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[P7] TROPODITHIETIC ACID PRODUCTION INFLUENCES ACTIVATION OF A GENE TRANSFER AGENT IN PHAEOBACTER PISCINAE

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Horizontal gene transfer (HGT) is an important mediator of bacterial evolution, and in Rhodobacteraceae, gene transfer agents (GTAs) are believed to be a major driver of horizontal gene transfer. GTAs are virus-like particles, which transfer pieces of the bacterial host DNA through a mechanism combining aspects of natural transformation and transduction. However, GTA release happens through cell lysis and thus at the expense of the donor cell, necessitating a tight control of this process. In Phaeobacter piscinae S26, we found that the production of the antibiotic compound tropodithietic acid (TDA) represses the activation of an uncharacterized GTA. In this study, we characterize this novel GTA and investigate the possible regulatory mechanisms behind this repression. Through bioinformatic analysis, we identified homologs of 38 out of 42 genes of the multi-locus GTA genome, including a homologue of GafA, a direct activator of GTA release, which is repressed by TDA production. In Dinoroseobacter shibae, GafA is repressed by the LuxIR2 quorum sensing system, and we found that this system is homologous to the PgaIR system of Phaeobacter, which TDA is proposed to act as an autoinducer of. Based on these data, we propose a regulatory system where TDA interacts with PgaR to repress GafA, leading to a repression of GTA activation. Experimental verification of this pathway is currently on-going. These data contribute to the growing understanding of how GTA regulation is achieved. Although the role of GTAs in Nature remains under debate, they have been proposed to accelerate bacterial adaptation and evolution. GTAs may also facilitate the dissemination of antibiotic resistance, a major threat to human health, providing another important incentive for studying them. Underpinning the regulatory mechanisms governing GTA release is thus an important part understanding of what role GTAs play in Nature.