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A brief note on the biology and larvae of *Megalodontes klugi* LEACH (Hym.: Megalodontidae)

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A brief description is given of the biology and the larvae of *Megalodontes klugi,* a web-spinning sawfly feeding on sermountain. *Ctenopelma* sp. (Ichneumonidae) was reared as a larval parasitoid.

INTRODUCTION

The Megalodontidae represent a small family (about 50 species) of web-spinning sawflies, mainly distributed over south-eastern Europe and western Asia. This is exemplified by the fact that only 4 species each are known from France (CHEVIN, 1980) and Austria (SCHEDL, 1980), but 16 (mostly *Megalodontes* spp.) from Turkey (BENSON, 1968). Only 4 species extend their range into central Europe. Two of them, *Melanopus fabricii* LEACH and *Megalodontes cephalotes* F., are preponderantly restricted to the warmer and drier parts of central Europe, whereas *Megalodontes plagiocephalus* F. is more widely distributed reaching northward to northern France and Belgium (CHEVIN, 1987) and to the river Main in Germany (STRITT, 1937). The foodplants of *M. cephalotes* and *M. plagiocephalus* are masterworts (*Peucedanum* spp.) growing in sun-exposed habitats such as open oak or pine woodland, or wooded steppes.

The most abundant and widely distributed species in central Europe is *Megalodontes klugi* (= *spissicornis* KLUG), which occurs chiefly in the mountains, e.g. in the Alps, the Jura Mts. and northward to the Harz Mts. of Germany (WEIFFENBACH, 1985). In the Swiss Alps it has been found from the valleys up to an altitude of 1750 m (BENSON, 1961), mainly on sermountain (*Laserpitium* spp.), but it is said to feed also on *Peucedanum cervaria* and *Seseli (Libanotis) montanum* (STRITT, 1937). Hence, European species of Megalodontidae seem to be restricted to Umbelliferae (Apiaceae), but a species from western Asia has been recorded from the related Rutaceae (BENSON, 1951). Surprisingly, no other sawflies are known to feed on this large plant family.

On July 1, 1977 large numbers of adults of *M. klugi* were seen flying in the Alps of Lower Austria (near the border to Styria) at an altitude of around 900 m, about 15 km north-east of the pilgrimage place of Mariazell. As almost nothing is known on the life-history of *Megalodontes* spp., biological observations upon this population will be described in the following.

OBSERVATIONS

Adults

Mainly males were seen on July 1, but a few females were already present at that date suggesting that adult emergence must have commenced during the

second half of June. Both sexes were most active in bright sunshine and were mainly frequenting the flowers of yellow ox-eye (*Buphtalmum salicifolium*). Only few were sitting on the umbels of *Laserpitium siler,* and still fewer on those of *L. latifolium,* though both sermountain species grew abundantly amongst young Scots pines on the rocky, south-facing slope bordering the road. On July 23, adults were still active, but males were now much scarcer than females and on August 8 both sexes had disappeared. The flight period from late June to late July corresponds well with other collection data from the north-eastern Alps which state June 13 as the earliest, and July 29 as the latest date of capture (FRANZ, 1982).

Eggs

Eggs were abundant upon the underside of the leaflets. Usually 3–5 (2–7) fully exposed eggs were found close together, though not touching each other, and this cluster was always deposited near the base of a leaflet. The eggs were on average 2 mm long (1.85–2.15 mm) and slightly less than 1 mm broad, cylindrical in shape, and of a creamy-white colour. The egg is laid onto a tiny slit that just scratches the epidermis of the leaf. This slit is about half as long as the egg and somewhat pinches the chorion on the underside of the egg thus holding it in the slit, and also securing the absorption of water from the leaf. Fully developed eggs appear therefore swollen, their length increasing to about 2,3 mm and the width to just over 1 mm. Eggs were still scarce on July 1st, whereas on July 23 most clusters had already hatched indicating that embryonic development occurred mainly during the first half of July.

Larval development

The young larvae hatching from an egg cluster fed gregariously in a flimsy web covering the surface of a leaflet, or spinning two leaflets loosely together. Tiny faeces particles are dispersed in the silken webbing. At the beginning, only the upperside of the leaves was fed upon, but later the larvae made holes into the leaflets or fed from the leaf-edge. Older larvae usually dispersed and lived individually, or in groups of 2–3, in silken tubes with a length of 2–5 cm depending on the number of larvae inside. This webbing was light-brown in colour and intervowen with faeces and dried plant particles. The feeding tubes occurred mainly along the main axis of the compound leaves. These observations agree only partially with those of STRITT (1937) which may be due to the fact that younger and older larvae appear to have different feeding habits. The larvae pass through 5 instars. The L_1 is between 4–5 mm long and the width of the head-capsule is 0.7–0.75 mm. The L_2 measures about 6–8 mm and the head width 0.9–1.0 mm. The corresponding figures for L_3 larvae are 10–12 mm and 1.3–1.4 mm, and for L_4 larvae 15–18 mm and 1.7–1.8 mm, respectively. Mature larvae (L_5) attain a maximum size of 20–24 mm in body length, with the head capsule width varying between 2.0–2.2 mm. This gives an average DYAR-factor of about 1.3 for the growth of the head width. It is not clear whether only females have 5 larval instars (and males only 4), but as this condition is common in the related Pamphiliidae (EIDT, 1969), it is not altogether unlikely that it may also apply to Megalodontidae.

On August 8, 1977 Dr. G. SCHEIBELREITER collected a total of 316 mature larvae, 242 from *Laserpitium siler* and 74 from *L. latifolium* indicating that the first

mentioned species was more heavily infested than the broadleaved sermountain. The larvae left their foodplants between August 13 and 22, most of them on August 15, and were transferred to a large flowerpot filled with sand at the bottom and with peat in the upper half. Assuming that the peak of oviposition occurred in early July, embryonic and larval development together must have covered a period of around 4–6 weeks. Mature larvae of *M. klugi* were also collected and preserved in August 1978 from a mountain-slide locality near Admont in Upper Styria and from a gorge near Moutier in the Swiss Jura Mts., in both cases with *L. latifolium* serving as host.

Hibernation, eclosion of adults and parasitoids

The larvae collected in early August 1977 transformed to the eonymphal (early prepupal) stage and hibernated in diapause in earthen cells in the peat-sand mixture. The flowerpot was buried in the ground in a garden in the Vienna Forest (altitude 250 m) and a total of 200 adults emerged the following year, mostly during June 1978. The early emergence was probably due to the lower altitude of the hibernation site. Females were more common than males. The fate of the non-emerged individuals (about one third) was not determined, but it is not unlikely that some remained in prolonged diapause, a phenomenom particularly frequent with the related Pamphiliidae (PSCHORN-WALCHER, 1982). At any rate it is clear that *M. klugi* has normally just one generation per year, with adults in June–July and larvae in July and August.

Twenty-five mature larvae were dissected in early August 1977 but no larval parasitoids were found. However, in July 1978 two males of an Ichneumonid species emerged (i. e. rate of parasitism about 1 per cent) which were identified by Mr. R. HINZ as "*Ctenopelma* sp., probably an undescribed species". Species of *Ctenopelma* and of other genera of the tribe Ctenopelmatini are wellknown larval endoparasites of web-spinning sawflies (Pamphiliidae) (PSCHORN-WALCHER, 1982; EICHHORN, 1988), and the first record of this parasitoid group from a Megalodontid host thus supports the close taxonomic affinities of these two families of Megalodontoidea.

DESCRIPTION OF LARVAE

According to LORENZ & KRAUS (1957) the larvae of Megalodontidae resemble those of Pamphiliidae. The major differences are as follows: Megalodontidae with 6 annulets per abdominal segment, with distinct setae an annulets 2, 3, and 5 (Pamphiliidae have only 4 annulets per segment and minute setae on annulets [1], 2 and 3). Setae on head and body relatively long in Megalodontidae; in young and semimature larvae bases of setae surrounded by sclerotized black dots (setae in Pamphiliidae short, and their base not blackish). Subanal appendages, the so-called cerci, bare in Megalodontids (setaceous in Pamphiliids).

LORENZ & KRAUS (1957) described and figured the mature larva of *M. klugi* (and of the other central European species). However, as there are considerable differences between the final prespinning instar (L_5) and young to semimature larvae (L_1–L_4), especially with regard to sclerotization, pigmentation and bristle pattern of different sclerites, some diagnostic features of the larvae of *M. klugi* will be illustrated here in more detail. Fig. 1 compares the abdomen (segment IV

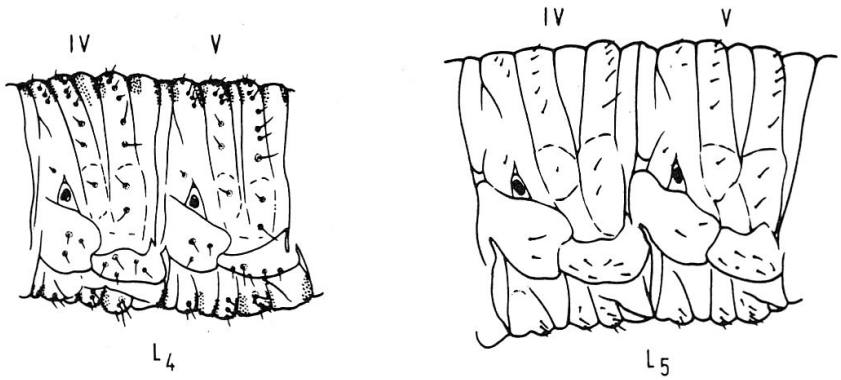

Fig. 1. *Megalodontes klugi;* Abdominal segments 4 and 5 of L_4 and L_5 in lateral view.

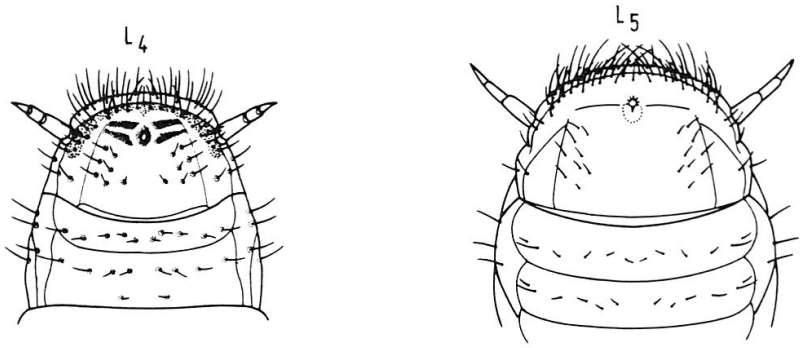

Fig. 2. *Megalodontes klugi;* Anal segment of L_4 and L_5, dorsally.

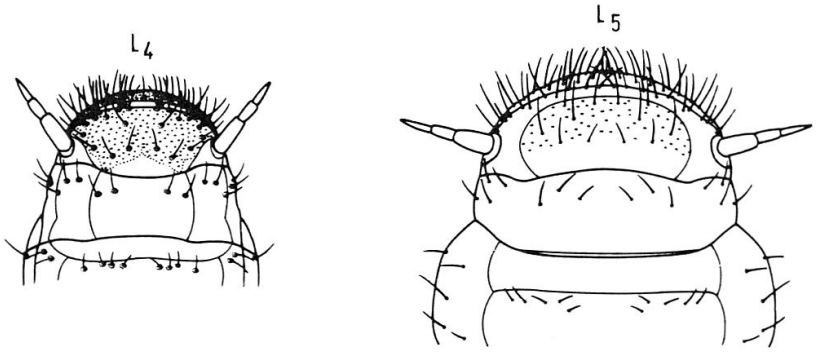

Fig. 3. *Megalodontes klugi;* Anal segment of L_4 and L_5, ventrally.

and V) in lateral view of the fourth and fifth instar, whereas Figs. 2 and 3 show the abdominal segment X (the anal lobe) from the dorsal and from the ventral side, respectively, also for the penultimate and ultimate larval instars.

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ZUSAMMENFASSUNG

Es wird eine kurze Beschreibung der bisher kaum bekannten Biologie und der Larven von *Megalodontes klugi,* einer auf Laserkraut fressenden Gespinstblattwespe der Familie Megalodontidae, gegeben. Als Larvenparasit wurde eine unbekannte Schlupfwespe der Gattung *Ctenopelma* gezogen.

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