Parasites of Pulicalvaria piceaella (Kft.) in Quebec.—*Pulicalvaria (Recurvaria) piceaella* (Kft.) is a needle-miner of spruce indigenous to North America. Its first occurrence on the continent of Europe near Pfungstadt (Hesse) has recently been reported (Führer, E. 1963. Anzeiger für schädlingskunde 36: 93-4), and its further spread in Germany is considered highly probable.

The following is a list of 30 species of parasites recovered from *P. piceaella* during studies carried out between 1956 and 1959 at various localities in the Province of Quebec. It has been prepared in anticipation of the interest that may be expressed by workers in Germany. The list is subdivided according to host stage attacked and the habits of the parasite.

Group 1. Attacks and emerges from host eggs in June or July. Alternate hosts probable. HYMENOPTERA: Trichogrammitidae; *Trichogramma minutum* Riley.

Group 2. Attack young larvae in September, may emerge as adults in fall or overwinter as larvae or pupae, emerging the following spring. Ectoparasites; host killed at onset of attack. Alternate hosts probable. HYMENOPTERA: Eulophidae; *Dicladocerus westwoodii* West., *Sympiesis* sp.

Group 3. Hyperparasitic on species in Group 2. HYMENOPTERA: Eulophidae; *Tetrastichus* sp.

Group 4. Attack young larvae in later summer, overwinter and emerge following spring or summer from mature larvae. Endoparasites. Life history apparently synchronized with that of host. HYMENOPTERA: Encyrtidae; *Copidosoma deceptor* Miller. Braconidae; *Eubadizon gracile* Prov., *Agathis bicolor* (Prov.), *Apanteles paralechiae* Mues., *Apanteles* sp. near *tischeriae* Vier., *Chelonus* sp. Ichneumonidae: *Pimplopterus parvus* (Cress.).

Group 5. Attacks and emerges from mature larvae in spring. Endoparasite. Alternate host probable. HYMENOPTERA: Ichneumonidae; *Campoplex rufipes* (Prov.).

Group 6. Emerge from mature larvae in spring or early summer. Endoparasites. Complete life history of parasite unknown. HYMENOPTERA: Braconidae; *Meteorus pinifolii* Mason, *Orgilus* sp., *Agathis* n. sp. near *pumilus* Ratz. Ichneumonidae; *Neliopisthus piceae* Cush., *Horogenes stenosomus* (Vier.), *Trathala (Zaleptopygus)* sp. DIPTERA: Tachinidae; *Shizactia vitinervis* (Thom.).

Group 7. Known or suspected to be hyperparasitic on one or more species in Groups 4, 5, or 6. HYMENOPTERA: Eulophidae; *Elachertus pini* Gahan. Elasmidae; *Elasmus atratus* How. Perilampidae; *Perilampus fulvicornis protoracicus* Smul. Pteromalidae; *Amblymerus verditer* (Nort.). Ichneumonidae; *Mesochorus* sp.

Group 8. Pupal parasites. Little is known of the life histories of these parasites on *P. piceaella*. HYMENOPTERA: Pteromalidae; *Amblymerus verditer* (Nort.). Chalcidae; *Spilochalcis* sp., probably *albifrons* (Walsh). Ichneumonidae; *Itoplectis* n. sp., *Alegina apantelis* (Cush.), *Alegina* n. sp., *Phaeogenes epinotiae* (Cush.), *Campoplex* sp.

During the 4-year study period, apparent parasitism of *P. piceaella* eggs varied between 6 and 7%; of young larvae by parasites in Groups 2 and 3 (ectoparasites), from 3 to 6%; of larvae by endoparasites (Groups 4 to 7 inclusive), 8 to 79%; and of pupae, 11 to 17%. Of the endoparasites attacking larvae, those in Group 4 were by far the most abundant.

A more complete report on parasites and other mortality factors encountered during studies on *P. piceaella* is in preparation.—J. M. McLeod.