

**Chemically mediated behavior of the
western subterranean termite,
Reticulitermes hesperus Banks
(Isoptera: Rhinotermitidae)**

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Laboratory studies were conducted on the feeding, orientation, and trail-following behavior of *Reticulitermes hesperus* in response to chemical stimuli in plant materials and insect body tissues. An apparatus for termite culture and a video image analysis system for measuring termite feeding are described.

In the first study with plant semiochemicals, termite fed least on rice paper containing starch from *Lycoris radiata* (Amaryllidaceae) and greatest on paper containing a synthetic binder. Low termite mortality suggests antifeedant rather than toxic effects. In a second study, the behavior and survival of termite pseudergates was assessed on sawdusts and solvent extracts of *Pseudotsuga menziesii*, *Pinus ponderosa*, and four tropical hardwoods: *Centrolobium* sp., *Lysiloma seemanii*, *Tabebuia guayacan*, and *Tabebuia ochracea*. Mortality was greatest on *T. ochracea* sawdust and extracts of *T. ochracea* and *P. ponderosa*. In behavioral assays with groups and individual pseudergates, extracts of *P. menziesii* and *P. ponderosa* attracted or arrested termites. In individual assays, extracts of *T. guayacan* and *T. ochracea* were repellent. A third study was performed with extracts of *Abies concolor* decayed by a basidiomycete isolated from wood adjacent to *R. hesperus* galleries. A chloroform extract elicited trail-following, but much less than that elicited by extracts of termite sternal glands.

In studies of *R. hesperus* trail-following behavior, more pseudergates were recruited to artificial trails of greater pheromone concentration, they traveled a greater distance without pausing, and their rate of locomotion increased over that observed on trails of lesser concentration. Also, fewer left the trails or reversed direction than on trails of lower concentration. Termites walking down concentration gradients failed to complete these trails to the low-concentration termini. At a point on the gradient possibly proportional to the original concentration of pheromone, they reversed their direction of travel and returned to the high-concentration terminus, indicating orientation by longitudinal klinotaxis. Trail pheromone was isolated by sequential HPLC fractionation and bioassay of solvent extracts of excised sternites from *R. hesperus* pseudergates. Recruitment and orientation were elicited by the same HPLC and GLC fractions. Mass spectroscopy indicates that an unsaturated dodecatrienol is present in the active fraction.

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