Lab-based all year round anti-fouling bioassay to screen for pre- and post-settlement bioicide activity against barnacles.

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Rationale
- Current antifouling technologies are mainly based on the continuous release of biocides and consequently discharge into the environment.
- Barnacles are important fouling organisms worldwide - largely increasing the hydrodynamic drag of ships and damaging coatings on underwater surfaces.
- Barnacles are extensively used as a model in antifouling research mostly in static, lab-based systems - however, reliable flow-through test assays for the screening of antifouling paints and its incorporated biocides are rare.
- We have developed a test assays to screen diverse low-release biocide paints and their pre- as well as post-settlement activity against barnacles.

The Flow Cell Assay
- Test assay for coatings where antifouling activity is confined to the paint surface and biocides are bound to the paint matrix -- antifouling activity exercised only when the fouling organism makes contact with the paint, e.g. at settlement or post-settlement penetration:
  - Open flow cells with continuous flow-through seawater prevent accumulation of biocides
  - Design and nylon net ensure the panels to be the only surfaces available for settlement
  - Choice or no-choice tests: each flow cell holds two treated or one treated and one control panel (11 x 11 cm)

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Conclusions
This settlement assay produces all-year round reliable results in order to test for large-scale and more realistic anti-settlement activity of biocides against barnacles. The settlement assay can be easily extended to screen for post-settlement activity of biocides.

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Preliminary Results
- Preliminary tests with biocide-free panels show high settlement rates and demonstrate that settled barnacles can be monitored after metamorphosis to explore time-dependent post-settlement effect of biocides.
- This novel flow-cell assay is now used to test for antifouling activity against barnacles, where the biocide effect is triggered when post-settlement barnacles penetrate the coating.

Figure 1 - Settlement and post-settlement growth of B. improvisus on PMMA (Plexiglas®) and LEAF-4.1 paint (Ab & Iv) without biocides.

Figure 2 - Settlement and post-settlement growth of B. improvisus on PMMA (Plexiglas®) and LEAF-4.1 paint (Ab & Iv) with biocides (Ab & Iv), photo=LEAF-4.1-Co.

Figure 3 - Settlement and post-settlement growth of B. improvisus on PMMA (Plexiglas®) and LEAF-4.1 paint (Ab & Iv) with biocides (Ab & Iv), photo=LEAF-4.1-Co.

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