Post-Biopsy Wound Repair in *Dichocoenia stokesii*

Presenter: Michelle Sparks
Objective

The aim of this study is to describe the gross and microscopic features of wound healing in *Dichocoenia stokesii* and to document the extent to which a biopsy-induced wound typically heals in this species.
Background

*Dichocoenia stokesii* is a prevalent coral in the Caribbean. *Dichocoenia stokesii* reach maturity at 3 to 8 years of age and longevity is thought to be greater than 10 years.

According to Richardson the populations of *Dichocoenia stokesii* are growing but they are not reproducing; therefore, populations are not maintaining and continue to decline (3).

Microscopic pathology of boulder hard corals like *Dichocoenia* is typically assessed using histology of a ~3cm core biopsy from the coral colony.

Researchers may not use histopathology during field investigations of coral disease because of concern that the biopsy process may be damaging to the colony.
Yet, there are few studies which describe wound healing in biopsy sites.

It is thought that stressed corals are considered to be less capable of healing, and that biopsy wounds may be subject to predation, or colonization by pathogens or competing organisms (1,3).

Moreover, histopathologic investigations of coral diseases are limited by our poor understanding of basic coral responses to injury.
Methodology

The *Dichocoenia stokesii* that were biopsied are located on the coast line of Saint Kitts and Nevis on the rocky shoreline of White House beach.
Methodology

A total of eight biopsies were taken from 7 corals.

Core biopsies were performed using a hammer and 2.5cm diameter stainless steel pipe, sharpened at one end.

The samples were then labeled and photos of the biopsies were taken.

The healing biopsies were then observed on a biweekly basis.

During the observation sessions information was gathered via photography of the healing biopsies to document regrowth and development of gross lesions.
## White House Corals *Dichocoenia stokesii* Biopsy

<table>
<thead>
<tr>
<th>Sample</th>
<th>Colony size (cm)</th>
<th>Colony depth (m)</th>
<th>Height</th>
<th>Length</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1L</td>
<td>32x42</td>
<td>3.5</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Sample 1R</td>
<td>32x42</td>
<td>3.5</td>
<td>2</td>
<td>2</td>
<td>0.5</td>
</tr>
<tr>
<td>Sample 2</td>
<td>38x32</td>
<td>4</td>
<td>1.9</td>
<td>1.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Sample 3</td>
<td>23x32</td>
<td>4</td>
<td>1.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>Sample 4</td>
<td>12x10</td>
<td>4.5</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Sample 5</td>
<td>29x41</td>
<td>4</td>
<td>2.5</td>
<td>2.5</td>
<td>1.2</td>
</tr>
<tr>
<td>Sample 6</td>
<td>29x41</td>
<td>4</td>
<td>1.9</td>
<td>2</td>
<td>1.4</td>
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<tr>
<td>Sample 7</td>
<td>32x40</td>
<td>2.5</td>
<td>2</td>
<td>2</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Results

At the time of biopsy, 2/7 corals experienced unintentional skeleton fracture which led to a larger than anticipated biopsy wound.

Sample 7, Day 0: Showing accidental skeleton fracture
Sample 4, Day 0: Showing accidental skeleton fracture
Results

By 2 weeks, most corals had developed a zone of bleaching +/- tissue loss up to .5cm thick around the biopsy wound.

3/7 corals biopsies additionally had erosion of the skeleton in these areas, consistent with predation at the wound margins (Samples 1R, 1L and 5).
Results

By 4 weeks, the skeletal wound beds of all corals were filled with sediment and algal growth to varying extents. At this time, a fine brown line at the margin of the foreign material was evident.

Sample 5, Day 32: sediment and light algal growth fill the skeletal wound bed 1 month post biopsy.

Sample 6, Day 32: sediment and light algal growth fill the skeletal wound bed 1 month post biopsy. Note fine brown line at wound margin.
Biopsy 1A

Day 0

Day 5

Day 12

Day 19

Day 32

Day 53

Day 69

Day 110

Day 113
Biopsy 1B

Day 0
NO PIC

Day 5
Day 12
Day 19
Day 32
Day 53
Day 69
Day 110
Day 113
Biopsy 2

Day 0
Day 5
Day 12
Day 19
Day 32
Day 53
Day 69
Day 110
Day 113
Biopsy 3

Day 0
Day 5
Day 12

Day 19
Day 32
Day 53

Day 69
Day 110
Day 113

NO PIC
Biopsy 4

Day 0

Day 5

Day 12

Day 19

Day 32

Day 53

Day 69

Day 110

Day 113

NO PIC

NO PIC

NO PIC
Biopsy 5

Day 0

NO PIC

Day 5

Day 12

Day 19

Day 32

Day 53

Day 69

Day 110

Day 113
Biopsy 6

Day 0

Day 5

Day 12

Day 19

Day 32

Day 53

Day 69

Day 110

Day 113
Biopsy 12

Day 0

Day 5

Day 12

Day 19

Day 32

Day 53

Day 69

Day 110

Day 113
Conclusion

Instances of post-biopsy predation at the wound margins were substantiated, potentially delaying wound healing. Post-biopsy disease or competition have not yet been observed.

The biopsy wound appears to grow up to .5cm in diameter in the 2 weeks post biopsy, potentially indicating the marginating coral tissue is injured by the technique.

The brown line of demarcation seen at 4 weeks post biopsy may represent early regeneration of the coral tissue (coenenchyme).
Conclusion...

It is unclear if the foreign material which eventually covers exposed skeleton will interfere with migration of regenerating coral tissue.

The core biopsy technique can produce larger wounds than intended, depending on coral shape and size. It is recommended that core biopsies are not performed on *Dichocoenia stokesii* smaller than <10cm diameter, where possible.

Wound sites will be monitored long term for healing success, and histological evaluation of regenerating sites will be pursued.
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References


Questions?