

Attraction Pheromone of The Benthic Diatom *Seminavis robusta*: Studies on Structure-Activity Relationships.

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Diatom pheromones – structure and function of communication mediators of unicellular algae
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Abstract

Recently the first pheromone of a marine diatom was identified to be the diketopiperazine (S,S)-diproline. This compound facilitates attraction between mating partners in the benthic diatom *Seminavis robusta*. Interestingly, sexualized *S. robusta* cells are attracted to both the natural pheromone (S,S)-diproline as well as to its enantiomer (R,R)-diproline. Usually stereospecificity is a prerequisite for successful substrate-receptor interactions, and especially pheromone perception is often highly enantioselective. Here we introduce a structure-activity relationship study, to learn more about the principles of pheromone reception in diatoms. We analyzed the activity of nine different diketopiperazines in attraction and interference assays. The pheromone diproline itself, as well as a pipecolic acid derived diketopiperazine with two expanded aliphatic ring systems, showed the highest attractivity. Hydroxylatoin of the aliphatic rings abolished any bioactivity. Diketopiperazines derived from acyclic amino acids were not attractive as well. All stereoisomers of both the diproline and the pipecolic acid derived diketopiperazine were purified by enantioselective high-performance liquid chromatography, and application in bioactivity tests confirmed that attraction pheromone perception in this diatom is indeed not stereospecific. However, the lack of activity of diketopiperazines derived from acyclic amino acids suggests a specificity that prevents misguidance to sources of other naturally occurring diketopiperazines.

Identifier

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