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A Natural Light *Sapyga* and Parasite Emergence Trap in Leafcutting Bee Management (*Megachile rotundata*)

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Populations of leafcutting bees, *Megachile rotundata* (F.), maintained in the same nesting material for several years rapidly become infested with various species of nest destroyers (*Tribolium, Trichodes, Trogoderma,* the Indian meal moth—*Plodia,* cadelle beetle), parasites *(Monodontomerus, Tetrastichus, Pteromalus, Melittobia),* and cleptoparasites (*Sapyga, Nemognatha).*

If the bee is propagated in solid boards or straws, this complex of insect pests can be controlled only through phasing-out of these media on an annual basis through incubation and the use of emergence traps. The loose-cell system of bee management has proven an effective means of reducing populations of many of the nest destroyers since passing the loose cells over a vibrating screen after their removal from the nesting medium eliminates most larvae and adults of this pest group. Parasites and cleptoparasites, however, are secreted within the cells and are not affected by screening.

A variety of traps has been developed for use during the emergence period and all are reasonably effective in eliminating many larvae and adults of the non-specific nest destroyers. An exception is the adult of the cadelle beetle (*Tenebroides*) which is a severe pest of *M. rotundata* in California and parts of Nevada, and has recently increased in numbers in the Pacific Northwest. The beetle is flat and much broader than either *Tribolium* or *Trogoderma* adults. The breadth of the adult prevents it from passing through the square nylon or wire mesh utilized in all current phase-out traps so the beetle passes unimpeded through the trap.

Aside from the checkered flour beetle, *Trichodes ornatus, Sapyga pumila* is perhaps the most difficult parasite to eliminate from nesting bee populations. Conventional phase-out traps are ineffective and only the black light trap developed by Torchio (1970) has proven successful in removing *Sapyga* from infested nesting materials. The black light trap, however, requires a battery as a power source for field operation, and maintaining a fully charged battery at each trap site is both inconvenient and costly.

The trap herein described was designed to overcome two principal limitations of available traps: the removal of the adult cadelle beetle, and the elimination of *Sapyga* adults using only natural light. In two years of testing on heavily parasitized nesting materials (20.2 percent *Sapyga;* 18 percent cadelle beetle and *Tribolium* spp.) in an isolated area, the trap successfully removed all but one specimen of *Sapyga,* and in combination with the loose-cell management technique, reduced the population of nest destroyers to less than 0.2 percent.

The trap is illustrated in Figure 1 and presented diagramatically in Figures 2-A and 2-B. The overall length of the unit is approximately 15 inches; its width and height are indicated as a "variable" for it can be constructed to fit any emergence aperture in the incubator unit. The principal features of the trap include:

1. Interchangeable horizontal and vertical screens.
2. A slotted screen over tray 1 (Figure 2-A) through which adults and larvae of *Tribolium, Trogoderma,* and the cadelle beetle can pass.
3. A plexiglass deflector extends from the trap lid to the surface of the slotted screen and

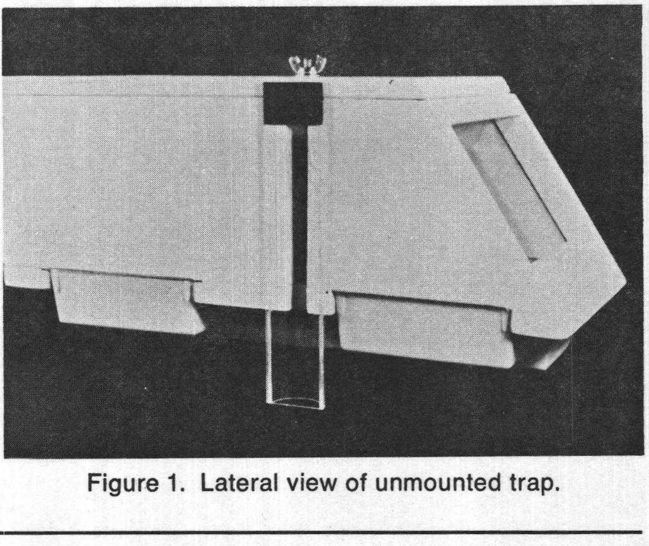

Figure 1. Lateral view of unmounted trap.

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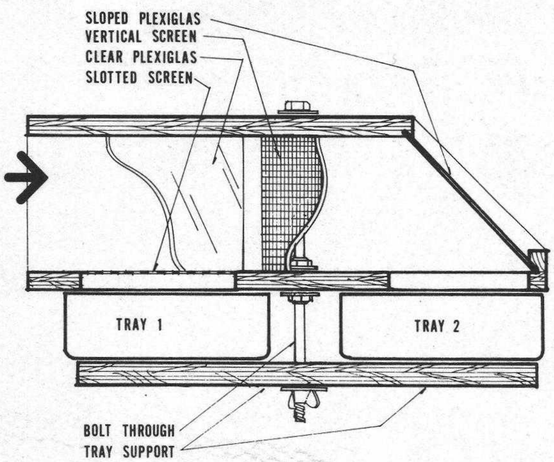

Figure 2-A. Lateral section of trap.

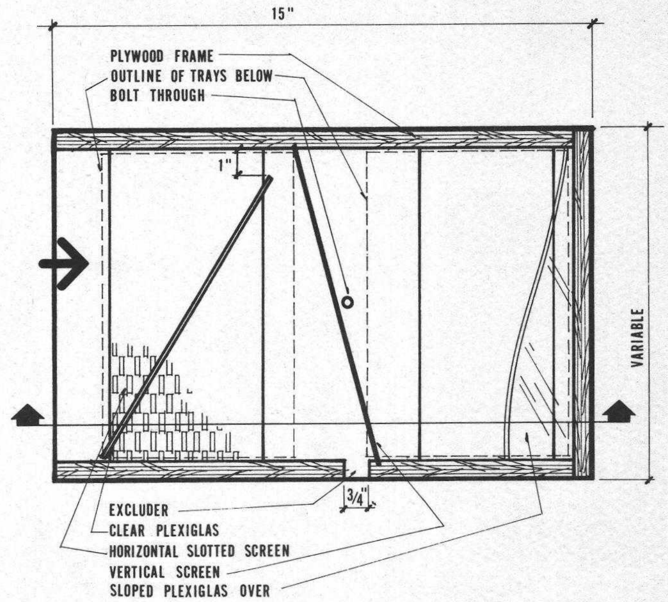

Figure 2-B Plan of trap.

is angled from one wall to within one inch of the opposite wall (Figure 2-B). Parasites and depradators must move over most of the slotted screen before they can leave the rear chamber of the trap, thus increasing the probability of their dropping through the screen into the oil-baited tray beneath.

4. An anterior vertical round-hole screen (.070-inch to .090-inch) is angled to run the entire width of the trap. *Sapyga*, microhymenopterous parasites, and bees must pass over the length of the screen before reaching the excluder covered exit. The parasites pass through the screen and are eliminated.
5. The plexiglass sheet covers the 3/4-inch egress aperture and a semi-circular plexiglass piece is fused to its lower end to prevent the re-entry of adult bees (Figure 1). The excluder is intentionally constructed to extend below the bottom of the trays. Emergent bees may be confined to a cage at the incubator site for subsequent transport to a field domicile.
6. A continuously threaded 3/8-inch steel rod extends through the trap from the cover to the lower tray support. Wing nuts at the top and bottom give ready access for tray removal or trap cleaning. The rod is fixed by two nuts above and below the trap floor so the trays remain in position when the cover is removed and vice versa (Figure 2-A).

With this trap, as with all others, the body must be sealed tightly against the emergence aperture from the incubator. We found toggle bolts extending from eye bolts on the incubator wall to others at the mid-point on the sides of the trap body hold the trap tightly against the incubator body and also facilitate ready removal of the trap at the end of the season.