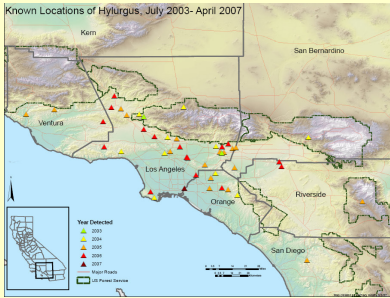


Redhaired pine bark beetle



Photo by A.G. Gutierrez and D.N. Thomas

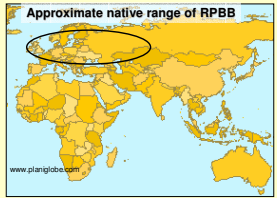
The invader



Redhaired Pine Bark Beetle (RPBB) *Hylurgus ligniperda* (F.) (Coleoptera: Scolytidae)

The redhaired pine bark beetle (RPBB) was first found overwintering in North America in New York in 2000. In July 2003, it was detected in Los Angeles Co., California. RPBB has since been collected in flight traps in urban and more remote forest lands in Orange, Riverside, San Bernardino, San Diego and Ventura Cos.

Where is it from?



Native range	Europe, Mediterranean, and Asia
Also invaded	Australia, Brazil, Chile, Japan, New Zealand, St. Helena Island, South Africa, Swaziland, Uruguay, U.S.
How RPBB entered the U.S. is unknown, but it likely arrived with solid wood packing material associated with imported goods.	

What are the potential impacts?



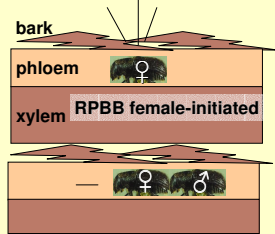
RPBB is generally a secondary pest attacking the lower stem and roots of dead or stressed pines, but has been reported to kill healthy trees and seedlings. A major concern is that RPBB could vector black-stain root disease, *Leptographium wagneri*, a virulent native pathogen that currently threatens western pines through a native bark beetle vector system.

Left: Adult maturation feeding on a pine seedling; Right: Adults under bark/photo W.M. Ciesla

What is its biology?

The pioneer sex (female) is attracted to volatiles from pine hosts, and bores through the bark, constructs a "nuptial chamber" in the phloem, and may emit an aggregation pheromone.

One RPBB female mates with one male. The female lays up to 500 eggs in a long gallery, often laying eggs in a few batches.



How was the study conducted?

- Host volatiles attached to 12-unit Lindgren funnel traps in 150 ml pouches (ethanol) or 5X 15 ml poly bottles (95% (-)- α -pinene) purchased from Pherotech Inc., Delta, B.C., Canada.

- Four blocks established; trap cups positioned about 20 cm above ground; traps completely randomized within a block; and re-randomized with each collection.



- Attractive baits drew in hundreds of beetles.
- Data analyzed by using repeated measures ANOVA, $P < 0.05$; means compared with Tukey test.

Responses of Redhaired Pine Bark Beetle (RPBB), *Hylurgus ligniperda*, and Associated Subcortical Coleoptera to Host Volatiles in Southern California

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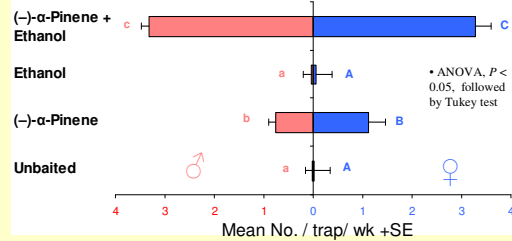
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Research Questions

- How would flying RPBB adults respond to host volatiles?
- What seasonal flight pattern does RPBB have in Southern California?
- How diverse are subcortical insects associated with exotic Mediterranean pines in Southern California?
- How would those subcortical insects respond to host volatiles?

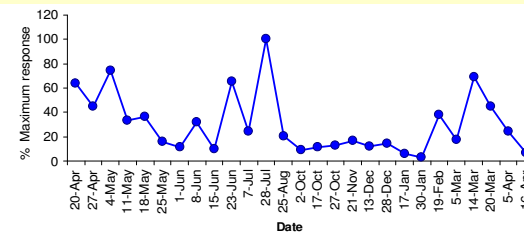
What was found?

1. Flight response of RPBB to α -pinene and ethanol at three sites in Los Angeles County, California



α -Pinene was attractive to RPBB, and ethanol was not. Ethanol and α -pinene worked synergistically to attract RPBB. No differences were found in the responses of males and females.

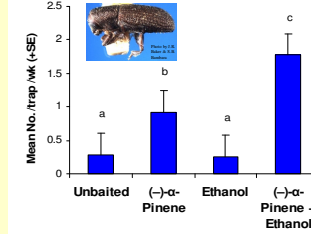
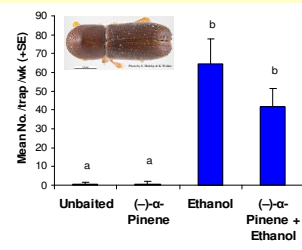
2. Seasonal flight pattern of RPBB in Los Angeles County, California from 2006 to 2007



Seasonal flight activity fluctuated from April (2006) to April (2007), peak activity was observed in the spring (March to early May) and summer (late July). Activity was low from August to January, and increased from mid-February.

3. Flight response of *Xyleborinus saxeseni* (Coleoptera: Scolytidae) to host semiochemicals

Xyleborinus saxeseni was attracted to ethanol, but not to α -pinene. The addition of α -pinene did not significantly affect the response to ethanol

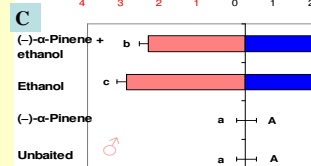
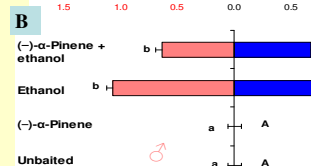
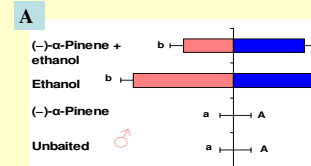
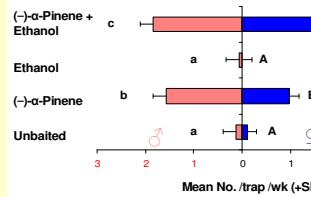


4. Flight response of *Hylastes tenuis* (Coleoptera: Scolytidae) to host semiochemicals

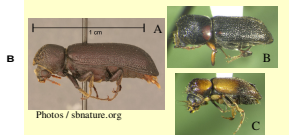
Hylastes tenuis was attracted to α -pinene, but not to ethanol. Ethanol synergized the attraction of α -pinene.

5. Flight response of *Arhopalus syriacus* (Coleoptera: Cerambycidae) to host semiochemicals

Both male and female *A. syriacus* responded to α -pinene, but not to ethanol. Ethanol synergized the attraction of α -pinene to males and females.



6. Flight responses of *Amphicerus cornutus* (Pallas) (A), *Scolicia declivis* (LeConte) (B), and *S. suturalis* (Horn) (C) (Coleoptera: Bostrichidae) to host semiochemicals



Photos: A, *Am. cornutus*; B, *S. declivis*; C, *S. suturalis*

All three bostrichids showed significant responses to ethanol. The addition of α -pinene tended to decrease the attraction of ethanol for all the three species, but only significantly for *S. suturalis*.

Research Summary

The flight of RPBB occurred year round with major peaks in the spring (March to early May) and summer (late July). A wide range of other subcortical Coleoptera were trapped in the experiment including 22 species of Scolytidae, 6 species of Bostrichidae, 3 species of Colydiidae, and 5 species of Cerambycidae. Ethanol and/or (-)- α -pinene elicited significant flight responses from RPBB, *X. saxeseni*, *H. tenuis*, *A. syriacus*, *Am. cornutus*, *S. declivis*, and *S. suturalis*. The combination of ethanol and (-)- α -pinene can be used in early detection for RPBB and other invasive species.

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