Creation of a 3D Design for Hermit Crab Shells

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The rapid decline of hermit crabs can compromise a marine ecosystem that relies on crabs to fertilize soil, disperse seeds and eat detritus (Lavers, 2019). These scavengers have a vital role in recycling energy back into the ecosystem. This research studied the role of 3D printed shells as a potential solution to manage the hermit crab “shell-housing crisis”. The purpose was to find the best 3D shell based on design, material and size. Hermit crabs carry a shell with them, but 30% percent of them are living in shells that are too small (Demaray, 2004) or they can’t find any. A model of hermit crab shell was created to later test four materials and print them using a 3D printer; these were acrylonitrile butadiene styrene (ABS plastic), polyethylene terephthalate glycol (PETG), nylon, and polylactic acid material (PLA). A fish tank was prepared with the required habitat as specified in two guides prior to collection from local beaches. The crabs varied in size, based on their developmental stage. Each hermit crab was placed in a controlled environment with four options of shell materials. The behavior and shell selection of the hermit crab was observed and recorded; PLA was the preferred material. This research addressed a significant challenge faced by marine ecosystems all over the planet because it can potentially solve the hermit crab housing shortage as well as stop the “avalanche” death effect of hermit crabs when selecting and being trapped in plastic debris that they “adopt” it as their housing.

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