# HOST LOCATION BEHAVIOUR IN *PELECINUS POLYTURATOR* (HYMENOPTERA: PELECINIDAE)

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*Pelecinus polyturator* (Drury) (Hymenoptera: Pelecinidae) is a relatively common endoparasitoid wasp of june beetles, *Phyllophaga* spp. (Coleoptera: Scarabaeidae) (Masner 1993; Johnson et al. 1999). Its range extends from southeastern Canada to central Argentina (Johnson and Musetti 1998). It exhibits "geographic parthogenesis" (Brues 1928) in which tropical populations are bisexual whereas temperate populations consist predominantly of thelytokous females (Johnson and Musetti 1998). Only three extant species comprise the genus and family (Johnson and Musetti 1999) and the relationships of the family within the Proctotrupoidea are unclear (see Koenigsmann 1978; Gibson 1985; Rasnitsyn 1988; Dowton et al. 1997). Despite the large size of *P. polyturator* (body length up to 6 cm) and its relatively common occurrence in deciduous forests of eastern North America, little has been documented about its biology and behaviour. Lim et al. (1980) described the pupa (from one specimen), Aguiar (1997) described its mating behaviour (from one pair) and Johnson et al. (1999) described the larva (from five specimens). Descriptions of the collection of live *P. polyturator* have been made for over 100 years (e.g., Ashmead 1902; Brues 1928) and yet a detailed account of host location behaviour and/or oviposition has never been made. The only previous description of these behaviours was made by Davis (1919) who reported that *P. polyturator* inserts its entire metasoma into the soil during host location. The current short communication describes and quantifies the elements of host location behaviour of *P. polyturator* for the first time.

A female *P. polyturator* was collected by hand (CANADA, Ontario, York Region, nw. of Newmarket, 28 August 1996, Bennett) (voucher deposited at the Canadian National Collection of Insects, Ottawa). It was kept in the laboratory in a terrarium, the bottom six cm of which was filled with potting soil. Twenty-four third instar *Phyllophaga* sp. grubs were added to the soil and allowed to burrow. A Panasonic Omnimovie® video camera was used to record the interactions.

Under a white 60 W incandescent light bulb, no probing of the soil with the metasoma was seen for two days; however, within ten minutes of changing the light source to a red 60 W incandescent bulb, probing was observed. During six hours of observation, the wasp spent most of the time (more than five hours) wandering the terrarium (wandering behaviour) with no apparent interest in the grubs moving in the soil below. Host location behaviour was considered to have commenced when the wasp's antennae ceased movement completely and the distal segments appeared to be touching the soil. At this time, the metasoma was not in contact with the soil, but was held aloft with the distal segments curved downwards and anteriorly towards the mesosoma. After a period of time (usually less than ten seconds), the wasp rotated its body (rotation behaviour) to orient its head over a new area of soil and once again ceased movement. The rotation of the body (as seen in dorsal view) was 30 – 270° from the original direction when motion ceased (usually 90 – 180°). There was no discernible pattern to the angle of rotation or to the direction (clockwise, counter-clockwise, or alternating). Rotation of the body was usually, but not always, followed by insertion of the metasoma into the soil. If insertion did not occur, the wasp returned to wandering behaviour. The duration of rotation behaviour ranged from 35 – 240 seconds (mean = 95 seconds; n = 8).

Insertion of the metasoma was witnessed seven times in six hours. In order to insert the metasoma into the soil, the wasp held the first and second metasomal segments vertically upwards and the third and distal segments curved downwards and anteriorly toward the mesosoma. The posterior end of the second metasomal segment was then levered down to a horizontal position, which pushed the distal segments into the soil. Insertion was also facilitated by side to side movement of the metasoma, by twisting of the body around the point of insertion, and by raking of the hind tarsi to pull soil from the insertion point. Occasionally one hind leg was used to brace the metasoma as it entered the soil and the wasp sometimes climbed partially up the side of the terrarium to help lever the metasoma into the soil. The flexibility of the metasoma (as reported by Mason 1984) allowed the wasp to probe not only vertically down into the soil, but also horizontally in a posterior or anterior direction. On several occasions, the entire length of the metasoma and much of the mesosoma was inserted (Fig. 1), showing that *P. polyturator* can reach grubs up to 5 cm below the soil surface.

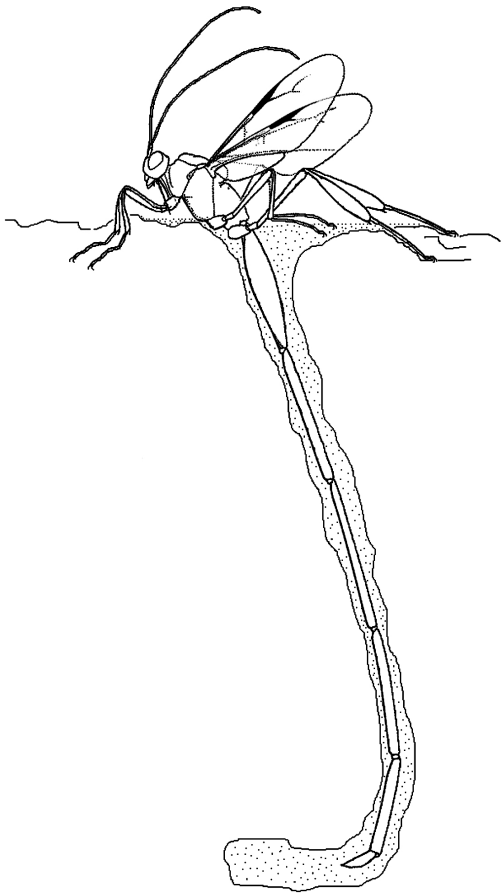

FIGURE 1. Female *Pelecinus polyturator* with metasoma completely inserted into soil during host location.

Metasomal insertion lasted 67 – 407 seconds (mean = 145 seconds; n = 7). In five of the insertions, the metasoma was removed completely from the soil after probing, whereas in the other two, removal was incomplete, followed by re-insertion and re-positioning of the metasoma in the soil. Removal of the metasoma from the soil was rapid, and once completely removed, grooming of the metasoma and wings with the hind legs ensued (10 – 25 seconds duration). Oviposition into the grubs was not witnessed. The grubs seemed agitated when the wasp's metasoma was probing near them. During one metasomal insertion, a grub moved rapidly away from the tip of the metasoma when it entered a gallery in which the grub was present. Later dissection of all the grubs revealed no larvae.

Because this study is based on only one individual, a comparative discussion is not warranted. It should be noted; however, that there is an almost complete lack of knowledge of host-searching and/or oviposition behaviour in the entire superfamily Proctotrupoidea to which the Pelecinidae belongs and so any information is valuable (see Huggert 1979 on the proctotrupid *Cryptoserphus foveolatus* (Möller); Deyrup 1985 on the vanhorniid *Vanhornia eucnemidarum* Crawford). Attempts to replicate my observations and to witness oviposition have been unsuccessful over the last eight years which is the reason why the study is presented here as a short communication. Hopefully these observations will stimulate and complement future investigations on host location and oviposition behaviour of *P. polyturator* and other species with poorly known biology.

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