



## **Soldier-biased gene expression in a termite implies indirect selection for defense**

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In a termite colony, reproduction is monopolized by a small number of sexuals that are supported by an army of reproductively altruistic soldiers and workers. A recent RNA sequencing analysis of the Eastern subterranean termite revealed that most of the identified (78%) caste-biased genes exhibit a distinct soldier-specific pattern (Wu et al. *Evol Dev* 20:3-16). Paradoxically, despite a shared developmental program with workers, this defensively specialized caste is well-differentiated from both the reproductive (nymph) and the other non-reproductive caste (worker) of this species. The soldier biased pattern suggests novel use of genes specifically implicated in this caste's defensive role. Behl et al. (*Insectes Soc* in review) found support for the hypothesis that termite soldiers are a source of genetic novelty by showing that genes with soldier-biased expression are more phylogenetically restricted than un-biased genes. Based on the premise that *Reticulitermes* and most termite soldiers are sterile, any past selection for genetic novelty in this caste must have been mediated indirectly through reproducing relatives. We here propose to test how this indirect type of selection affects the rates of molecular evolution. On the one hand, we predict that genes indirectly selected for selfless defense may experience relaxed adaptive molecular evolution, relative to the genes directly selected for reproduction. On the other hand, genes explicitly associated with defense-specialized soldier caste may be less constrained, and thus, free to evolve rapidly. Herein, we employ population genomics and comparable data from the social Hymenoptera to infer the differences in rates of adaptive molecular evolution across soldier-biased and un-biased genes from the Eastern subterranean termite.