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Collecting, Rearing, Shipping, and Monitoring *Olesicampe Benefactor* (Hymenoptera: Ichneumonidae), a Parasite of the Larch Sawfly, *Pristiphora Erichsonii* (Hymenoptera: Tenthredinidae)

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**COLLECTING, REARING, SHIPPING, AND MONITORING
OLEUSICAMPE BENEFACITOR (HYMENOPTERA:
ICHNEUMONIDAE), A PARASITE OF THE LARCH SAWFLY,
PRISTIPHORA ERICHSONII (HYMENOPTERA: TENTHREDINIDAE)**

A. T. Drooz¹ and L. C. Thompson²

ABSTRACT

Procedures are described for collecting, rearing, shipping, and monitoring the introduced ichneumonid, *Olesicampe benefactor*, a valuable parasite of the larch sawfly, *Pristiphora erichsonii*.

The European ichneumonid, *Olesicampe benefactor* Hinz, has been a valuable addition to the biological control fauna of the larch sawfly, *Pristiphora erichsonii* (Hartig), in North America (Muldrew and Ives 1984). Recently several successful relocations have been made to establish *O. benefactor* in the Northeast (Drooz et al. 1985). This paper is written to help others who wish to collect, rear, ship, and monitor *O. benefactor*.

COLLECTING

The most convenient way to obtain *O. benefactor* is to collect its sawfly host, either late instars or prepupae in cocoons. Larvae can be collected by beating infested branches over a white cloth sheet, or infested branches can be cut with a pole-pruner and dropped onto the cloth. Larvae and small branches with foliage should be transported in cloth sacks. Adequate supplies of larch foliage are needed to rear larvae to the cocoon stage. These cocoons should be removed weekly and stored at 15–18°C in barely dampened sphagnum moss. After 30 d they must be chilled at 0–5°C and held at least 250 d before rearing parasites for release. Rearing larvae is the most expedient way to obtain the parasite when rates of parasitization are high.

Collecting cocoons in the field is chancy because there is competition from small, predator mammals. This predation becomes increasingly common as the season progresses, so collecting should be scheduled soon after cocooning occurs, about 1 July in Pennsylvania and 21 July in Minnesota. The sawfly spins its cocoons only in the duff. In sphagnum bogs the cocoons may be found as deep as 20 cm below the surface. Collecting cocoons is time consuming because one needs to sort through large quantities of duff and many empty cocoons from previous years are encountered. Once cocoons have been obtained they should be carried in an insulated container (never leave these insects unprotected from the heat in a vehicle) and taken to a place where it is convenient to sort them by size and condition. Cocoons longer than 9.25 mm are unlikely to contain *O. benefactor* (Muldrew 1967). Those with visible fungal growth are diseased and should be discarded.

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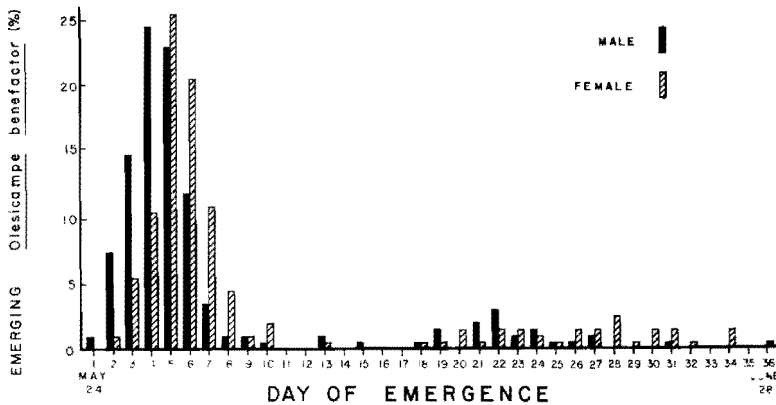


Fig. 1. Percentage emergence of *Olesicampe benefactor* adults placed at 18°C on 6 May, after overwintering at 0–5°C (N = 208 ♀, 204 ♂).

REARING

Cocoons should be stored individually to minimize cross contamination with fungi and to isolate them from the cocoon parasite, *Tritneptis klugii* (Ratzeburg). We used plastic boxes (1.7 by 2 by 2 cm), each with a pinhole in the bottom to admit moisture from white blotting paper dampened with distilled water. (1-oz creamer cups are also suitable.) High relative humidity, but no free contact water, is critical in storage because larch sawfly cocoons desiccate quickly. The boxes were then placed in plastic trays, 50 per tray. The trays of cocoons are stored at 0–5°C, and the blotters kept damp with distilled water. Frequent observations are advisable so that boxes with diseased cocoons can be removed.

Olesicampe benefactor parasitizes only first instars. Larch sawfly adults emerge and oviposit over a prolonged period, and *O. benefactor* adults live for about 30 d, therefore it is best to time the releases for 2–4 d after the earliest sawfly eggs hatch. Generally, this period would be ca. 10 June in northern Minnesota and ca. 31 May in central Pennsylvania. If this information is unavailable for a particular location, learn when oviposition occurs by looking for the characteristically curled new shoots. Hatch should occur 7–10 d after egg deposition.

HANDLING THE PARASITE

Adult parasites for release are obtained by moving the presumably parasitized sawfly cocoons from cold storage to 18°C. Adults begin emergence in 18 d. Approximately 80% will emerge in the next 7 d (Fig. 1). Therefore, allow 25 d lead time at 18°C to meet your scheduled date for releasing the parasites. In a large collection, *O. benefactor* will continue to emerge for another 30 d. Emergence of most of the males precedes that of the females.

Three ichneumonid species may emerge from the cocoons: the primary parasites, *O. benefactor* and *Mesoleius tenthredinis* Morely, and the hyperparasite, *Mesochorus globulator* (Thunberg) (= *dimidiatus* Holmgren). These insects are easy to distinguish from one another. The bodies of the parasites are black, whereas that of the hyperparasite

is dark brown dorsally and tan laterally and ventrally. The two species of parasites can be separated by the color of the hind coxae which are black in *O. benefactor* and amber in *M. tenthredinis*.

Male and female *O. benefactor* should be caged separately with ample food (40% aqueous honey on disks cut from dental rolls). Females can be identified by their short, external ovipositor sheath. The cages should be kept in the dark at 15°C, and water should be misted or rubbed on the cage screens daily. We had good success with 25 individuals per cage (13 by 18 by 18 cm, with wooden sides, 32-mesh screen back, and acrylic sliding door). With this arrangement we could control numbers (50/final cage), parasites' interference with one another, and prevention of mating until the parasites were ready for shipping.

The parasites are strongly photopositive. It is easy to direct them into one cage with either sunlight or artificial light. First, a small amount of slightly dampened hardwood excelsior is formed into a loose ball in the cage of females. Fresh food is put on the cage floor and a bright light is applied to the screened end of the females' cage. The cage of females and the cage of males are placed door to door, the doors are opened, and a dark cloth draped over the cages to exclude extraneous light. The males orient quickly to the direction of light and move toward it. When all the parasites are in what was the females' cage, the door is shut. Mating occurs quickly in bright sunlight and then the cage is ready to ship.

SHIPPING AND RELEASING

Correct authorization for interstate and international shipping is required. Permits for interstate shipment should be requested at least 4 mo in advance. They usually can be obtained through the office of the state entomologist. The permits ultimately are issued by USDA Animal and Plant Health Inspection Service (APHIS) and Plant Protection and Quarantine Programs. International shipping permits have to be requested from officials in the nation receiving *O. benefactor*. Again, allow ample time to process the request.

The cages should be packed in insulated containers with sufficient packs of coolant to keep them cool for the duration of the trip. Adult parasites should be in transit as briefly as possible. Air freight or other special airline service is usually required for 24-h shipment from origin to destination. The recipient should be notified that the package is underway, the name of the shipping service, the bill of lading number, and the estimated time of arrival.

The parasites should be released as soon as possible upon arrival. Accurate records should be kept on condition of the package, the sex and number of dead parasites, weather, adequacy of hosts, and observations on the condition of the parasites at release. It is suggested that the location of the liberation site be marked with a painted stake to aid in locating the site for monitoring in subsequent years. Records of the site should contain longitude and latitude, township, range, section, name of nearby community, and other features for identification.

MONITORING

It is important to monitor the success of the parasite release by rearing future generations of cocooned sawflies. A minimum of 300 cocoons is normally suitable for this purpose. Records from larval rearings or dissections should indicate the progress of the parasite or the need to repeat the introduction. Establishment of *O. benefactor* should be indicated within 2 yr. Dissection of the sawflies requires a stereomicroscope, single-edge razor blades, a fine forceps, a small bottle of water and medicine dropper, paper tissues, a microscope slide, a block of wood, and dissecting needles, one of which has been altered so that the point is in the handle. A half-spear is handy for scraping the fat body from the inside of the integument.

Cut the end of the cocoon with the razor blade and pull the larva out with forceps. Put the larva on the wood and decapitate it with the razor blade. Carefully, to avoid squeezing, pick up the larva with the forceps and transfer it to your thumb and forefinger. With the blunt-ended dissecting needle on the anal end of the insect, push the larval skin back over the needle until the larva is inside out. Place it on the microscope slide and add two drops of water. Scrape the fat body, guts, etc., into the water with a half-spear, and examine this material at about 15× with the stereomicroscope. Manipulate the mass with the half-spear and a needle to disclose the presence of parasite larvae. Larvae of *O. benefactor* are hygrophobic and will float free of the host fat body, whereas *M. tenthredinis* larvae will not. Descriptions and drawings of these two larval forms are given in Pschorn-Walcher and Zinnert (1971). Use the tissues to clean the slide.

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