170.
- Trouessart, E. L. 1885. Note sur la classification des Analgésiens et diagnoses d'espèces et de genres nouveaux. Bull. Soc. Etud. sci. Angers, 14:46-91.
- Vitzthum, H. G. 1922. Acarologische Beobachtungen. 6. Reihe. Die Gattung *Proctophylloides* Robin 1868. Arch. Naturgeschichte, A, 88(5):1-86.

NOTES ON THE BEHAVIOR AND ECOLOGY OF THE MANTISPID, *CLIMACIELLA BRUNNEA* *OCCIDENTALIS*¹

S. W. T. BATRA²

ABSTRACT

This usually rare mantispid was locally abundant during 1968 on thistles in Cache Valley, Utah, where it may mimic *Polistes fuscatus utahensis*. It ate various insects, thistle sap, and honey. Females lived as long as 43 days and laid up to 3,334 eggs. Courtship by the males includes an elaborate visual display and the production of a distinct odor. The agile larvae preferred *Bombus morrisoni* to other insects and spiders tested. Courtship, mating, oviposition and larval behavior are described.

Members of the Mantispidae are rarely encountered (Hungerford, 1936); however, adults of the species *Climaciella brunnea occidentalis* (Banks) were locally abundant during the summer of 1968 at Providence Canyon in Cache Valley, Cache Co., Utah. An unusual opportunity to observe the behavior of this species was thus provided. Although it was abundant in 1968 (about 30 individuals observed in the field and 20 collected between mid-June and mid-August), only five mantispids were seen during the same period in 1969 (at Providence and Green canyons).

An examination of specimens from Cache Valley in the entomological museum of Utah State University showed that relatively large collec-

¹ Neuroptera: Mantispidae. Received for publication July 23, 1971.

² 2-Q Plateau Place, Greenbelt, Maryland 20770.