

## ❖ Microplastics disturb coral-algae symbiotic relationship

Dr. Nami Okubo in Tokyo Keizai University and her colleagues in National Institute for Basic Biology and University of the Ryukyus provided the first evidence that microplastics disturb the initiation of symbiotic relationship in coral-algae symbiosis. Many cnidarians including reef-building corals form the symbiotic relationship with symbiotic algae mostly through recruiting them from environment. Since the host rely a part of their requiring energy on symbionts, the recruitment of symbionts is crucial for their survival. Dr. Okubo and her colleagues demonstrated using corals and anemones that microspheres including microplastics from commercial facewash directly or indirectly through microsphere-fed zooplankton suppress the hosts to recruit potential symbionts from environments due to competitive inhibition. This finding suggests that ongoing accumulation of microplastics in the ocean may disturb the healthy coral-algae symbiotic relationships, which are cornerstones of the biologically enriched coral reef ecosystem.

Title : Microplastics disturb the anthozoan-algae symbiotic relationship

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### ❖ Research Highlights

Materials: Coral, Sea anemone *Aiptasia* (the model organism without skeleton for coral)

Microplastics from commercial facewash, Fluorescent microspheres (polystyrene)

### Results

#### ◆ Microspheres transfer via captured zooplankton into whole body of sea anemone.



Fig. 1. Fluorescent microspheres were dispersed throughout whole body of sea anemone via captured prey *Artemia* (i). e, *Artemia* nauplii; f, *Pontogeneia* sp.; g, *Calanus* sp.; i, *Aiptasia* in the 2nd day after microsphere feeding.

❖ **Smaller microspheres remained longer in the cells and were hardly expelled.**

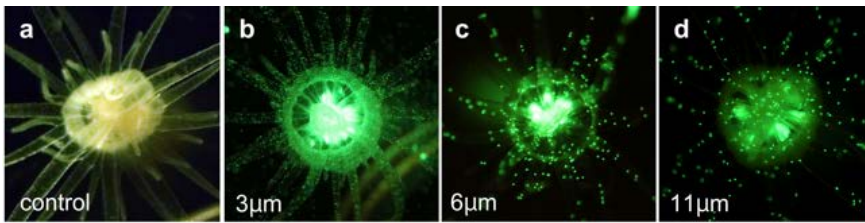
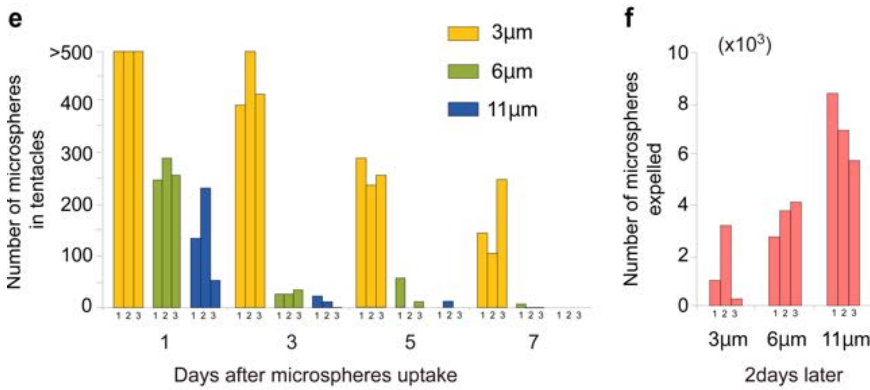


Fig. 2. Okubo et al. 2018, Marine Pollution Bulletin

a, Aposymbiotic *Aiptasia*; b, *Aiptasia* fed with microspheres of 3 µm; c, 6 µm; d, 11 µm; e, Smaller microspheres remained longer in the cells; f, Larger microspheres were more easily expelled from the cells than smaller ones



❖ **Algae *Symbiodinium* cannot live inside corals fed with microspheres**

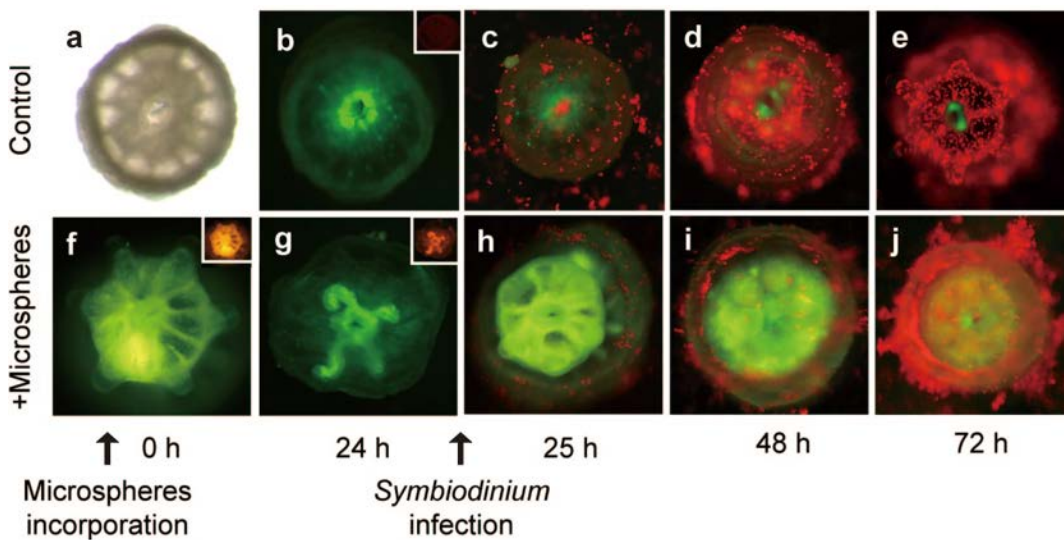


Fig. 4. Okubo et al. 2018, Marine Pollution Bulletin

Corals without microspheres are able to incorporate the algae *Symbiodinium* for symbiosis (a-e), while incorporation of *Symbiodinium* was severely suppressed in corals fed with microspheres.

## ❖ Microplastics from commercial facewash severely suppressed symbiotic relationship

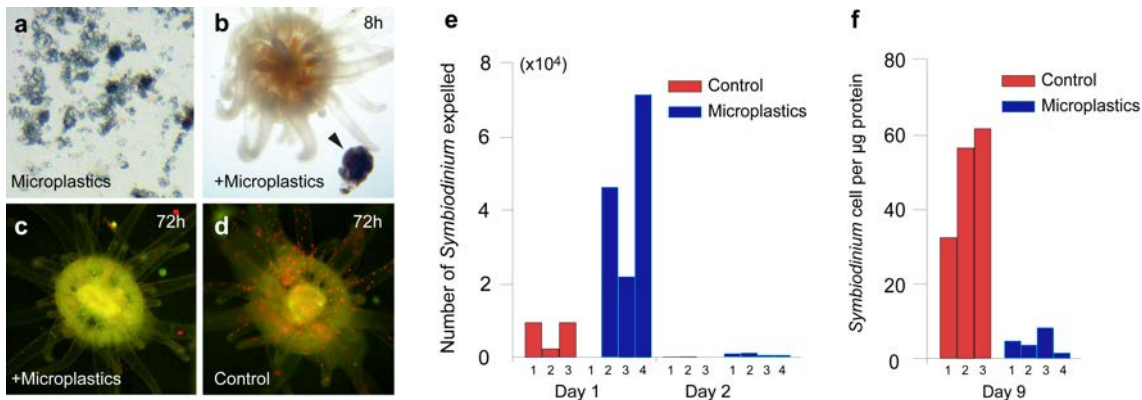


Fig. 5. Okubo et al. 2018, Marine Pollution Bulletin

### Conclusion: Microplastics disturb coral and algae symbiotic relationship.

#### Concerns

In most coral species, larvae or primary corals shortly after settlement initiate the symbiotic relationship by uptake of algae from the environment. The uptake of algae by adults also occurs, particularly following bleaching caused by stresses. However, this study shows a possibility that the inhibitory effect on such cases.

#### Message from the corresponding author Nami Okubo

Coral reefs are continuously being destroyed by huge coastal reclamations and water pollution in addition to global warming. The ongoing restoration techniques such as coral transplantation cannot regenerate coral reef ecosystems and thus the most effective measure for rescuing coral reef ecosystems is to mitigate stressors caused by human activities. We hope that the governments and companies will proceed the limitation of plastics and develop the technologies to degrade plastics.

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