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Supplemental Information

Surface flow for colonial integration in reef-building corals

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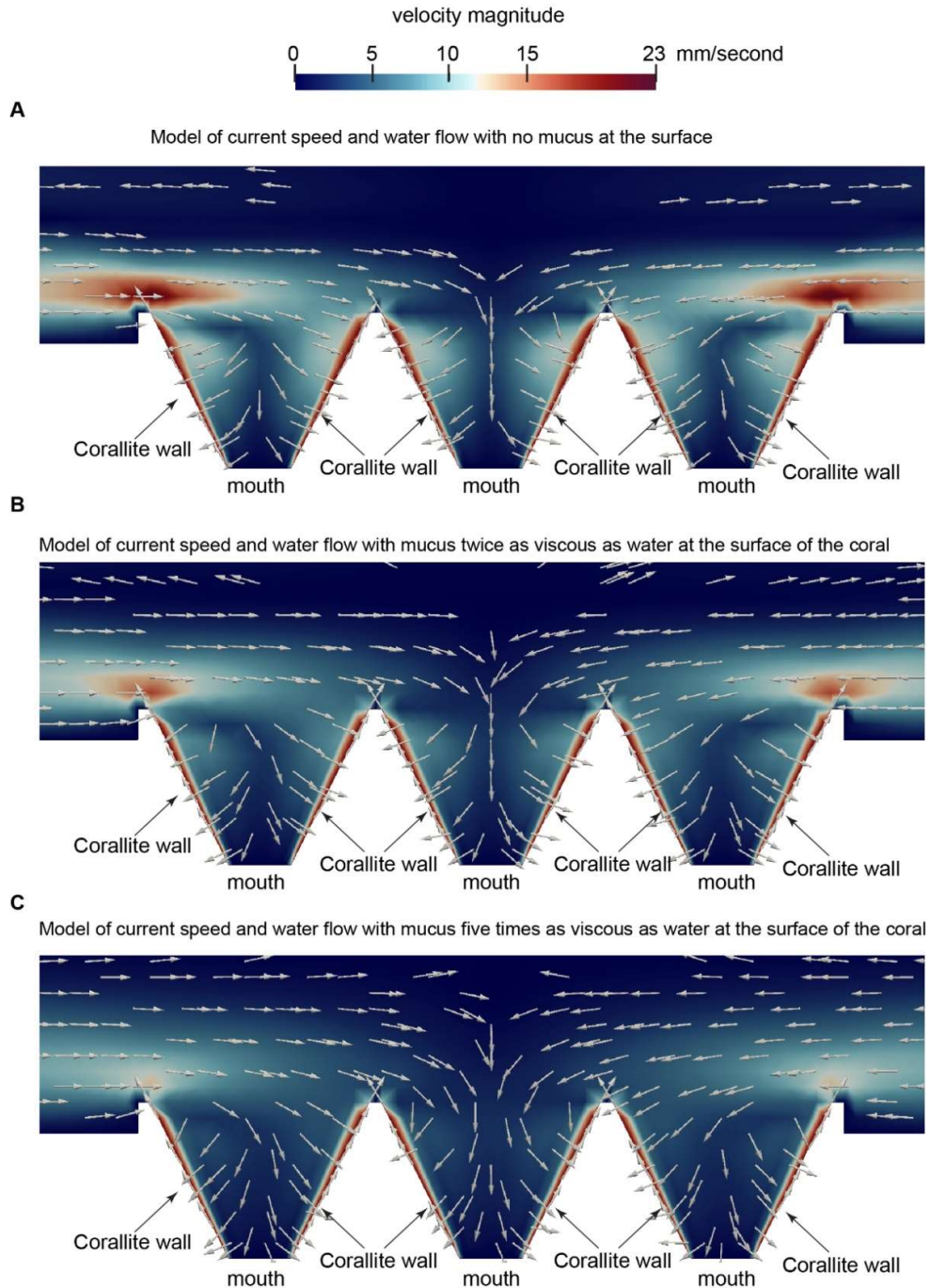


Figure S1: Mucus at the surface of *A. lamarcki* does not impair particle movement towards the mouth. Related to Figure 1, 2.

(A) Model in presence of water at the surface of the coral. (B) Model in presence of a fluid twice as viscous as water at the surface of the coral. (C) Model in presence of a fluid five times as viscous as water at the surface of the coral. Colors represent the velocity of the fluids currents; vectors represent the direction of the fluids currents.

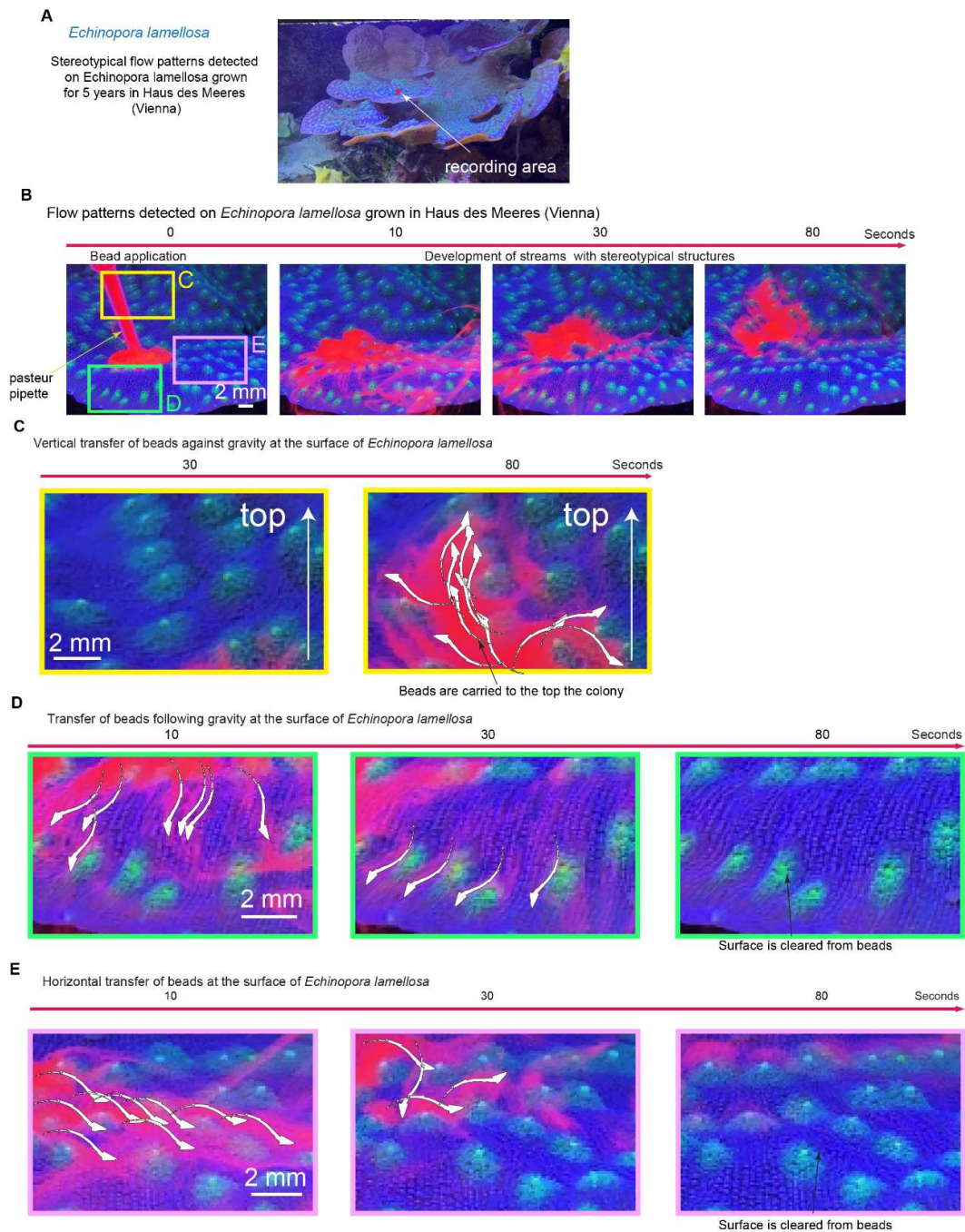
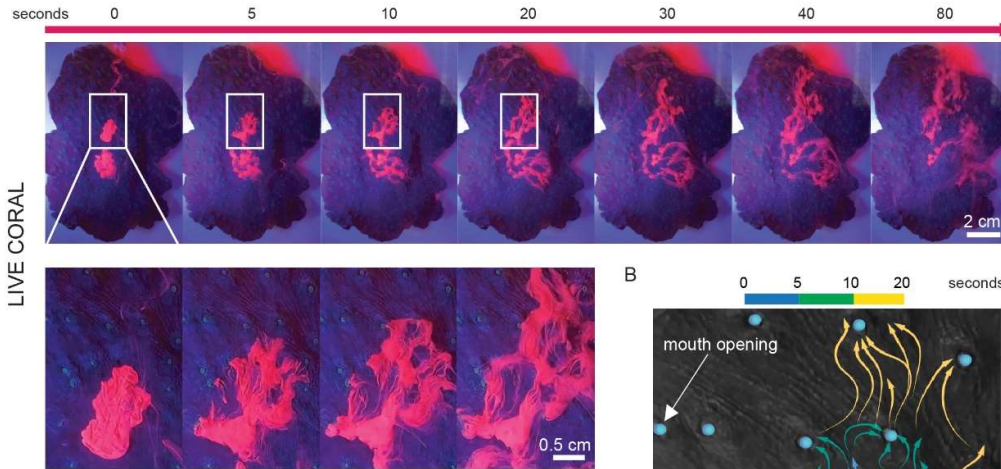


Figure S2: *E. lamellosa* can transport beads over the colony, even against gravity. Related to Figure 1.

(A) Picture of the aquarium- cultivated (5 years, Haus des Meeres, Vienna) *E. lamellosa* colony used for tracking beads. (B) Time course after bead application at the surface of the colony. The colored boxes at time 0 are the areas that are enlarged in panels C, D and E. (C) Enlarged picture of the yellow panel in B. (D) Enlarged picture of the green panel in B. (E) Enlarged picture of the pink panel in B. Arrows represent the movement of the beads.

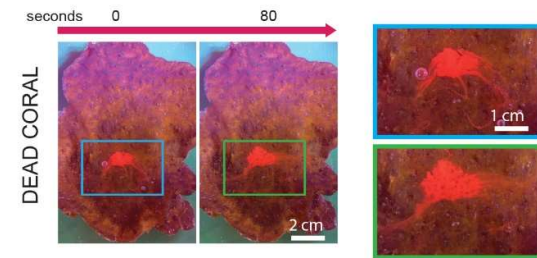
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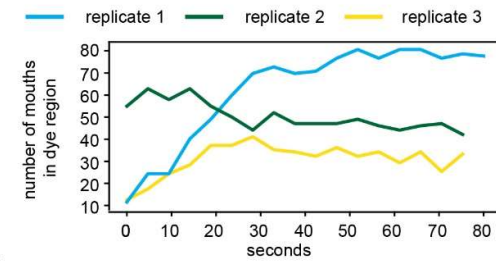
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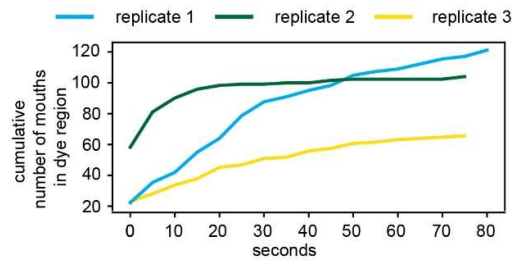
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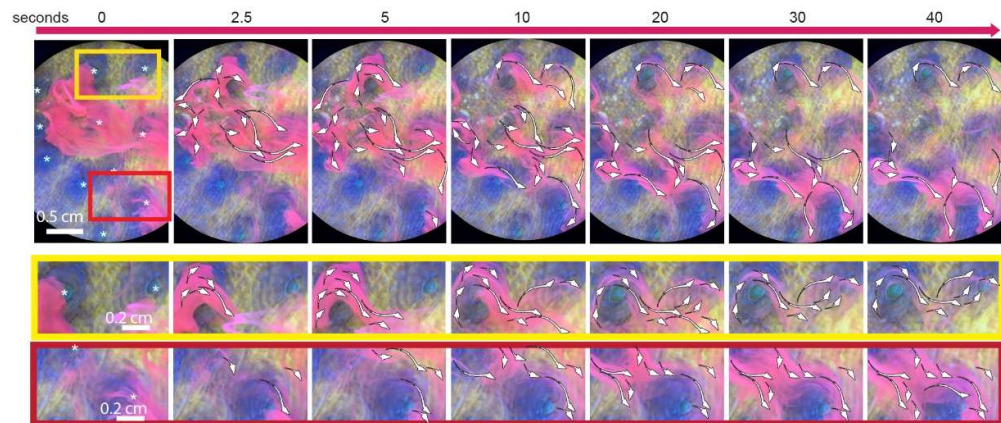


Figure S3: Formation of horizontal transportation water mass transfer units on the surface of a 15 cm-wide *E. lamellosa*. Related to Figure 5.

(A) Application of red fluorescent beads to two locations on the coral surface allows the visualization of stable currents and transportation units connecting a fraction of specifically distributed individual polyps. (B) Most of the currents are unidirectional and share the same general direction within this portion of a coral surface. (C) Control condition with the same coral after killing the colony via a 24-hour drying period. Note that oriented streams are not formed, and the beads sediment and stay in the same location. (D-E) Graph showing the absolute and cumulative numbers of individual polyps connected via the visualized water currents over time. (F) Horizontal currents engage and transport fluorescent beads until the translocation of beads is complete. During the transportation of beads, currents show high stability in terms of geometry, localization and speed. Arrows delineate the directions of the currents; stars highlight the coordinates of individual polyps or their mouths. The experiment was repeated 3 times on different colonies and produced similar results.

Supplemental references

- [S1]. Jacquemin, J., Husson, P., Padua, A.A.H., and Majer, V. (2006). Density and viscosity of several pure and water-saturated ionic liquids. *Green Chemistry* 8, 172-180. 10.1039/B513231B.