

United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant QuarantineA TECHNIQUE FOR ESTABLISHING ATTACKS
OF ISOLATED BARK BEETLESBy R. Z. Callaham
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Recent investigations have shown that pine species show a differential resistance to various species of bark beetles. These investigations have emphasized the need for a study of the responses of different species as they attack the same tree; they also have emphasized the need for a genetic study of certain species of the bark beetle genus Dendroctonus. For undertaking such investigations it would be necessary to have some satisfactory method of inducing isolated beetles to attack the host material. One such method is to insert the insects into nail holes in the bark and to cover the opening with screen to prevent their escape.^{1/} This method obviously does not allow the beetles to choose whether or not to attack, or to select either the place of attack or their mates.

A more satisfactory technique recently has been devised and tested in connection with studies of the host factors affecting the success of bark beetle attack. Pieces of 16-mesh metal screen are cut as shown in figure 1, and the straight margins are stapled together to form a cone. The cone apex is left open. Next a portion of the bark on the tree is smoothed with a 1-inch wood chisel, to provide a base for securing the cone. Care should be taken to complete this operation with the least possible disturbance of the natural bark surface to be enclosed within the cone. A thin layer of cotton is placed on the smoothed bark surface, and the basal margin of the cone is attached by means of staples driven through the screen and cotton into the bark. Finally, the insects are placed in the cage through the open apex of the cone, and the opening is closed by means of staples (fig. 2).

Western pine beetles (Dendroctonus brevicornis Lec.) were used to test this technique. Adults that had recently emerged were taken in flight in a rearing room. Sex determinations were made on the basis of general size (from any one piece of brood bark the females were

^{1/} Method developed in 1931 by W. D. Bedard, of this Bureau.

noticeably larger than the males) and the shape of the seventh abdominal tergite as described by Hopkins (1, p. 36). Care was taken to avoid bunching the insects together, for if given an opportunity the beetles clipped the legs and antennae from their neighbors.

The object of the experiment was to investigate the behavior responses of single males, single females, and pairs of beetles. No less than six replications of each condition were made. An examination of the galleries made by the paired beetles and the single females revealed normal attacks, egg galleries, and broods. Hence, it seems logical to assume that the technique described herein can be used in studies of host resistance and in genetic investigations of the genus Dendroctonus where attacks and broods of individual pairs of beetles are studied. As expected, single males did not attack. Males observed under natural conditions usually enter the galleries of the females and do not participate in the boring activities.

Literature Cited

- (1) Hopkins, A. D.
1909. The genus Dendroctonus. U. S. Dept. Agr. Tech. Ser. 17,
Pt. I, 164 pp.

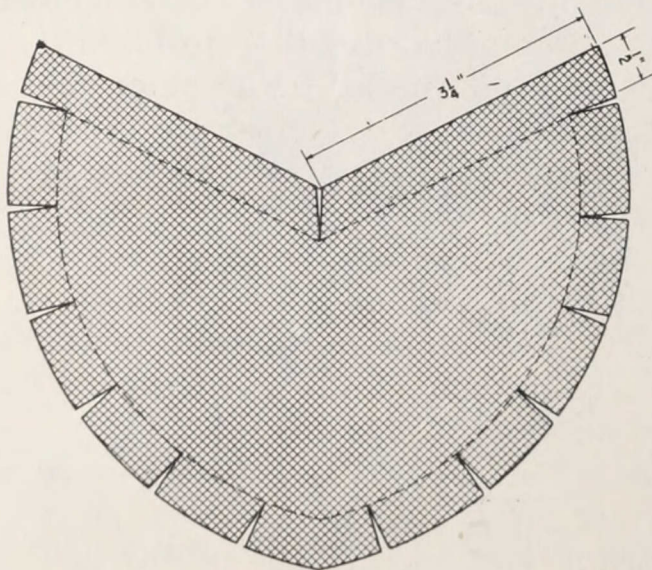


Figure 1.--Pattern for screen cones.

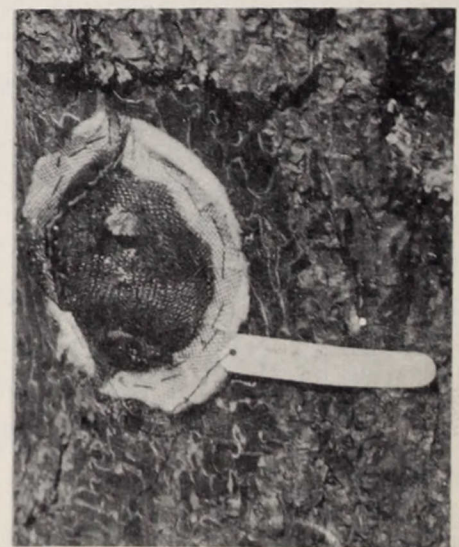


Figure 2.--Screen cone installed on a pine log.