# Review of: "Effects of Sediment Disturbance by the Heart Urchin Echinocardium Cordatum on the Sediment–Seawater Solute Exchange: An Exclusion Experiment"

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Potential competing interests: No potential competing interests to declare.

Review: Effects of Sediment Disturbance by the Heart Urchin *Echinocardium Cordatum* on the Sediment–Seawater Solute Exchange: An Exclusion Experiment.

This manuscript investigated the role of the heart urchin *Echinocardium cordatum*, which is an important bioturbator in shallow marine environments throughout the world.

The author began by conducting a seafloor survey before an experiment to study the resident population of Echinocardium cordatum. This survey involved:

- Divers using cameras to capture images of quadrats

- Timelapse photography to estimate the speed of urchin plowing activity

The authors proceeded to isolate a section of the seafloor from urchin activity and observe the resulting changes in sediment structure, and they compared the sediment within the isolated area with the surrounding, unaltered sediment.

This experiment establishes a control area (inside the rings) where urchins are excluded and a treatment area (outside the rings) where urchins can continue their activity. By comparing the sediment cores from these two areas, the author can potentially assess the influence of urchin bioturbation (sediment reworking) on the seafloor structure.

**In the laboratory**, the author created a controlled environment in the laboratory that closely resembles the natural conditions experienced. The light cycle, temperature, and water circulation are all crucial factors in maintaining the health of the sediment microbiome and allowing for accurate measurements of sediment-seawater interactions.

to compare the **rate of solute exchange** between the sediment and seawater under light and dark conditions. Oxygen concentration is often used as an indicator of biological activity in the sediment. By measuring oxygen changes within the closed system, the author assessed the impact of light on the sediment's ability to consume or release solutes.

**Sample analyses**

Various analytical techniques like Water Sample Analysis (Nutrients: nitrate, nitrite, ammonium), and Sediment Analysis (Granulometry, Water Content), Chemical Analyses (Dissolved Nitrogen Gas (N2), Nitrate, Nitrite, Ammonium)

used by the author after the sediment-seawater solute flux measurements analyses aim to understand

the cycling of nutrients (nitrogen) between the sediment and the overlying seawater.

Changes in nutrient concentrations before and after incubation can shed light on their uptake or release by the sediment under light and dark conditions.

Sediment properties like particle size distribution and water content can influence solute exchange rates.

Solute flux estimates: To calculate the rate of solute exchange (flux) between the sediment and seawater, the author refers to the change in the concentration of a specific solute (e.g., nitrate) and the volume of seawater before and after the incubation period (during a 4-hour period) under light and dark conditions.

As a result, this study provides insights into the composition, water content, and biological activity within the sediment of Man O'War Bay. It also highlights the role of light in influencing the sediment's ability to remove nitrogen gas and release ammonium. The findings suggest that the bay's sediment plays a role in cycling nitrogen through the water column, and this is consistent with other studies carried out in other localities (exp. De Ridder C, Saucède T, 2020, Echinocardium cordatum; and by Koji Seike K et al., 2022, earthquake–liquefaction–tsunami disaster).

The author presented a consistent study with good methodology, and in my opinion, this work deserves to be published in your journal.