Learning and Long-Term Memory Are Found in Sea Urchin

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On the coast of Japan, the sea urchins (Heliocidaris crassispina) of the same species gather together, while they are separated from their enemy, or the starfish (Patiria pectinifera). We found that sea urchins used their tube feet, which act as a sensory organ, to recognize the same species or the starfish, and determined their behavior to gather or escape, respectively. However, the sea urchins living in a field without contact with starfish did not escape from the starfish when their tube feet made contact, suggesting the possibility that avoidance behavior of sea urchins are dependent on the attack by starfish. In our experiments, we found that when the sea urchins were allowed to be attacked by starfish, they changed their behavior and they showed avoidance. Once the sea urchins showed avoidance behavior, they maintained this memory even after 12 days without a contact with the starfish. Our research is the first report showing learning and long-term memory in sea urchins.

Awards Won: