

**PARASITISM OF THE AQUATIC MOTH  
*PETROPHILA CONFUSALIS* (LEPIDOPTERA:  
PYRALIDAE) BY THE AQUATIC WASP  
*TANYCHELA PILOSA* (HYMENOPTERA:  
ICHNEUMONIDAE)<sup>1</sup>**

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**ABSTRACT:** Pupae of the pyralid moth *Petrophila* (= *Paragyraactis*) *confusalis* (Walker) are parasitized by the ichneumonid wasp *Tanychela pilosa* Dasch in Owl Creek, below Placid Lake, Missoula Co., Montana. The incidence of parasitism is localized, ranging from 55% of pupae at a site 0.5 km below Placid Lake to 24% and 0%, 3 and 5 km, respectively, below the lake. Parasitized pupal cocoons contain an air bubble, which presumably is related to the wasp's respiration.

Of the 13 orders of insects that are generally considered to have representatives in aquatic habitats (Merritt and Cummins 1984), the Hymenoptera are probably the group that are most rarely encountered. It would be safe to say that the majority of aquatic entomologists and benthic biologists spend entire careers studying stream and lake benthos without ever collecting a single aquatic hymenopteran. Many of the entomologists who have observed aquatic hymenopterans have done so in European streams where the agriotypid wasp *Agriotypus armatus* Curtis parasitizes larvae of the goerid caddisfly *Silo pallipes* (Fabricius). The presence of this parasitoid is distinct: a long respiratory ribbon protrudes from the parasitized caddisfly case (Grenier 1970, Photo 3; Elliott 1982, Plate 1).

Recent studies in a Montana stream [Owl Creek, below Placid Lake, Missoula Co., MT; see McAuliffe and Williams (1983) for site description] revealed the presence of an ichneumonid parasitoid in the pupal cocoons of the aquatic pyralid moth *Petrophila* (= *Paragyraactis*) *confusalis* (Walker); this parasitoid has been identified as *Tanychela pilosa* Dasch. Previously, Hagen (1956, 1984), Lange (1956), Tuskes (1977), and Krombein *et al.* (1979) have reported that an undescribed species of ichneumonid wasp parasitized aquatic pyralids in California. *Tanychela pilosa* (one of two described species in the genus, the other occurs in Brazil) "was reared in California from a species of the pyralid genus *Argyraactis*" (= *Petrophila*) and has also been collected in Mexico (Dasch 1979: 331). The female of

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this species is illustrated in Dasch (1979).

When non-parasitized, the pupa of *P. confusalis* is within a silken cocoon that is beneath an elliptical, external pupal case (McAuliffe and Williams 1983). When the pupa of *P. confusalis* is parasitized, a dark brown, leathery wasp pupal cocoon lies inside the empty moth pupal cocoon (Fig. 1). In both circumstances, shed moth larval sclerites are compacted in one end of the moth pupal cocoon. Full-grown larvae, pupae, and adults of *T. pilosa* are 7-8 mm long.

Because the empty wasp cocoon remains within the moth pupal case after the wasp has emerged, the incidence of parasitism in the moth pupal population can be ascertained. The percentage of parasitized *P. confusalis* pupae was examined at three sites along Owl Creek on July 29 and August 9, 1987; these sites were 0.5, 3, and 5 km, respectively, below the outlet of Placid Lake. Specimens were collected randomly and the results are presented in Table 1. Estimates of parasitism at two of the sites are higher than the 9-10% of *S. pallipes* pupae that were parasitized by *A. armatus* in a southwest England stream (Elliott 1982).

In parasitized moth cocoons, we found that an air bubble occupying 10-20% (by volume) of the wasp cocoon was consistently present. Grenier (1970) reported that the final instar of the wasp *A. armatus* also fills the caddisfly pupal cocoon with gas; the respiratory ribbon of the wasp pupa allows a gaseous exchange between the cocoon and the water. The pupae of *T. pilosa* lacks an obvious external respiratory ribbon and we do not know the mechanism by which the cocoon becomes gas-filled.

The agriotypid wasp *A. armatus*, like *T. pilosa*, is in the Ichneumonoidea.

Table 1. Parasitism of *P. confusalis* by the ichneumonid wasp *T. pilosa* at three sites in Owl Creek, Missoula County, Montana.

	Distance Below Placid Lake Outflow		
	0.5 km	3 km	5 km
Date of collection	July 29, 1987	August 9, 1987	August 9, 1987
Number of <i>P. confusalis</i> pupal cases examined	138	99	143
Number of <i>P. confusalis</i> pupae or emerged moth adults	62	75	143
Number of parasitized pupae or emerged wasp adults	76	24	0
% of <i>P. confusalis</i> cocoons parasitized by <i>T. pilosa</i>	55%	24%	0%

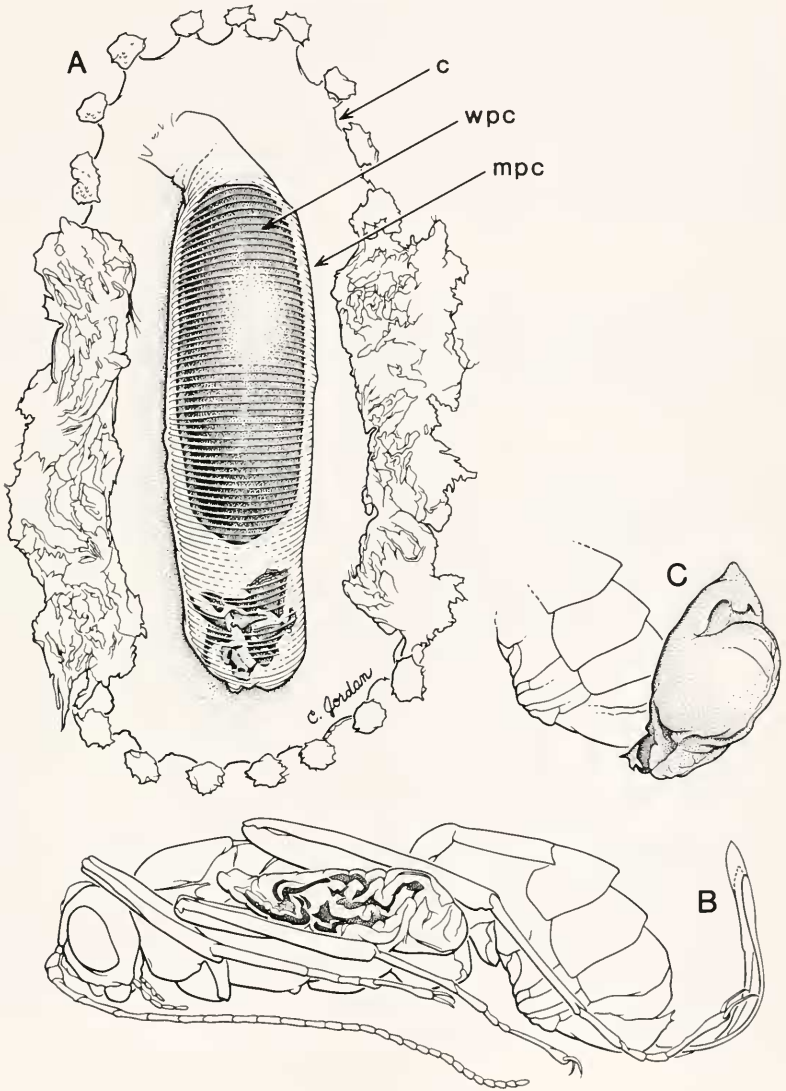


Fig. 1. A. External pupal case (c), pupal cocoon of the aquatic moth *P. confusalis* (mpc), and pupal cocoon of the aquatic wasp *T. pilosa* (wpc); B. female pupa of *T. pilosa* with pupal cocoon and meconium (i.e. fecal pellet at base of abdomen) removed; C. abdomen of *T. pilosa* pupae with meconium.

In Elliott's (1982) description of the life cycle of *A. armatus* and its host *S. pallipes*, he reported that *A. armatus* females lay eggs in the pupal cases of its host in late spring; the wasp larvae feed on the living hosts and grow rapidly to the pupal stage that summer; both the parasitoid and its host have a one-year life cycle. *P. confusalis* is univoltine in Owl Creek (McAuliffe and Williams 1983). Circumstantial evidence suggests the phenology of parasitization of *P. confusalis* pupae by *T. pilosa* is similar to the above pattern.

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