

**OR195**

*The evolution of mound building in the Australian Coptotermes termites*

**Timothy Lee**, Stephen Cameron, Theodore Evans, Simon Ho, Dieter Hochuli, Nathan Lo

The mounds of termites are the result of some of the most complex co-operative behaviour in the animal kingdom, but the evolutionary origins of this behaviour remain poorly understood. Mound-building has evolved multiple times independently in the termites, including one occurrence in the Australian *Coptotermes*. Some Australian *Coptotermes* species also nest in living trees, while the most closely related non-Australian species predominantly nest in dead wood. Worldwide, the genus includes some of the most destructive termite pests. We conducted a phylogenetic study of the Australian *Coptotermes* in order to shed light on the evolution of nesting behaviour in this group, sequencing mitochondrial COI and COII and nuclear ITS1 in >100 specimens representing all currently described Australian species. We have found that mound-building behaviour arose at least three times independently within the Australian *Coptotermes*, in all cases resulting in distinctive thick-walled mound architecture. We have used ancestral-state reconstruction and molecular-clock analysis to estimate the timing of the appearance of new nesting types in the Australian *Coptotermes*. Along with the results of logistic a regression analysis using climate data, this suggests that the evolution of new nesting types in the Australian *Coptotermes* coincided with a period of climate fluctuation on the Australian continent. We tentatively conclude that the ancestral Australian *Coptotermes* was a living-tree nester, and that mound-building in the Australian *Coptotermes* arose in response to the increasingly erratic availability of moisture in the Australian environment. Finally, we find that genetic diversity within the Australian *Coptotermes* is greater than previously thought, with a possible three new species discovered.