

Evaluating Different Methods to Determine a Cause for Reproductive Failure in *Lobatus gigas*.

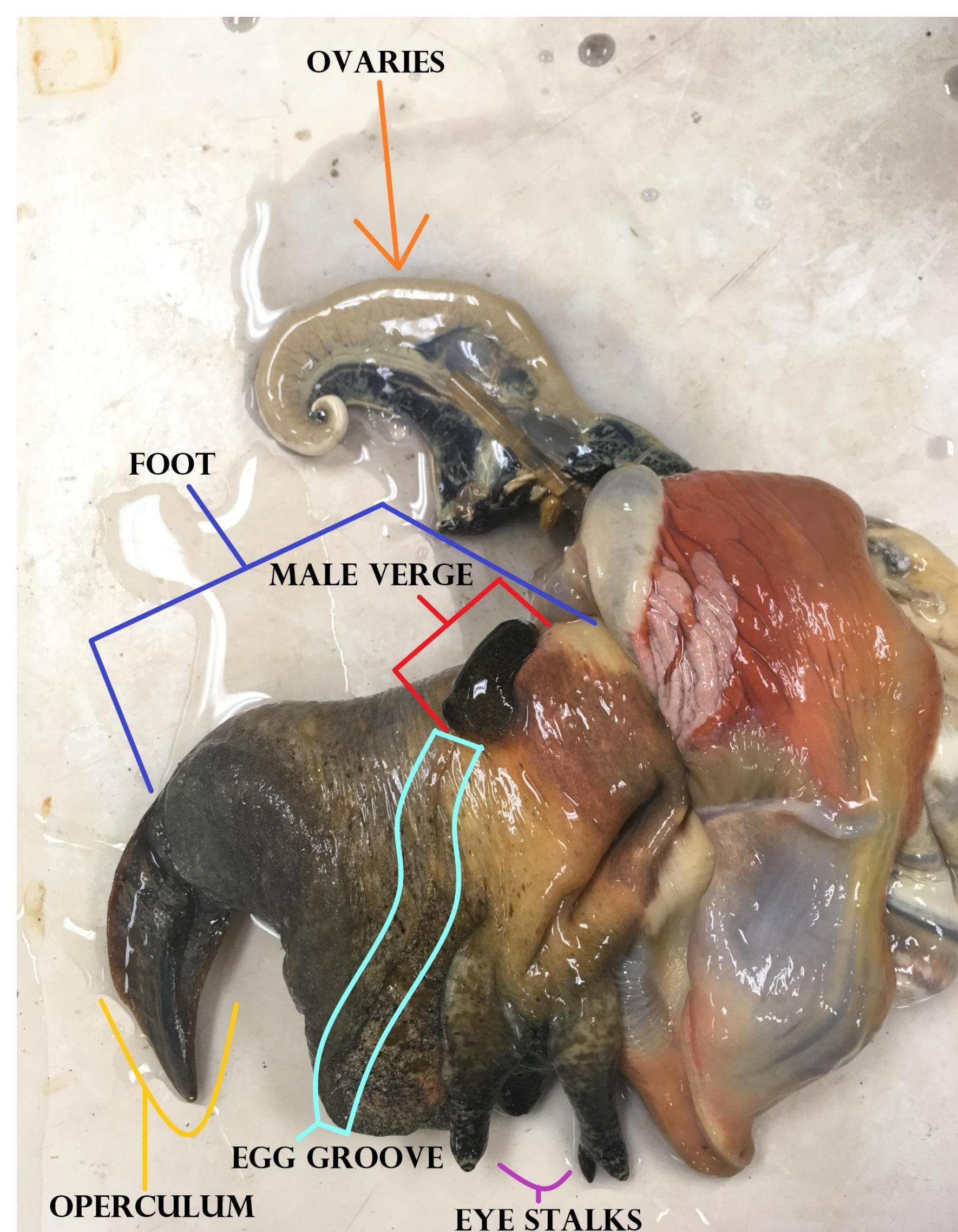
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Research Question

What is the most effective method to use when determining a cause for reproductive failure in *Lobatus gigas*?

Introduction

- Queen conch (*Lobatus gigas*) have been experiencing low reproduction rates throughout their distribution (Titley-O'Neal et al., 2011; Delgado et al., 2019; Glazer et al., 2008).
- Imposex female *Lobatus gigas* have male appendage(s), called a verge (Titley-O'Neal et al., 2011).
- Abnormalities in the cerebral ganglion (c.g. responsible for hormone production) and deficiencies in the gonadal tissue have been observed in nearshore populations (Delgado et al., 2019).
- In the British Virgin Islands, conch's imposex has been linked to areas of high boating activity, while in the Florida Keys, reduced reproduction has been linked to nearshore habitats (Titley-O'Neal et al., 2011; Delgado et al., 2019).



Labels illustrated by Pollard, M.J. Voss, J. (2020).

References

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Glazer, R., Denslow, N., Delgado, G., Kroll, K., & Spade, D. (2008). Anthropogenic effects on queen conch reproductive development in South Florida. http://ocean.floridamarine.org/FKNMS_WQPP/docs/special_projects/2008/20080630_Glazer_Etal_Anthropogenic_Effects_on_Queen_Conch_Reproductive_Development_Complete.pdf

Hickerson, E. (n.d.). A close-up look at the eye stalks of a queen conch (*Strombus gigas*) observed in a sand flat at West Flower Garden Bank [Photograph]. NOAA Photo Library. <https://photolib.noaa.gov/Collections/Sanctuaries/Flower-Garden-Banks/emodule/845/eitem/36218>

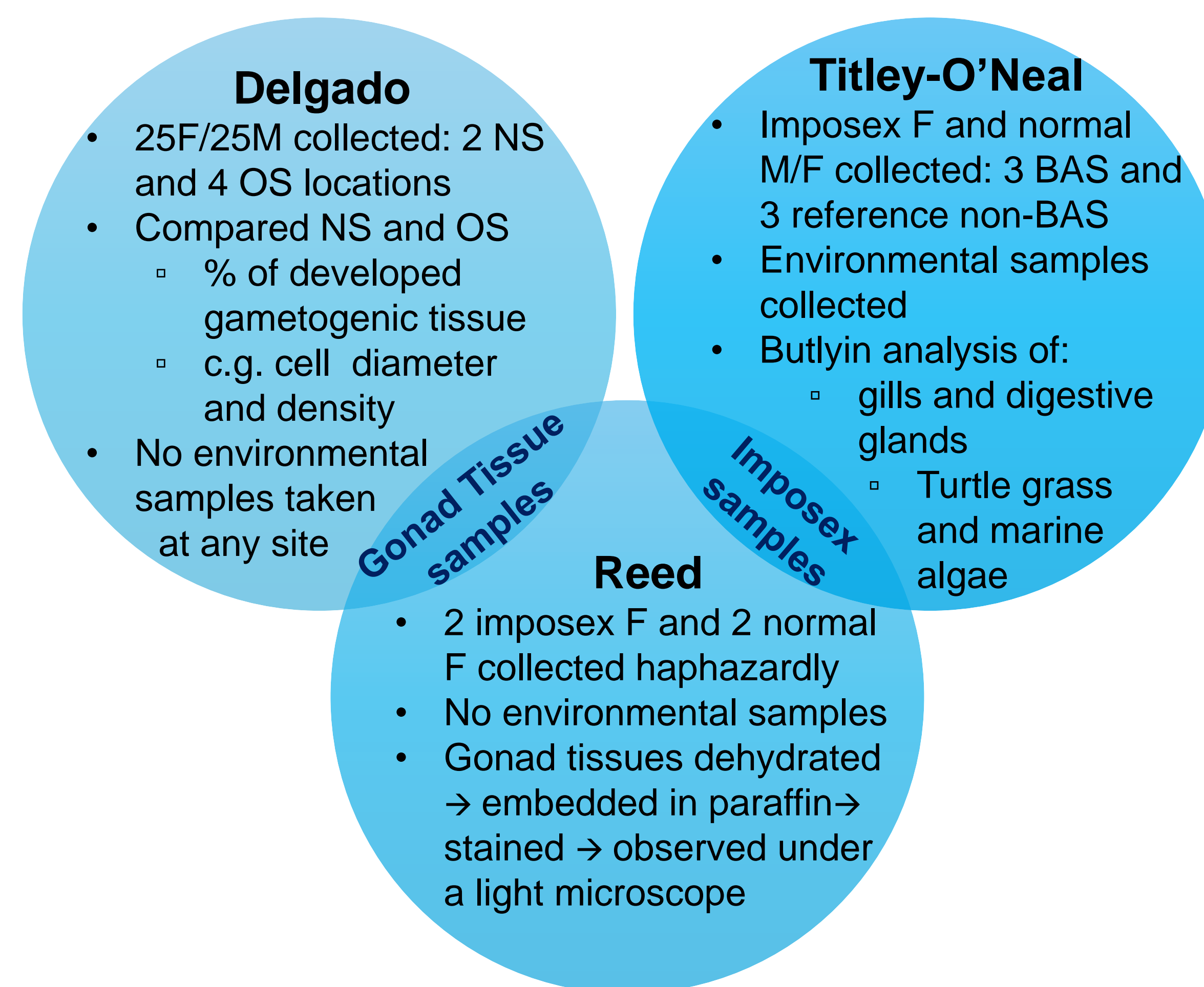
Reed, S. E. (1993). Gonadal comparison of masculinized females and androgynous males to normal males and females in *Strombus*. *Journal of Shellfish Research*, 12, 71-75. https://archive.org/details/cbarchive_109121_gonadalcomparisonofmasculinize1981/page/n2/mode/2up

Titley-O'Neal, C. P., MacDonald, B. A., Pelletier, É, Saint-Louis, R., & Phillip, O. S. (2011). The Relationship Between Imposex and Tributyltin (TBT) Concentration in *Strombus gigas* from the British Virgin Islands. *Bulletin of Marine Science*, 87(3), 421-435. <https://doi.org/10.5343/bms.2010.1093>

Voss, J. (2020). *Lobatus gigas* [Photograph via email].

Methods

OS – Offshore site
NS – Nearshore site
BAS – Boating active site



Hickerson, E. (n.d.).

Conclusion

- Abnormalities in the cerebral ganglia and gonads of *Lobatus gigas*, contribute to the reproductive failure observed in populations aggregated nearshore (Delgado et al., 2019).
- Low concentrations of Tributyltin (TBT) in the turtle grass and marine algae samples taken, suggests food source is not enough uptake of TBT to cause imposex in *Lobatus gigas* (Titley-O'Neal et al., 2011).
- Imposex has not yet been proven to have a negative impact on *Lobatus gigas* reproduction (Reed, 1993; Titley-O'Neal et al., 2011).
- Collecting samples based on aggregation location compared to collecting masculinized females has been more successful in providing reason for reproductive failure in *Lobatus gigas*.

Recommendations

- Further study in the spawning of normal and imposex conch, with specific attention to their egg masses and habits, can potentially link imposex to failing reproduction among aggregations.
- Butlyin analysis on the gonads of *Lobatus gigas* may determine a link between TBT and delay in gametogenic tissues.
- Study of reproduction in other aggregated distributions of *Lobatus gigas*.
- Water quality and sediment sampling in areas of spawning aggregations.

Acknowledgements

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Results

Titley-O'Neal

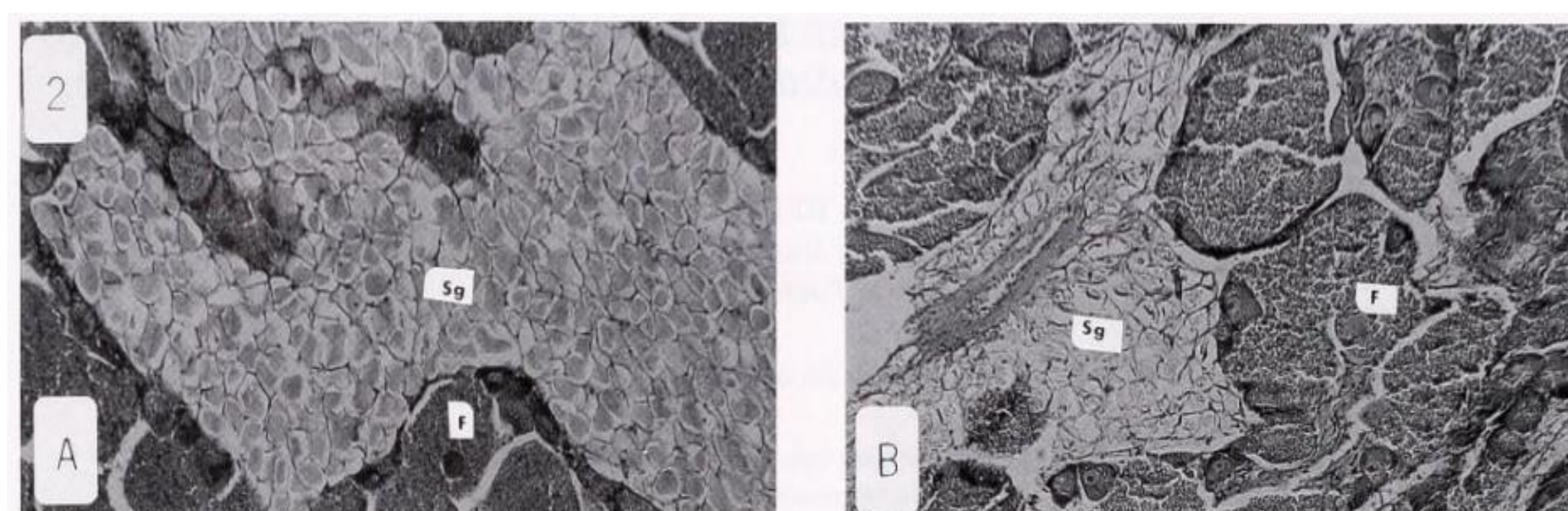
- Imposex was observed in all high BAS, not in reference sites.
- % imposex ranged from 28.6-100% in BAS
- ↑ concentrations of TBT found in digestive glands of M/F at every site except Anegada (reference site)
 - Significantly ↑ in M conch
- ↓ concentration of TBT in marine algae and turtle grass – suggest unlikely source of TBT

Delgado

	NS Population	OS Population
	54.6% M inactive; <50% spermatogenic tissue	92.9% M ripe; ≥75% spermatogenic tissue
	62.5% F inactive; <50% oogenic tissue	All F conch active; >50% oogenic tissue
	Ganglia cell diameter larger and lower in density both M and F	Normal ganglia cell diameter and density

Reed

- Revealed no difference in sexual tissue
- Verge was split at base (35mm in length) (normal male 60mm)
- No male-like behavior was observed upon collection
- Signet cells of imposex F were empty (shown below in image B) given she was found upon completion of spawning, suggesting successful reproduction.



Reed, S. E. (1993).