

## Southern Pine Beetle (Coleoptera: Scolytidae) Brood Adults: Reverse Emergence<sup>1</sup>

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**ABSTRACT** The emergence of southern pine beetle (*Dendroctonus frontalis* Zimmermann) brood adults from the inner surface of removed *Pinus taeda* L. bark is described.

It is well known that bark beetles normally emerge through the outer bark. The parent adults bore the so-called "ventilation holes" (Melnikova 1964, Payne 1980), while the brood adults bore the more frequent "exit holes." However, Miller and Keen (1960) reported that when bark was removed from trees infested with the western pine beetle *Dendroctonus brevicomis* LeCompte 1876, the adults reversed their normal direction of emergence and emerged through the inner surface. If the bark were kept in a container with light excluded, the beetles emerged from both the outer and inner bark surfaces. This note reports similar behavior for the southern pine beetle, *D. frontalis* Zimmermann 1868.

### Methods

The methods and procedures used here were the same as those reported in Moser and Bridges (1983).

The bark from three bolts of *Pinus taeda* L. 1753, each containing 875 cm<sup>2</sup> of bark area, was removed from infested bolts and air-dried inside the laboratory for 36 h. As a control, the bark from three other bolts was not removed. Material from both treatments was held in individual rearing cans inside the laboratory until emergence was complete. The closed can interiors were kept dark at about 20°C and 50% relative humidity with little or no air movement.

### Results and Discussion

Beetles emerged through both sides of the removed bark, but twice as many emerged through the inner sur-

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FIG. 1. Inner surface (inner bark) of removed bark showing beetle emergence holes (arrows).

**Table 1.** Number of emergence holes in inner and outer surfaces of bark removed from bolts

Slab	No. of holes in bark			
	Inner surface		Outer surface	
	Ventilation	Exit	Ventilation	Exit
A	58	103	58	73
B	90	218	90	63
C	76	177	76	120
Total	224	498	224	256

face (Fig. 1) as through the outer surface (Table 1). All adults emerged through the outer surfaces of those bolts where bark was not removed.

Moser and Bridges (1983) report that bark removed from *Pinus taeda* in the laboratory quickly dries and any emerging brood adults are mite free. Hence, any laboratory emergence of brood adults in this manner would indicate mite-free conditions.

To our knowledge this is the first record of southern pine beetles emerging "in reverse" through the inner surface of the bark. G. N. Lanier (personal communication) states that in *Scolytus ventralis* LeConte 1868, *S. multistriatus* (Marsham 1802), and *D. adjunctus* Blandford 1879, as well as in all members of the *D.*

*brevicomis-frontalis* species group, larval populations migrate from the phloem into the outer bark where they pupate. Lanier further states that in trees infested by *S. multistriatus*, the bark sometimes cracks and dries out in winter, separating the bark from the wood; in these instances he has observed brood adults emerging in reverse through the inner surface. So this behavior might be expected from any bark beetle whose larvae migrate to the outer bark. Moser and Bridges (1983) also propose that the laboratory removal process can be duplicated in nature by woodpeckers who knock off pieces of bark containing beetle brood.

#### REFERENCES CITED

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