



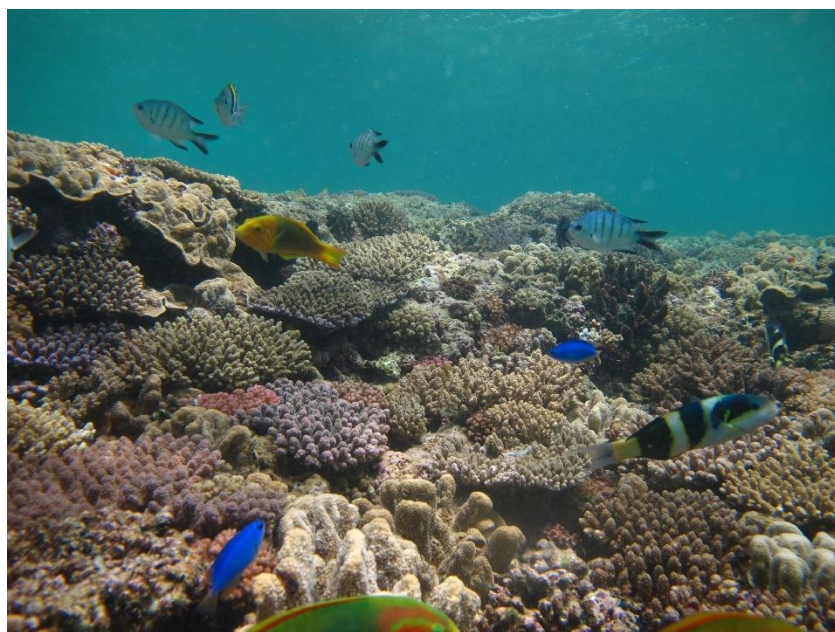
Chemical & Physical Sciences
UNIVERSITY OF TORONTO
MISSISSAUGA

COLLOQUIUM TALK
TUESDAY, FEBRUARY 2, 2016
12:00 NOON – 1:00 PM
IB 260

Dr. Merinda Nash

Smithsonian Institute, Washington DC

**How to Build a Coral Reef: Unexpected
Biomineral, Bacterial and Material Properties**



Charles Darwin, during his voyage on the Beagle, first documented rims of coralline algae capping tropical coral reefs, and identified the important role this played in building, stabilizing and providing protection for the coral reefs. However, in the intervening 180 years there has been no research to identify the exact physical properties that enable the corallines to carry out their reef building activities. Recently, at the Australian National University, we employed a combination of nanoindentation, X-ray diffraction

and scanning electron microscopy analyses to identify properties controlling the corallines reef-building capacity. Unexpectedly, we found secondary mineralization processes associated with bacterial alteration and the formation of the mineral dolomite within cells, were the key controls. Coralline algae with dolomite had substantial fracture resistance and it appears that this superior fracture toughness is the fundamental property enabling the corallines to persist and build a reef. Bacterial erosion, surprisingly, also led to enhanced fracture toughness.