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# A Holistic Investigation of the Bonairian Cubozoa

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## Introduction

Cubozoa: Box Jellyfish, a class of Cnidaria with roughly 40 known species  
3 Cubozoan species known from Bonaire (Netherlands)

- *Alatina* sp.
- *Carybdea cf. xaymacana*
- *Tamoya Ohboya*

Goals:

- Confirm a lunar spawning pattern for *Alatina* sp. and resolve disputed *Alatina* phylogeny
- Elucidate life history of *Carybdea cf. xaymacana* and *Alatina* sp.
- Collect rarely encountered *Tamoya Ohboya* (a newly discovered local species)
- Interact with the public and educate locals as part of the 7<sup>th</sup> Annual Jellyfish Jamboree
- Preserve *Alatina* sp. RNA for transcriptome



Figure. Four *Alatina* sp. specimens preserved in EtOH

## Methods and Materials

Collection

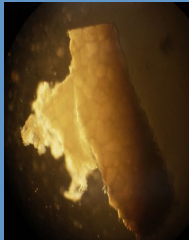
- Adult specimens by dip net and hand
- Juvenile specimens by plankton net



Collecting jellyfish with a long-handled net

Sex Determination

• The jellyfish were dissected and identified as male or female upon examination of the gonads



Female *Alatina* sp. gonad under dissecting microscope

Preservation

- For morphology: 10% formalin
- For genetics: 95% EtOH
- For RNA: Trizol and guanidine hydrochloride (6 different body regions excised and fixed for RNA preservation)



Curation of the *Alatina* sp. at the Smithsonian Institution National Museum of Natural History

Jellyfish Rearing

- Gametes from spawning adult *Alatina* sp. were cultivated in a small aquarium

## *Carybdea cf. xaymacana*



Picture taken by Bud Gillan

## *Tamoya ohboya*



Picture taken by Bud Gillan

## *Alatina* sp.

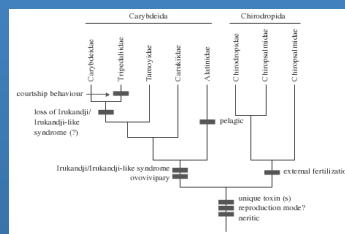


Two male and two female *Alatina* sp.

## Phylogenetic Setting



Map of Bonaire and three collection sites.



Phylogenetic tree of Cubozoa with annotations (Bentlage et al., 2010)

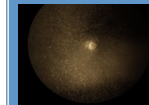
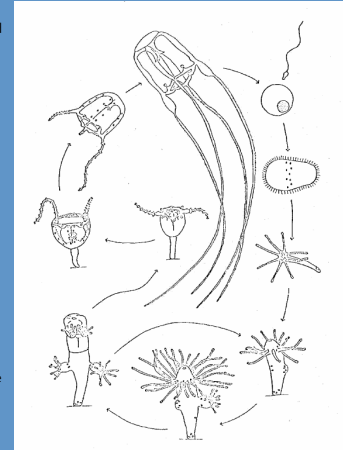
## Life History

*Alatina* sp.

- Observed spawning jellyfish 8 and 9 days after the full moon with fertilized, dividing cells inside the manubrium and gut cavity
- Successfully raised *Alatina* sp. to the polyp stage

*Carybdea sp. xaymacana*

- A large number of juvenile medusae were captured, offering conclusive proof that this species spawns on Bonaire

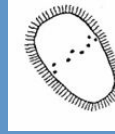


Sample of fluid taken from male *Alatina* sp. gonad viewed under compound microscope.



Fertilized egg taken from female *Alatina* sp. Gonad viewed under compound microscope

*Carybdea cf. xaymacana* life history as described by Studebaker, 1972



Drawing of Cubozoa larvae with the distinguishing lateral girde of eyespots (Studebaker, 1972)

*Tamoya Ohboya*

- Captured and observed juvenile medusae of this newly described species for the first time ever, also indicating the polyps of this species are in Bonaire



Figure. Juvenile *Tamoya Ohboya* viewed under dissecting microscope.

## Future Research

- RNA and whole genome sequencing on collected specimens
- More complete description of life history for all three species
- Greater understanding of geographic range
- Molecular species resolution among *Alatina*



## Acknowledgement and References

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