

New Host Associations for New World Spider Wasps (Hymenoptera: Pompilidae)

JOSEPH S. WILSON AND JAMES P. PITTS

Department of Biology, Utah State University, 5305 Old Main Hill,
Logan, Utah 84322
e-mail: jpitts@biology.usu.edu

ABSTRACT: A new host association is made for the Neotropical spider wasp *Priochilus gloriosum gloriosum* Cresson, which also represents the first host association for this genus. A new host association also is made for *Aporinellus fasciatus* Smith and additional host associations are provided for *Ageniella conflicta* Banks, *Ageniella (Ameragenia) nr. fabricii* Banks, *Ageniella (Alasagenia) sp. A*, *Cryptochilus attenuatum* Banks, *Priocnemella sp. A*, *Agenioideus birkmanni* Banks, *Ammosphex silvivagus* Evans, *Anoplius imbellis* Banks, and *Tachypompilus ferrugineus ferrugineus* Say. Host transportation behaviors are reported where observations were made.

KEY WORDS: Agelinidae, Ctenidae, Lycosidae, Pisauridae, Salticidae, Thomisidae

Spider wasps (Hymenoptera: Pompilidae) exhibit variation in many interesting behaviors in host selection and host transport, as well as in nest construction. Many authors have described these behaviors (including Evans, 1951a, 1951b; Evans and Yoshimoto, 1962; Krombein, 1979; Kurczewski, 1961, 1962, 1963, 1975, 1981), but little attention has been given to the activities of these wasps in recent years. Where known, many spider wasps seem to demonstrate a some degree of host specificity (Evans and Yoshimoto, 1962), which is either taxonomically or ecologically based (Wasbauer, 1995), and show several distinct forms of host transportation. Spider wasps may be good subjects for future behavioral evolution studies. However, in many parts of the world, including western North America, few host associations have been made and little is known about species-specific behaviors. Here we present host associations and, where available, descriptions on host transportation behaviors for eleven pompilid species in nine genera.

Materials and Methods

All spider wasp and spider specimens were collected by hand. Spider specimens are preserved in alcohol or were pinned along with the wasp. In order to compare the size of the spider wasps to their hosts, each wasp specimen and its host were measured. The length of the cephalothorax was measured for each spider using an ocular micrometer. The abdominal length, however, becomes distorted in preserved spider specimens and is not reported. The combined length of the wasp's head, mesosoma, and metasoma were measured in lateral view using an ocular micrometer.

Recorded behaviors were observed in the field prior to collection of the spider wasp and host. All spider wasp and spider specimens were identified by JPP using Carico (1972, 1973, 1976); Dondale and Redner (1978); Evans (1950, 1951a, 1951b, 1966, 1973); Platnick (2005); Schick (1965) and Ubick *et al.* (2005). Specimens are

housed in the Department of Biology Insect Collection at Utah State University, Logan, UT (EMUS) or in the Rocky Mountain Systematic Entomology Laboratory, University of Wyoming, Laramie, Wyoming (ESUW).

PEPSINAE

Ageniella conflicta Banks

Host: Lycosidae

Collection data: USA, TX, La Salle Co., Chaparral Wildlife Management Area 20 May 2006, K.A. Williams (EMUS).

This 7.1 mm long spider wasp was observed carrying an immature lycosid spider with the spider's venter up as it ran across an open sandy area. Because the spider is immature, it can not reliably be identified to species. The spider's cephalothorax measured 2.1 mm in length. The four hind legs of the spider were amputated along with the left foreleg. Although hosts are not known from all *Ageniella* species, it is thought that nearly all members of *Ageniella* amputate the legs of their host and carry the spider ventrally (Townes, 1957), and Evans and Shimizu (1996) have suggested that leg amputation occurs in virtually all Ageniellini. This species is reported to also use other lycosid species including various *Trochosa* species, as well as *Arctosa littoralis* Hentz, *Pardosa valens* Barnes and a variety of *Lycosa* species (Krombein, 1979). These host records suggest that *A. conflicta* potentially is a specialist on lycosids.

Ageniella (Alasagenia) sp. A

Host: *Dolomedes* sp. (Pisauridae)

Collection data: Costa Rica, Alajuela, ACA Arenal, R.B. San Ramon, Est. San Ramon, 17 July 1998, S. Dadelahi (ESUW).

This 15.4 mm long spider wasp was collected while grasping an immature female *Dolomedes*, probably by the coxae. The spider's cephalothorax measured 6.1 mm in length. The spider's legs had not been amputated, which is of interest given that nearly all members of *Ageniella* are expected to amputate the legs of their host. There is only one previous record of an *Ageniella* transporting a spider without amputating its legs (*Ageniella anconis*: Kimsey, 1980). This represents the first host record for the subgenus *Alasagenia*.

This wasp is undescribed, but it can be separated from other Costa Rican *Ageniella* by the following characters; flagellomeres three through six are white, the metasoma is rufous, and the clypeus is tridentate.

Ageniella (Ameragenia) sp. near *fabricii* Banks

Host: Salticidae

Collection data: Costa Rica, Alajuela, Bijagua, 20 km S. Upala, 1 Nov. 1990, F.D. Parker (EMUS).

The spider wasp measured 5.3 mm in length and the spider's cephalothorax measured 2 mm in length. The spider's legs had not been amputated. This is the third record of an *Ageniella* transporting a spider without amputating its legs, and suggests that the prey transport behavior is more variable than previously thought. The wasp was dragging the immature salticid by the tarsus of its leg. To our knowledge this is the first record of a member of the subgenus *Ameragenia* using salticids. Other *A. (Ameragenia)* species reportedly use clubionids (Krombein, 1979).

Although this spider wasp is undescribed, it can be easily recognized by coloration of the clypeus and mesosoma, which are red, and the head and metasoma, which are black. Also, the legs are black dorsally, but yellowish ventrally. The forewing is hyaline with two transverse infuscated bands; one located centrally and the other in line with the stigma.

Cryptochilus attenuatum Banks

Host: *Novalena* sp. (Agelinidae)

Collection data: USA, TX, Cameron Co., Bensten Rio Grand State Park, 22 May 2006, K.A. Williams & J.S. Wilson (EMUS).

This 11.2 mm long spider wasp was seen flying low through tall grass pursuing an immature female *Novalena* sp. The wasp caught the spider and grappled with it; the stinging behavior was not observed because the wasp was obscured by tall grass. Soon after the spider was immobilized, the wasp was seen dragging the spider backwards through the grass by grasping its chelicerae. At this point the wasp and spider were collected. The spider's cephalothorax measured 5.6 mm in length. This wasp is known to use a variety of immature *Lycosa* species (Krombein, 1979). To our knowledge this represents the first record of *C. attenuatum* using a spider outside of the family Lycosidae. This suggests that *C. attenuatum* may not be a lycosid specialist. This is particularly interesting because the behavior required for hunting lycosids, which are generally wandering or burrowing spiders, would be different than the behavior required to capture agelinids out of their funnel webs.

Priocnemella sp. A

Host: immature *Tinus* sp. (Pisauridae)

Collection data: Costa Rica, Guanacaste, Finca Montezuma, 3 km SE Rio Naranjo, 18 Nov. 1991, F.D. Parker (EMUS).

The spider wasp measured 9.6 mm in length, while the spider's cephalothorax is 4.7 mm in length. The genus *Priocnemella* is another member of Ageniellini and is expected to amputate the legs of its prey (Evans and Shimizu, 1996). For this case, all of the spider's legs were amputated at the coxae. Only one other host record exists for the genus; a specimen of *P. rufothorax* (Banks) was collected carrying an *Acanthoctenus* sp. (Ctenidae), but the spider's legs were not amputated (Kimsey, 1980).

Although this wasp is undescribed, it can be recognized from the other Costa Rican *Priocnemella* by coloration. This spider wasp has a black body with golden setae, which is especially dense on the dorsum of the mesosoma giving the wasp an olive hue. The wings are yellowish with an infuscated central band and the apex also is infuscated.

POMPILINAE

Agenioideus birkmanni Banks

Host: *Schizocosa* sp. (Lycosidae)

Collection data: USA, NM, Hidalgo Co., Granite Gap, 20 July 2006, J.P. Pitts and K.A. Williams (EMUS).

This 6.5 mm long spider wasp was observed dragging a lycosid backwards by holding the spider by its chelicerae. The right front two legs of the spider were

missing. The cephalothorax of the spider was 3.2 mm in length. This pompilid species has been reported to prey on *Herpyllus vasifer* Walckenaer (Gnaphosidae) (Krombein, 1979), and *Platycryptus undatus* DeGeer (Salticidae) (Kurczewski and Spofford, 1986). These host records suggest that *A. birkmanni* is a generalist hunter on non-web building spiders.

Aporinellus fasciatus Smith

Host: *Misumenoides formosipes* Walckenaer (Thomisidae)

Collection data: USA, TX, Ward Co., Monahan's Sand Hills State Park, 25 May 2006, K.A. Williams (EMUS).

This 6.0 mm long spider wasp was found dragging an individual *M. formosipes* backwards by grasping the spider by its chelicerae. The cephalothorax of the spider measured 2.5 mm in length. This represents the first host association for this species. Other members of this genus have been reported to use salticids (Krombein, 1979).

Ammosphex silvivagus Evans

Host: Lycosidae

Collection data: USA, AZ, Cochise Co., Southwestern Research Station, 27 July 2006, J.S. Wilson (EMUS).

This 10.5 mm long spider wasp was first observed dragging an immature lycosid off of a rock, falling about 20 cm onto an open soil patch. The spider was placed outside of the entrance to the wasp's burrow, which was approximately 5 mm in diameter. The spider wasp then entered the burrow head first. Approximately 5 sec after entering the burrow the wasp emerged head first, grasped the spider by the spinnerets, and pulled it backwards into the burrow. The wasp and spider were collected at this time. The cephalothorax of the spider measured 3.7 mm in length. Another closely related species *A. solonus* (Banks) uses lycosid spiders as well (Krombein, 1979).

Anoplius imbellis Banks

Host: *Xysticus* sp. (Thomisidae)

Collection data: USA, NV, Washoe Co., Reno, Hidden Valley, 15 April 1997, F.D. Parker (EMUS).

This 9.7 mm long spider wasp was collected with a mature female *Xysticus* sp. (Thomisidae). The spider's cephalothorax measured 2.8 mm in length. *Anoplius imbellis* reportedly uses a variety of lycosid spiders including *Trochosa avara* Keys and an *Arctosa* sp., as well as various *Pardosa* species (Krombein, 1979). This apparently represents the first record of *A. imbellis* using a spider outside of the family Lycosidae. The use of this thomisid, however, should not be entirely surprising because *Xysticus* species, like many lycosids, are wandering spiders that are often found among grass roots and in leaf litter (Ubick *et al.*, 2005).

Priochilus gloriosum gloriosum Cresson

Host: Ctenidae, probably *Ctenus* sp.

Collection data: ECU, Napo province, Misahualli, Misahualli Jungle Lodge, juncture of the Napo and Misahualli rivers, 23 June 2006, J.S. Wilson & L.E. Wilson (EMUS).

A 17.1 mm long spider wasp was seen dragging an immature ctenid backwards up a twig by the spider's foreleg. The spider wasp and spider were collected as they reached a height of about 0.6 m. The cephalothorax of the spider measured 5.4 mm in length. This represents a new host association for the genus. Nesting in this genus is unique among the spider wasps; observations, based on of *P. g. gloriosum* and *P. regius* (Fabricius), have shown that leaf pieces are used to make nest cells under tree bark and in palm fronds (Williams, 1928).

Tachypompilus ferrugineus ferrugineus Say

Host: Ctenidae

Collection data: Costa Rica, Alajuela, Bijagua, 20 km S. Upala, 12 Feb. 1990, F.D. Parker (EMUS).

The spider wasp measured 15.8 mm in length and this mature female ctenid's cephalothorax measured 5.2 mm. This spider wasp species has been reported to prey on lycosids and pisaurids (Krombein, 1979). This is apparently the first host record of *T. f. ferrugineus* using a ctenid. This is not unexpected because all of these spiders have similar natural histories (Ubick *et al.*, 2005).

Acknowledgments

We are grateful to Frank Parker, Erik Pilgrim, Kevin Williams, and Lindsey Wilson for specimens and to Scott Shaw for loan of specimens. We thank Dr. Wilford Hansen for funds that enabled JSW to travel to Ecuador where the *Priochilus* host association was made. This research was supported by the Utah Agricultural Experiment Station, Utah State University, Logan, Utah. Approved as journal paper no. 7844.

Literature Cited

- Carico, J. E. 1972. The Nearctic spider genus *Pisaurina* (Pisauridae). *Psyche* 79:295–310.
- Carico, J. E. 1973. The Nearctic species of the genus *Dolomedes* (Araneae: Pisauridae). *Bulletin of the Museum of Comparative Zoology* 114:435–488.
- Carico, J. E. 1976. The Nearctic spider genus *Timus* (Pisauridae). *Psyche* 83:63–78.
- Dondale, C. D., and J. H. Redner. 1978. The Crab Spiders of Canada and Alaska (Araneae: Philodromidae and Thomisidae). *The Insects and Arachnids of Canada, Part 5. Agricultural Canada Publication* 1663:255.
- Evans, H. 1950. A taxonomic study of the Nearctic spider wasps belonging to the tribe Pompilini (Hymenoptera: Pompilidae). Part 1. *Transactions of the American Entomological Society* 75:133–270.
- Evans, H. 1951a. A taxonomic study of the Nearctic spider wasps belonging to the tribe Pompilini (Hymenoptera: Pompilidae). Part 2. Genus *Anoplius* Dufour. *Transactions of the American Entomological Society* 76:207–361.
- Evans, H. 1951b. A taxonomic study of the Nearctic spider wasps belonging to the tribe Pompilinae (Hymenoptera: Pompilidae). Part 3. *Transactions of the American Entomological Society* 77:203–340.
- Evans, H. 1966. A revision of the Mexican and Central American spider wasps of the subfamily Pompilinae (Hymenoptera: Pompilidae). *Memoirs of the American Entomological Society* 20:1–442.
- Evans, H. 1973. Studies on Neotropical Pompilidae (Hymenoptera). IX. The genera of Auplopodini. *Psyche* 80:212–226.
- Evans, H. E., and C. M. Yoshimoto. 1962. The ecology and nesting behavior of the Pompilidae (Hymenoptera) of the Northeastern United States. *Miscellaneous Publications of the Entomological Society of America* 3:67–119.

- Kimsey, L. S. 1980. Notes on the biology of some Panamanian Pompilidae, with a description of a communal nest (Hymenoptera). *Pan-Pacific Entomologist* 56:98–100.
- Krombein, K. V. 1979. Pompilidae. In K. V. Krombein, P. D. Hurd, Jr, D. R. Smith, and B. D. Burks (eds.). *Catalog of Hymenoptera in America North of Mexico*, pp. 1523–1570. Smithsonian Institution Press, Washington, DC. 2735 pp.
- Kurczewski, F. 1961. Some observations and prey records of Pompilidae (Hymenoptera) from Northeastern United States. *Brooklyn Entomological Society Bulletin* 56:23–24.
- Kurczewski, F. 1962. Observations, including new prey records, of some Nearctic Pompilidae (Hymenoptera). *Brooklyn Entomological Society Bulletin* 57:85–90.
- Kurczewski, F. 1963. Some new pompilid prey records from southern Florida (Hymenoptera: Pompilidae). *The Florida Entomologist* 46:209–213.
- Kurczewski, F. 1975. Host records for some species of Pompilidae from the Southwestern United States and Mexico (Hymenoptera). *The Pan Pacific Entomologist* 51:147–151.
- Kurczewski, F. 1981. Observations on the nesting behaviors of spider-wasps in southern Florida (Hymenoptera: Pompilidae). *The Florida Entomologist* 64:424–437.
- Kurczewski, F., and M. Spofford. 1986. Observations on the behaviors of some Scoliidae and Pompilidae (Hymenoptera) in Florida. *The Florida Entomologist* 69:636–644.
- Platnick, N. I. 2005. *The World Spider Catalog, Version 5.5*. American Museum of Natural History. Previously on-line at: <http://research.amnh.org/entomology/spiders/catalog/index.html>. Version 7.5, dated 2007, is available at this URL. [Last accessed: 18 April 2007].
- Schick, R. X. 1965. The crab spiders of California (Araneida, Thomisidae). *Bulletin of the American Museum of Natural History* 129:1–180.
- Townes, H. K. 1957. Nearctic wasps of the subfamilies Pepsinae and Ceropalinae. *U.S. National Museum Bulletin* 209:1–286.
- Ubick, D., Paquin, P. E. Cushing and V. Roth (eds.). 2005. *Spiders of North America: an identification manual*. American Arachnological Society. 377 pp.
- Wasbauer, M. S. 1995. Pompilidae. In P. E. Hanson and I. D. Gauld (eds.). *The Hymenoptera of Costa Rica*, pp. 522–539. Oxford University Press, Oxford. 892 pp.
- Williams, F. X. 1928. Studies in tropical wasps, their hosts and associates (with descriptions of new species). *Hawaii Sugar Planters' Association Entomological Bulletin* 19:128–143.