Marine Bacteria from Danish Coastal Waters Show Antifouling Activity against the Marine Fouling Bacterium Pseudoalteromonas sp. Strain S91 and Zoospores of the Green Alga Ulva australis Independent of Bacteriocidal Activity - DTU Orbit (31/01/2019)

The aims of this study were to determine if marine bacteria from Danish coastal waters produce antifouling compounds and if antifouling bacteria could be ascribed to specific niches or seasons. We further assess if antibacterial effect is a good proxy for antifouling activity. We isolated 110 bacteria with anti-Vibrio activity from different sample types and locations during a 1-year sampling from Danish coastal waters. The strains were identified as Pseudoalteromonas, Phaeobacter, and Vibronaceae based on phenotypic tests and partial 16S rRNA gene sequence similarity. The numbers of bioactive bacteria were significantly higher in warmer than in colder months. While some species were isolated at all sampling locations, others were niche specific. We repeatedly isolated Phaeobacter gallaeciensis at surfaces from one site and Pseudoalteromonas tunicata at two others. Twenty-two strains, representing the major taxonomic groups, different seasons, and isolation strategies, were tested for antiadhesive effect against the marine biofilm-forming bacterium Pseudoalteromonas sp. strain S91 and zoospores of the green alga Ulva australis. The antiadhesive effects were assessed by quantifying the number of strain S91 or Ulva spores attaching to a preformed biofilm of each of the 22 strains. The strongest antifouling activity was found in Pseudoalteromonas strains. Biofilms of Pseudoalteromonas piscicida, Pseudoalteromonas tunicata, and Pseudoalteromonas ulvae prevented Pseudoalteromonas S91 from attaching to steel surfaces. P. piscicida killed S91 bacteria in the suspension cultures, whereas P. tunicata and P. ulvae did not; however, they did prevent adhesion by nonbactericidal mechanism(s). Seven Pseudoalteromonas species, including P. piscicida and P. tunicata, reduced the number of settling Ulva zoospores to less than 10% of the number settling on control surfaces. The antifouling alpP gene was detected only in P. tunicata strains (with purple and yellow pigmentation), so other compounds/mechanisms must be present in the other Pseudoalteromonas strains with antifouling activity.

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