Coral Crabs

What's that crab doing in my coral?

By J. Charles Delbeek

"Eek! What's That Crab Doing in My Coral?"
Many times I have been asked just this question. Perhaps not with the same level of alarm, but definitely with some concern. When branching stony corals are imported it is not uncommon for them to contain numerous little hitchhikers, such as shrimp, worms, sponges, coralline algae, tunicates and crabs. Some of these passengers can be potentially harmful, but others are not — and some we just don't know what they do, so most people err on the side of caution and remove them anyway.

This is the case with some of the crabs we find in branching corals such as Acropora, Pocillipora and Stylophora. Crabs belonging to the genus Trapezia in Pocillipora corals, and Tetralia and Domecia in Acropora, were at one time thought to be ectoparasites, living off of the tissues of the coral. Later it was discovered that these little crabs actually protected the coral in which they lived from predators, such as the crown-of-thorns seastar (Acanthaster planci).

When the seastar begins to climb over a branching coral, these little crabs move to intercept it, much like the interceptors in the "Babylon 5" TV show move out to intercept an attacking space craft! They attack the seastar by nipping at its delicate tube feet, driving it rapidly from the coral. The benefits to the crabs were less easily ascertained, and it appeared to be simply that the coral offered shelter to the crabs in exchange for defense from predators. Others speculated that the crabs were feeding on the excess of carbon and lipid (fats and oils) in the mucous produced by the corals.

Several studies have also shown that corals contain large amounts of lipids in their tissues. In fact, 30 to 40 percent of a coral's dry tissue mass is lipid. The majority of these lipids are passed from the symbiotic algae in the coral to the coral's tissues, with the rest being manufactured by the coral from metabolites of the algae. What these lipids were being used for was a mystery. Most of it was used for the formation of reproductive cells, but there was still significant excess available. One interesting observation was that coral polyps on branches lower in the coral head had a greater vitality when the crabs were present than if they were absent.

In studies of the ubiquitous Hawaiian branching stony coral Pocillopora damicornis, Dr. John Stimson of the University of Hawaii found that the presence of Trapezia sp. crabs actually stimulated the coral to produce fat bodies, which were clearly visible as small, whitish globs in the tentacles of the polyps. These were then fed upon by the crabs. How this occurs is not clear. They could be eating the tentacles directly, they could stimulate the polyp in some way to cause it to release the fat bodies, or the fat may be exuded in coral mucus. When the crabs are removed, the fat bodies get larger for about a week, but then grow smaller.

Dr. Stimson recently discovered that if the crabs are fed, they readily release ammonia, but if they are not fed, they don't. This raises the possibility that when corals feed their crabs lipids, the crabs become living fertilizers, moving amongst the branches, releasing nitrogen-rich ammonia to the resident zooxanthellae. This may explain why polyps in the lower branches retain high vitality rates despite being exposed to less light.

When crabs are removed, the lower branch polyps often died, and the lower branches become covered with algae, sponges and tunicates. It has also been speculated that movements of the crabs lower down in the colony increase water circulation and prevent detritus from accumulating. They may also stimulate increased mucus production by the coral, further helping to keep the branches clean.

This example of mutualism is not unlike that exhibited by the acacia tree of Africa and a species of ant that lives amongst its branches. The thorns of the acacia are hollow, and the ants use these as nesting sites. The tree produces small swellings along its branches that are sites of nutrient-rich sap release that the ants feed upon. In turn, the ants protect the tree from predators by dropping down on some unsuspecting antelope that is eating the leaves of the acacia, and biting it. One ant is not much of a problem, but that all changes when there are thousands of little pinchers running all over the antelopes body.

The findings of the activities of these crabs and their benefit to the coral calls into the question the relationships that similar crabs have with soft corals. Colonies of Xenia are often imported with commensal crabs, perfectly colored to match the coral. Could these crabs also be feeding on coral mucus or lipids? Could they also be beneficial fertilizers for the

coral? Most observations of these crabs indicate that they do indeed consume the tentacles, but it could be that Xenia tentacles might be retracting for other reasons, such as reduced light levels. There are many aquarists who have maintained these corals successfully with their crab symbionts present, but there are also those who have reported losses of their colonies due, they believe, to these crabs.

In any event, it seems that Trapezia and other commensal crabs found in the branches of stony corals offer definite benefits to the coral. The next time you are lucky enough to acquire a coral colony with one or more of these beneficial crabs present, please do not recoil in horror, but rather leave them in place and your coral will thank you.