Sustainable barnacle-repelling paint could help the shipping industry and the environment

30 April 2014

Barnacles might seem like a given part of a seasoned ship's hull, but they're literally quite a drag and cause a ship to burn more fuel. To prevent these and other hangers-on from slowing ships down, scientists are developing a sustainable paint ingredient from plants that can repel clingy sea critters without killing them. The report appears in the ACS journal *Industrial & Engineering Chemistry Research*.

Guillermo Blustein and colleagues explain that barnacles and other ocean creatures that stick to hulls create a cascade of problems. By increasing water resistance, they can bump a ship's fuel use by as much as 40 percent, which costs money, adds to pollution and depletes resources. These marine hitchhikers also can cause environmental problems by invading new parts of the globe and competing with native animals and plants. To keep hulls clean, some shipping companies have turned to special coatings. The problem is these coatings can permanently harm sea life. So the team sought an ocean-friendlier option from a sustainable source.

They turned to *Maytenus* trees, which are found worldwide. The plants' root bark contains compounds that are similar to defensive agents produced by bottom-dwelling ocean creatures. In the lab, the scientists found that the compounds repel barnacles, but generally don't cause long-term damage. They also added the compounds to paint, which they applied to tiles and field-tested in the sea. The new coatings effectively stopped algae, tube worms and other creatures from latching on.

More information: "Antifouling Activity of Celastroids Isolated from Maytenus Species, Natural and Sustainable Alternatives for Marine Coatings" *Ind. Eng. Chem. Res.*, Article ASAP.

DOI: 10.1021/ie4033507

Abstract
A group of celastroids, quinone-methide nortriterpenes isolated from Maytenus vitis-idaea and Maytenus spinosa were assayed for their antifouling activity. Toxicity assays were performed on Balanus amphitrite nauplii, and the most promising compounds were then incorporated in soluble-matrix antifouling paints, which were tested in the ocean. The results obtained after a 45 day-field trial of the paints indicated in all cases promising antifouling potencies. Although all compounds showed antifouling activity on a wide range of organisms, tingenone and celastrol were the most effective inhibitors of the settlement of fouling organisms. The effect of these substances on nauplii in laboratory tests was temporary instead of toxic, with a high recovery rate, which may avert a potentially adverse ecological damage on the benthic community. These results may provide a more environmentally friendly alternative for the control of biofouling, replacing toxic additives actually in use in marine paints.

Provided by American Chemical Society