

LIFE HISTORY AND HABITS OF *EXOTELEIA ANOMALA*  
HODGES, A PONDEROSA PINE NEEDLE MINER IN THE  
SOUTHWESTERN UNITED STATES (GELECHIIDAE)

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**ABSTRACT.** *Exoteleia anomala*, the larvae of which mine needles of ponderosa pine in Arizona and New Mexico, has a one-year life cycle similar to that of several species of needle-mining *Coleotechnites*. Each larva requires two needles to complete development. When numerous, larvae can cause highly visible foliage damage, but outbreaks do not appear to persist.

In summer 1977, I reared an undescribed species of *Exoteleia* (Gelechiidae) from foliage of ponderosa pines, *Pinus ponderosa* Dougl. ex Laws., near Silver City, Grant Co., New Mexico. In 1978, entomologists with the USDA Forest Service, Southwestern Region, Albuquerque, New Mexico, reported a needle miner infestation in ponderosa pines from an area near Show Low and Pinetop, Navajo Co., Arizona, some 90 km NW of Silver City. No moths were obtained at that time, but a resurgence of the population in 1981 provided material for study; it too was *E. anomala*. Collections and observations in 1981 and 1982, reported here, have made it possible to outline the species' life history and habits.

METHODS

Collections of foliage representing at least two years' growth were made 21 October 1981, and 4 March, 6 April, 10 May, 22 June, 12 July, and 25 August 1982 for the 1981-82 generation, and a single collection from the 1982-83 generation was obtained on 11 November 1982. Life history events and larval habits were recorded following examination of the foliage, and sufficient numbers of larvae were preserved to permit determination of instars. Adult voucher specimens are deposited in the U.S. National Museum of Natural History.

DESCRIPTION

The adult is described in detail by Hodges (1985). Briefly, it is a small, fragile moth, forewing length 4-5 mm, with a whitish head, mottled gray-brown to black and white forewings, and mottled brown and whitish abdomen. The hindwings are grayish, and have fringes of long hairs.

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First-stage larvae are tan, with light brown head capsules and prothoracic and anal shields. Instars 2, 3, and 4 are brown, with dark brown to black head capsules and anal shields. Prepupal fourth-stage larvae are dark brown to almost black.

Its appearance, coupled with its needle-mining habit, can lead nonspecialists to confuse this species with well known pine needle miners in the genus *Coleotechnites*.

#### LIFE HISTORY AND HABITS

*Exoteleia anomala* has a one-year life cycle. The moths fly and oviposit in midsummer, and the larvae overwinter. Pupation takes place in the mined needles. The life history is similar to that of a more northern but potentially sympatric species of needle miner *Coleotechnites ponderosae* Hodges & Stevens (Stevens 1973, Hodges & Stevens 1978), and an undescribed species of *Coleotechnites* from *Pinus jeffreyi* Grev. & Balf. in southern California (Luck 1976). However, larval habits of *E. anomala* are different.

Adults fly in June and July. Eggs were not seen, but they may be laid in old mined needles as with *Coleotechnites* pine needle miners (Stark 1954, Struble 1972, Stevens 1973), or in other locations near susceptible new foliage.

Larvae readily colonize foliage of the current year's growth, in contrast to *C. ponderosae* larvae, which seem to prefer older foliage (Stevens 1973). Examination of shoots from 12 heavily infested trees collected 21 October 1981 showed that 72% of the new (1981) needles had been invaded, as had 65% of the 1980 foliage. How much of the damage to 1980 foliage resulted from mining by the 1981 generation was not determined; certainly some was attributable to the 1980 generation. A collection of 14 1981 shoots, made in July 1982 after all larval feeding had ended, showed that only 8% of the needles had escaped infestation.

Larval head capsule measurements indicate four instars (Fig. 1). Each larva utilizes two needles to complete development. First instars enter the first needle in late summer, molt, and remain there as second instars until spring. Most of the larvae in the 4 March 1982 collection appeared to have only recently arrived at the second needle. Larvae enter the first-mined needles in the middle third of the needle. This mine is short, only 1–2 cm; the part of the needle distad of the mine soon dies and fades. Larvae normally enter the second-mined needle within 1 cm of the tip, and more of the second needle is excavated. A set of 28 fully developed mines (from which adults had emerged) averaged 5.7 cm long (SD = 1.2 cm). The larvae cut small holes in the needle surface for disposal of frass; these are covered with silk from

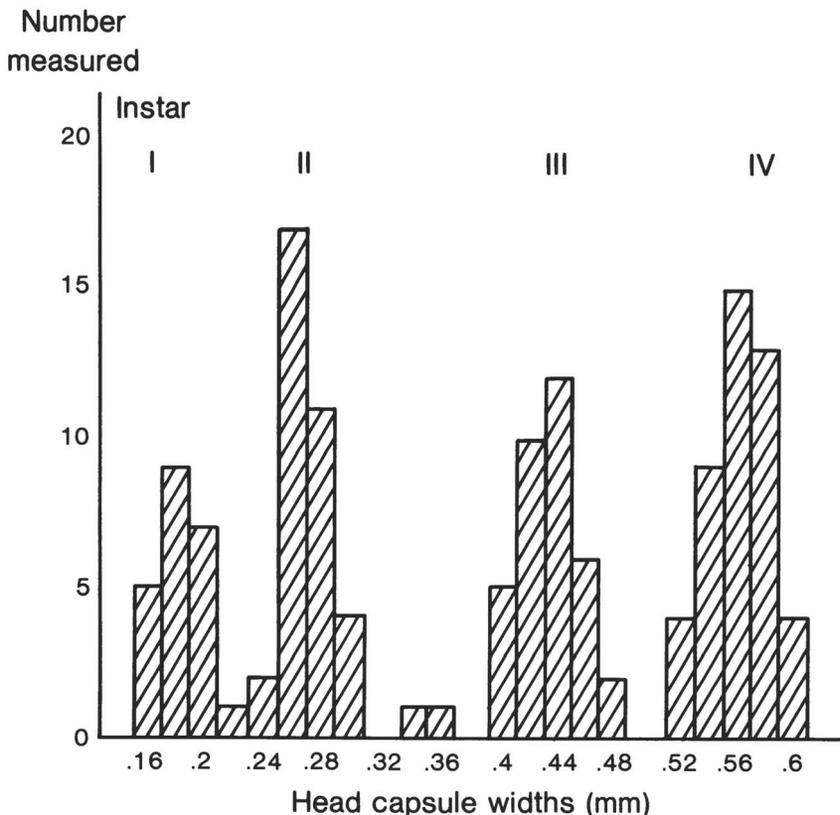


FIG. 1. Head capsule measurements ( $n = 138$ ) of *Exoteleia anomala* larvae.

within after they are no longer needed. There is usually only one needle miner per needle, but more than one larva per needle does occur. When this happens, normal entry locations are altered. Larvae located distally to others in a single needle do not complete development, and may move to another needle.

Pupation, as in the well known *Coleotechnites* pine needle miners and some species of *Exoteleia*, takes place within the last mined needle. The larva cuts a hole in the needle surface to allow for adult exit. The hole may be at either end of the mine. Pupae are dark brown to black, cylindrical, and 5.5 to 6.0 mm long. They are usually found 1 cm or more back from the exit hole, head pointing toward it.

#### POPULATION FLUCTUATIONS AND EFFECTS OF LARVAL FEEDING

Although heavy larval feeding can cause many needles to die, no permanent tree damage has been reported. This may be due to the

fact that outbreaks of *E. anomala* appear not to persist. For example, population densities were high enough to attract attention in Arizona in 1978, but no infestation was reported during the next 2 years. Larval numbers in 1981 appeared to decline markedly at the time of transfer from first- to second-mined needles. This may be a time in the insect's life cycle when it is particularly vulnerable.

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