HONOLULU FIELD STATION

A Quarterly newsletter of the Honolulu Field Station, part of the USGS-National Wildlife Health Center in Madison, WI

Collector sea urchin or Hawae.
Photo credit © Thierry Work

Focus: Sea Urchin Disease

Where: The Nature Conservancy (TNC) first observed sick-looking urchins at an old sunken barge (mudscow) in Maunalua Bay, Oahu. They were also observed more recently on patch reefs in Kaneohe Bay (KB), Oahu.

When: The first report of sick-looking urchins was made back in late February of 2014. Then in early May, sick-looking urchins were observed at KB.

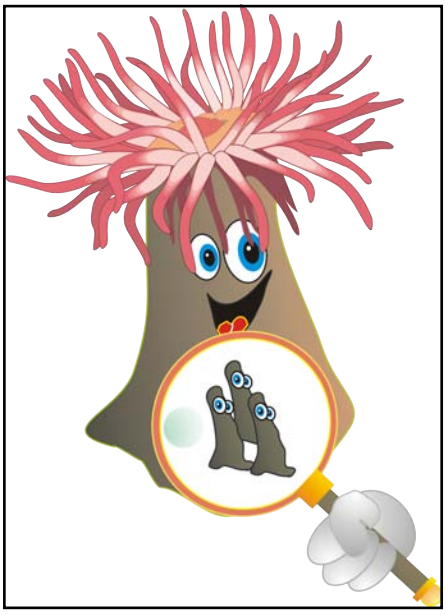
Who: The only species affected so far is the collector sea urchin also known as hawae in hawaiian. Its scientific name is Tripneustes gratilla. They graze on algae, making them an important reef environment species.

How: In response to TNC's report, HFS, DLNR, and TNC set out to investigate and conducted surveys at both sites, collecting healthy and sick urchins. Necropsies were then conducted at the HFS lab to determine cause of death.

What: Affected urchins have dull flattened spines (droopy urchins), or gradual to complete loss of spines (outside skeleton bare). Some are found empty with some tissue and spine remaining on their surface. At this point, the public is encouraged to report any sick or dead urchins to the Eyes Of the Reef network (EOR) http://eorhawaii.org/ in order to determine how widespread this event is. Laboratory efforts are underway to try and identify what is causing this disease.

Coral Symbiotic Bacteria Discovery

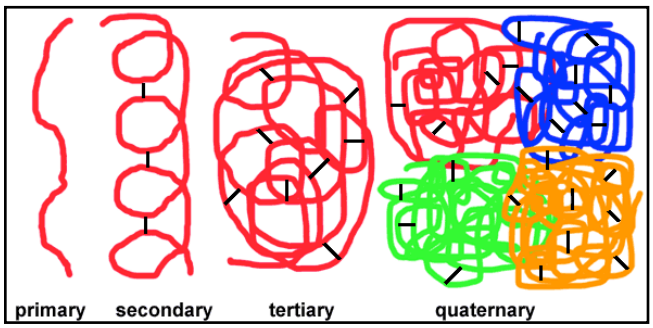
The HFS, in collaboration with UH Manoa coral researcher Greta Aeby, recently provided the first report of its kind describing the presence of tissue-associated bacteria amongst several coral species across Indo-Pacific, a region estimated to host about 3000 species of fish and around 500 species of reef building corals. The vast historical tissue archive at HFS, containing more than 8300 histological tissue slides comprising 152 species of corals from throughout the Indo-Pacific, made possible such analysis. In their analysis, Work and Aeby found that tissue-associated bacteria are widespread and more common in the Western versus Eastern Pacific. Interestingly, tissue- associated bacteria are common in a select few genera of corals that dominate coral reef ecosystems although they are not found in all regions nor species. It is thought that these tissue-associated bacteria are important symbiotic organisms that could impact coral health and perhaps evolution.



Coral and three symbiotic bacteria magnified.
Image credit © Thierry Work

Technical corner: What are proteins and why we study them?

Proteins are essential to life. They are made up of combinations of amino acids, the molecular building blocks of proteins. There are 20 different types of amino acids comprising proteins that can adopt 4 different types of structures (primary, secondary, tertiary, and quaternary) as in figure below. An example of a protein and how they change with environmental conditions is egg white, which is made up of a protein called “ovalbumin”. Egg white is liquid at room temperature but when heated, this alters the protein’s structure making it a solid. Most of our body is made up of protein forming the main components of muscle, cartilage, ligaments, hair and nail. Additionally, many chemical reactions in our bodies would not be possible without proteins called “enzymes”. Other specialized proteins called “antibodies” are important for immunity. Studying proteins helps us to better understand the processes and functions of cells, organisms, and diseases.



Simple diagram of the different types of protein structures. Photo credit http://waynesword.palomar.edu/chemid1.htm

Necropsy Files: Tumors in Birds

Nene goose in flight. Photo credit © Dan Clark

In August 2013, an adult nene from Hawaii died of lymphoma, a cancer of blood cells. In September, 2013, a critically endangered Rota crow died from liver cancer. These two cases were unusual in that cancer is rare in wildlife in general. Most wild animals do not live long enough to get cancer and usually die from things like starvation, trauma, or infectious diseases.

Molasses Spill

Last fall, a spill of 233,000 gallons of molasses occurred in Honolulu Harbor, killing over 20,000 fish and other marine organisms. The HFS provided key support to DLNR on investigating the mortality event. Dead specimens of eel, fish, shrimp and coral were examined by HFS to confirm that they had suffered from oxygen deprivation caused by the spill.

Rescue: Rota crows in captivity and nutrition

The HFS worked with partners to understand mysterious mortalities of critically endangered captive Rota crows. Birds developed odd nervous system signs and would die with no evident necropsy findings explaining cause of death. A bit of sleuthing by local aviculturists and the HFS revealed that birds were missing a vital nutrient in their diet which, when restored, alleviated the clinical symptoms almost overnight.

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