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PREDATION BY *MISUMENOPS ASPERATUS* (ARANEAE, THOMISIDAE) ON THE METALLIC PITCH NODULE MOTH, *RETINIA METALLICA* (LEPIDOPTERA, TORTRICIDAE)

Forest entomologists have long suspected that spiders play important roles in the population dynamics of forest insects because of their predatory habits and abundance on trees (e. g., see Loughton et al. 1963). Despite this potential importance, however, few observations of spiders actually feeding on tree pests have been reported. Some exceptions include spiders observed preying on destructive bark beetles (Jennings & Pase 1975) and on forest-tree defoliators (Jennings & Houseweart 1989). Possible reasons for the scarcity of observed predatory bouts by spiders in forests and tree plantations include: (1) the diminutive size of spiders compared to the tree; (2) the cryptic habits of some spiders, especially those that employ hunter-ambusher tactics; and (3) the low prey-capture success of some species (Jackson 1977). Hunting spiders are less apt to be observed with prey than web-spinners. Large orb weavers and other web-spinners that "store" prey in their webs offer an easier means of prey assessment. Nentwig (1987) noted that nonweb-building spiders handle only one prey at a time; consequently, their hunting success is relatively low, and ingestion time short. Hence, a low percentage of hunting spiders are found with prey at any specific time in a population (Nentwig 1987).

Here we describe predation by an ambushing crab spider on a destructive insect pest of ponderosa pine, *Pinus ponderosa* (Laws.), in a shelterbelt of Nebraska. This is the first recorded instance of spider predation on the metallic pitch nodule moth, *Retinia metallica* (Busck), in North America. Larvae of this moth bore into the new growth of pine stems, twigs, and branches (Furniss & Carolin 1977; Dix et al. 1986). During July, the larvae produce a nodule or lump of pitch and frass at the point of attack. Such feeding stunts tree growth and frequently kills the tips. Heavily infested trees have excessive branching.

On 22 May 1987, the senior author observed a crab spider feeding on a small female moth near the apex of a ponderosa pine branch (1.2 m high). The tree was approximately 5 m high and was growing in a multi-row farmstead shelterbelt (Hollst Farm) near Mead, Saunders County, Nebraska (41°16′N, 96° 28′W). The spider with captured prey was collected, photographed (Fig. 1), and then preserved in 70% ethanol for later identification.

The crab spider, an adult female *Misumenops asperatus* (Hentz), was identified by the junior author. The specimen will be deposited in the arachnid collections of the U. S. National Museum of Natural History, Washington, D. C.

This species of crab spider hunts by stealth and ambush (Gertsch 1939). Branch apices are hunting sites where these crab spiders can wait for flying insects such as moths to land (pers. obs.). Because *R. metallica* moths frequent branch apices and similar microhabitats, they are susceptible to predation by ambushing crab spiders like *M. asperatus*. However, the frequency and extent of predation by *M. asperatus* on *R. metallica* are unknown. This insect, and similar lepidopterous species whose larvae live inside the twigs of trees, is most susceptible to predation by spiders during the moth-flight period. In the collection locale, the adult flight of *R. metallica* spans three weeks during May and early June (Dix unpubl. data).

We suspect that hunting spiders are more successful at capturing small moths like *R. metallica* than are web-spinners. Moth scales provide a means of escape from spider webs (Eisner et al. 1964); however, such defenses are ineffectual against ambushing crab spiders. Juillet (1961) found that wandering spiders of the families Salticidae and Thomisidae killed three times as many adults of the European pine shoot moth, *Rhyacionia buoliana* (Schiff.), as did web spinners of the family Araneidae.

Although *M. asperatus* is common on young ponderosa pines in Nebraska shelterbelts, the density of its populations on shelterbelt trees is unknown. It is found in both old field (e. g., Berry 1970) and arboreal habitats. In South Carolina, *M. asperatus* preyed on both larvae and adults of the Nantucket pine tip moth, *Rhyacionia frustrana* (Comstock), another destructive insect pest of pine plantations (Eikenbary & Fox 1968).

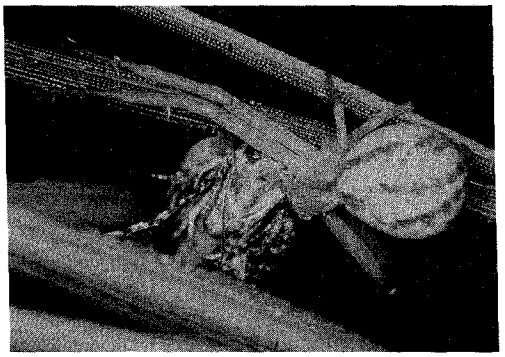

Figure 1.—A female *Misumenops asperatus* feeding on the metallic pitch nodule moth, *Retinia metallica*, on a ponderosa pine tree in Nebraska.

Ponderosa pine may gain some protection from the predatory habits of spiders like *M. asperatus*. Such mortality would be particularly important when spiders and other predators kill gravid moths of *R. metallica*. No doubt other spider species also capture and feed on *R. metallica*; however, this potential source of moth mortality has not been fully investigated. Similar observations of spider predation on other insect pests of ponderosa pine (e. g., scarab beetles (Jennings 1974), Southwestern pine tip moth (Jennings 1975; Lawson et al. 1983), and pine butterfly (Jennings & Toliver 1976)) support our conclusion.

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LITERATURE CITED

Berry, J. W. 1970. Spiders of the North Carolina Piedmont old-field communities. J. Elisha Mitchell Sci. Soc., 86:97–105.

Dix, M. E., J. E. Pasek, M. O. Harrell, & F. P. Baxendale. 1986. Common insect pests of trees in the Great Plains. Nebraska Coop. Ext. Serv. EC 86–1548. 44 pp.

Eikenbary, R. D. & R. C. Fox. 1968. Arthropod predators of the Nantucket pine tip moth, *Rhyacionia frustrana*. Annl. Entomol. Soc. America, 61:1218–1221.

Eisner, T., R. Alsop & G. Ettershank. 1964. Adhesiveness of spider silk. Science, 146:1058–1061.

Furniss, R. L. & V. M. Carolin. 1977. Western Forest Insects. U. S. Dep. Agr., For. Serv., Misc. Publ. No. 1339. U. S. Govt. Printing Office, Washington, D. C. 654 pp.

Gertsch, W. J. 1939. A revision of the typical crab-spiders (Misumeninae) of America north of Mexico. Bull. American Mus. Nat. Hist., 76:277–442.

Jackson, R. R. 1977. Prey of the jumping spider *Phidippus johnsoni* (Araneae: Salticidae). J. Arachnol., 5:145–149.

Jennings, D. T. 1974. Crab spiders (Araneae: Thomisidae) preying on scarab beetles (Coleoptera: Scarabaeidae). Coleopterists Bull., 28:41–43.

Jennings, D. T. 1975. Life history and habits of the southwestern pine tip moth, *Rhyacionia neomexicana* (Dyar) (Lepidoptera: Olethreutidae). Annl. Entomol. Soc. America, 68:597–606.

Jennings, D. T. & M. W. Houseweart. 1989. Sex-biased predation by web-spinning spiders (Araneae) on spruce budworm moths. J. Arachnol., 17:179–194.

Jennings, D. T. & H. A. Pase III. 1975. Spiders preying on *Ips* bark beetles. Southwestern Nat., 20:225–229.

Jennings, D. T. & M. E. Toliver. 1976. Crab spider preys on *Neophasia menapia* (Pieridae). J. Lepidopterists' Soc., 30:236–237.

Juillet, J. A. 1961. Observations on arthropod predators of the European pine shoot moth, *Rhyacionia buoliana* (Schiff.) (Lepidoptera: Olethreutidae), in Ontario. Canadian Entomol., 93:195–198.

Lawson, H. R., L. A. Yost & D. T. Jennings. 1983. Southwestern pine tip moth: notes on larval descent behavior, predators, and associated shoot borer in northern Arizona. Southwestern Nat., 28:95–97.

Loughton, B. G., C. Derry & A. S. West. 1963. Spiders and the spruce budworm. Pp. 249–268. *In* The dynamics of epidemic spruce budworm populations. (R. F. Morris, ed.). Mem. Entomol. Soc. Canada, 31. 332 pp.

Nentwig, W. 1987. The prey of spiders. Pp. 249–263, *In* Ecophysiology of Spiders. (W. Nentwig, ed.). Springer-Verlag, Berlin. 448 pp.

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