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Stretching boundaries: Biosynthetic pathways to novel antifouling agents

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Biofouling is the undesirable accumulation of fouling organisms such as barnacles, on artificial surfaces in sea-water. For years, the hulls of vessels have been coated with toxic antifouling paints to prevent marine growth. In 2003 one of the most effective paint, based on organic tin, was banned leaving methods too costly or environmentally hazardous to control the problem. The ban on environmental harmful paint products has increased interest in innovative antifouling technologies. Natural products are known to prevent settlements of fouling organism; they do not kill the organisms but inhibit their settlements. They are environmentally friendly. Natural products that can be produced by fermentation, with the aid of modern fermentation technology, may be produced cost-effectively. Over the years, several investigations have pointed to a biosynthetic pathway, initiating with roquefortine C that is the source of metabolites with unique structural features. These metabolites have shown antifouling activity. As we are able to produce roquefortine C efficiently, in excellent purity and in gram quantities by fermentation, we propose to develop a biomimetic semi-synthetic route to access this recently discovered class of antifouling agents. These products will be modified chemically to afford novel structures with potent antifouling activity.

Biography

Madeleine M Joullié is on the faculty of the University of Pennsylvania, where she isone of the first woman professors to earn tenure in chemistry in the Ivy League. She is a member of many honorary and professional societies, she teaches, runs a research group, and has authored three books and over 300 articles. She was on the Board of the American Chemical Society and is on the Board of the Chemical Heritage Foundation and has received many awards. Her research interests are in the areas of heterocyclic, medicinal, and natural products chemistry. Her laboratory has focused on the chemistry of the cyclopeptide alkaloids and didemnin families of natural products, as well as the development of compounds for the visualization of latent fingerprints as a forensic tool in law enforcement. Her current interest is in the utilization of fermentation as a green tool in synthetic organic chemistry.

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