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Detecting Noctuid Borers

Collecting and rearing stem-boring moths requires only a few pieces of equipment, plus some knowledge of plant identification and the preferred larval foodplants. The *Papaipema* moths of the family Noctuidae are one of the important groups of stem-boring Lepidoptera. *Papaipema* moths are medium-sized and usually marked with a series of white spots on the forewing. Some species have adult forms that are essentially unmarked, with only a faint outline of spots. Most *Papaipema* moths are quite colorful and easily blend with the autumn colors of yellow, red, orange and brown. Adult moths begin to appear in August and remain active until late October. Unfortunately, many *Papaipema* species are not easily collected at lights or with baits, but they can be reared from larvae found in various host plants. *Papaipema* larvae are borers within the stems, roots, or rhizomes of various herbaceous plants. Some species are very host specific while others infest plants of several genera. Some common foodplants are aster, ironweed, joe-pye weed, may-apple, mint, pitcher-plant, ragweed, thistle, burdock, bracken fern, and sensitive fern.

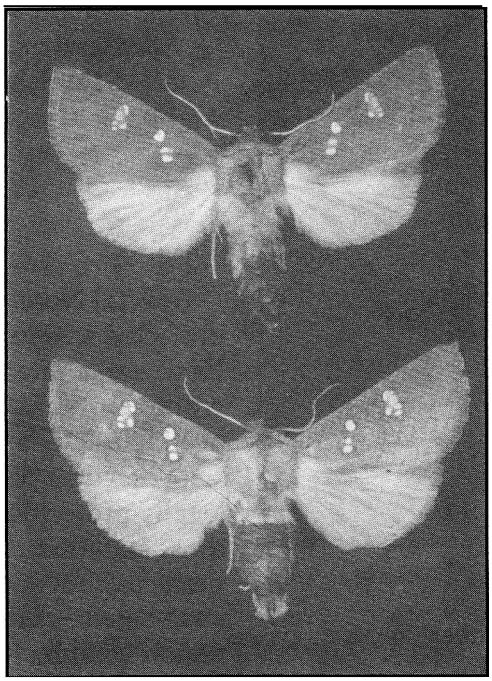

Fig. 1.
Papaipema beeriana Bird,
Otsego Co., Michigan

With a general knowledge of *Papaipema* moths and their larval foodplants, one can begin searching for signs of the boring larvae. A good time to begin the search is in June and July. This is where the fun and challenge of becoming an amateur detective begins. Most of these larvae can be located initially by searching for signs of an infested plant. Look for wilted or discolored leaves, or a bent or broken stem. By inspecting the main stem, usually one or two holes can be found along it, often with an accumulation of frass at the base of the plant. In some cases, the larva can be found within a gall near the base of the plant. Knowing the moth's larval foodplant may give a clue into the occupant's identity, although the color of the frass may assist in the identification. Some species have a bright orange frass, while others may produce frass that ranges from white to dark brown.

When an infested plant has been located, the larva can usually be collected by cutting a section of stem that extends both above and below the holes you find on the stem. The stem section should be placed in a vial, jar, or ziploc bag along with some moist moss or other planting medium. For larvae found as late instars, they can be kept alive within the stem section by placing it in a small jar or other container with soil. In cases, where the the larvae are found in the root or rhizome, the entire plant can be transported and replanted elsewhere. In all cases, full-grown larvae should be placed in escape-proof containers with moist soil for pupation. Glass or metal containers are best because larvae can chew their way through plastic, cloth and cardboard! Depending on the species of *Papaipema*, some larvae will pupate within the plant material. Rearing larvae is the best method to secure brightly colored, immaculate specimens. *Papaipema* moths collected at lights are often worn and duller looking.

Another method of rearing these fascinating moths is by collecting wild females and having them lay eggs inside paper bags. An ordinary brown grocery bag is sufficient for a female to lay a huge number of eggs. Often the tiny eggs will be hidden in creases and under seams in the bag, so you must look carefully. Placing a small section of the larval foodplant inside the bag and keeping the

bag somewhat moist will usually 'cue' the moth and guarantee eggs laying. The eggs should be kept outdoors or in a cold garage during the winter. The eggs will hatch sometime in April, usually when their foodplants begin to sprout. Foodplants can be grown in your yard, or sought for in the wild. An artificial diet is another method that can be used to rear these moths. One type of diet that has proven useful for rearing many *Papaipema* species is a commercial mix used for rearing the southwestern corn borer, *Diatraea grandiosella* Dyar. This diet can be obtained from several commercial biological supply companies. Some Umbelliferae borers can be reared in carrots by drilling a vertical hole into the carrot's top, inserting the larva, and then planting the carrot in a pot. Some people have also reared larvae in sweet potatoes!

There are 34 species of *Papaipema* currently recorded in Michigan. Some are still poorly known with respect to their statewide distribution, their preferred larval foodplants, and their general biology. The most colorful species is *P. appassiottata* (Harvey), which is host specific to the pitcher-plant. The larvae can easily be detected by searching for a wilted or dried flower-stalk and a pile of orange frass in the center of the plant. A very common species is *P. nebris* (Guenee), which is a general feeder, but quite often uses giant ragweed as its larval foodplant. One of the least known Michigan species is *P. aerata* (Lyman) whose larvae bore into burdock, an introduced weed. A mystery still remains as to which native plant was used by *P. aerata* prior to the arrival of burdock. Such a discovery would be a worthy goal for *Papaipema* borer detectives!

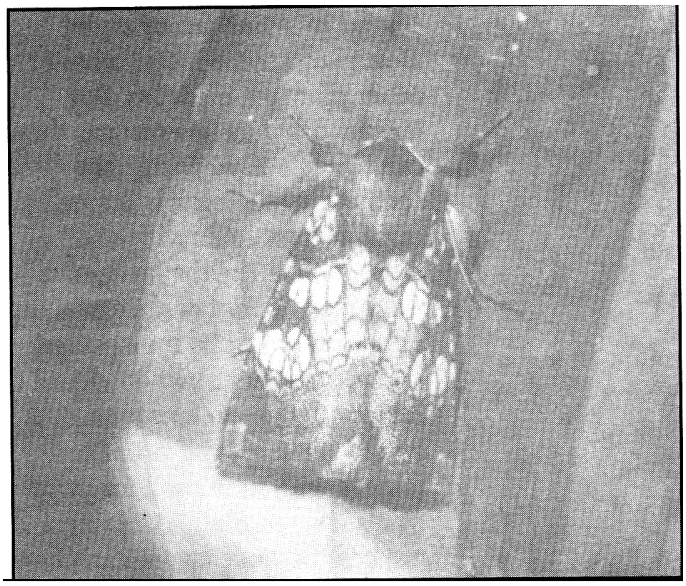

Fig. 2.
Papaipema appassionata on pitcher-plant, Cheboygan Co., Michigan.

There is still much to be learned about Michigan *Papaipema*. Anyone who has a yen to play detective and accepts this challenge, will find the study and collection of these unique moths very satisfying. For additional information, consult the following:

Covell Jr., C.V. 1984. A Field Guide to the Moths of Eastern North America. Houghton Mifflin Co., Boston, MA. 496 pp.

Hessel, S.A. 1954. A guide to collecting the plant-boring larvae of the genus *Papaipema*. Lepid. News 8:57-63.

Moore, S. 1955. An annotated list of the moths of Michigan exclusive of Tineoidea (Lepidoptera). Misc. Publ. Mus. Zool., Univ. Mich. No. 88: 87 pp.

Mogens C. Nielsen, 1995

Special Note. Currently there are no federally protected species of *Papaipema* in the United States. However, a few species of *Papaipema* are protected within individual states, and therefore collectors need to follow all pertinent state regulations. Insects state-listed as "endangered" or "threatened" are legally protected within those same states, while those state-listed as "special concern" are not protected but are considered rare. As of 1995, the state-listed *Papaipema* species in the Great Lakes region include: *P. aweme*, the aweme borer (special concern in Michigan); *P. beeriana*, the blazing star borer (special concern in Michigan; endangered in Ohio); *P. cerina*, the golden borer (special concern in Michigan); *P. maritima*, the maritime sunflower borer (special concern in Michigan); *P. sciata*, the culver's-root borer (special concern in Michigan); *P. silphii*, the silphium borer (threatened in Michigan; endangered in Ohio and Wisconsin); and *P. speciosissima*, the regal fern borer (special concern in Illinois, Michigan, and Ohio).