

The first biological portrait of stalk-eyed fruit flies: Life history, reproductive biology and host use patterns in *Pelmatops* spp. (Diptera: Tephritidae)

ABSTRACT

The stalk-eyed fruit flies, with their eyes borne at the ends of long stalks, are distinctly different from all other members of the family Tephritidae (Diptera). They resemble stalk-eyed flies (Diptera, Diopsidae) but they are much larger and their antennae are located in the middle of the head instead of on the eye stalks. The stalk-eyed fruit flies are represented by two genera (*Pelmatops* Enderlein and *Pseudopelmatops* Shiraki) mainly found in the Oriental tropics and subtropics, but their basic biology remains poorly documented. Here, we describe the life history, reproductive biology, and host use patterns of *Pelmatops* spp. (mainly *P. ichneumoneus* (Westwood)). These flies used two local brambles, *Rubus setchuenensis* and *R. multibracteatus* (Rosales, Rosaceae), as hosts, with females laying eggs below the epidermal tissue. The larvae bore into the stem, where they feed, eventually dropping to the ground to pupate in the soil. We describe the pupal morphology and eclosion, including the elongation of their eye stalks, feeding, mating, and agonistic behavior in adults. We observed mating between female *P. ichneumoneus* and male *P. tangliangi* and tentatively suggest that the two species could be conspecific. Our work presents the first detailed report on the biology of stalk-eyed fruit flies and it lays a significant foundation for future studies on the ecology and evolution of this group.