

An antifungal polyketide associated with horizontally acquired genes supports symbiont-mediated defense in *Lagria villosa* beetles.

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Abstract

Microbial symbionts are often a source of chemical novelty and can contribute to host defense against antagonists. However, the ecological relevance of chemical mediators remains unclear for most systems. *Lagria* beetles live in symbiosis with multiple strains of *Burkholderia* bacteria that protect their offspring against pathogens. Here, we describe the antifungal polyketide lagriamide, and provide evidence supporting that it is produced by an uncultured symbiont, *Burkholderia gladioli* Lv-StB, which is dominant in field-collected *Lagria villosa*. Interestingly, lagriamide is structurally similar to bistramides, defensive compounds found in marine tunicates. We identify a gene cluster that is probably involved in lagriamide biosynthesis, provide evidence for horizontal acquisition of these genes, and show that the naturally occurring symbiont strains on the egg are protective in the soil environment. Our findings highlight the potential of microbial symbionts and

horizontal gene transfer as influential sources of ecological innovation.

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