



atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS



Peeping through the deep: insights to the reproductive strategies of cold-water gorgonians in the Azores Archipelago

ATLAS General Assembly 2017

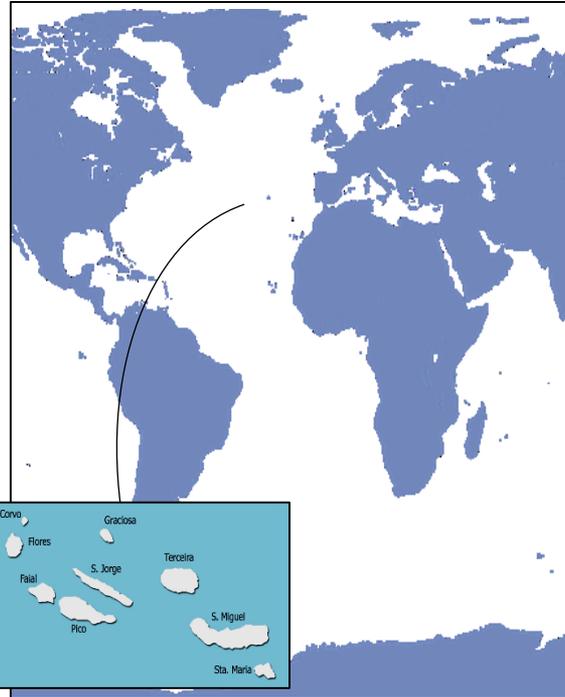
Rakka M., Sampaio I., Bilan M., Godinho A., Movilla J., Orejas C., Carreiro-Silva M.



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Introduction

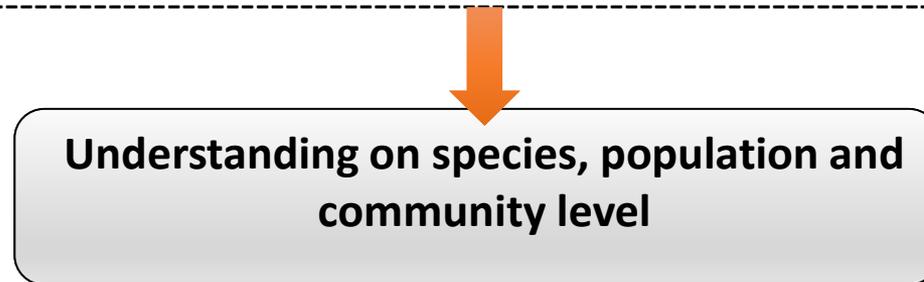
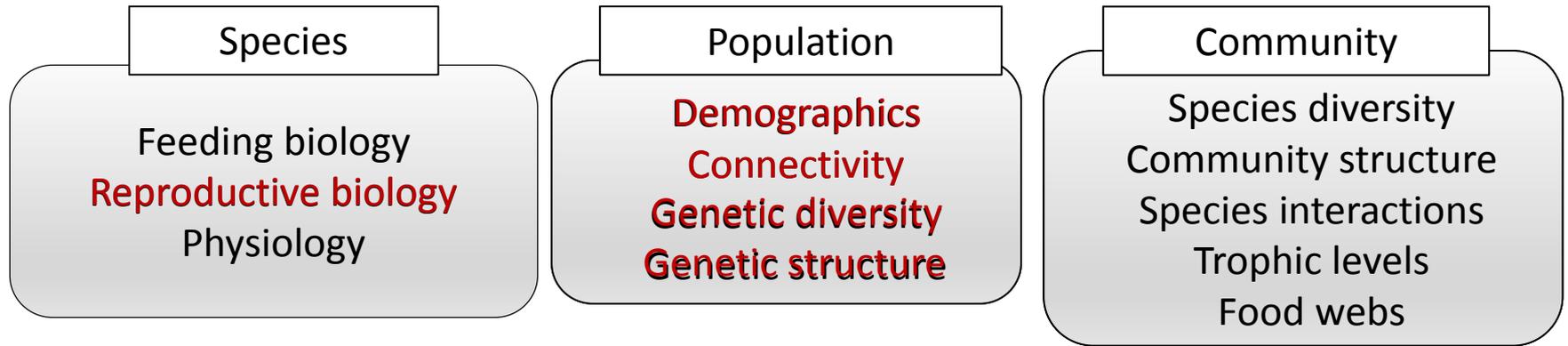
Octocorals in the Azores





Introduction

Octocorallia





Reproductive biology

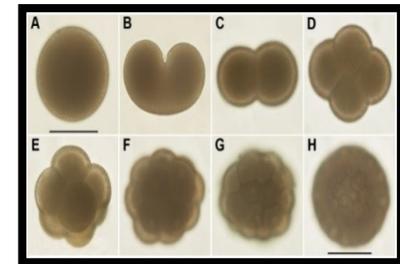
Reproductive Strategies

Sexual Reproduction

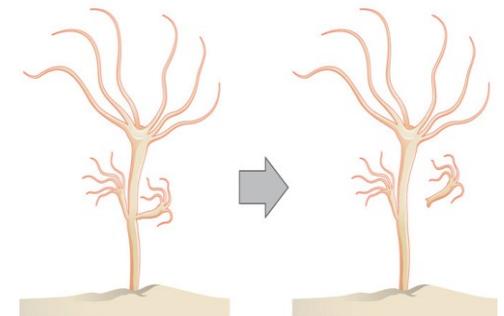
- Involves two individuals of different sexes
- Involves reproductive cells (gametes)

Asexual Reproduction

- Involves a single individual
- It doesn't include reproductive cells (gametes)
- Descendants are genetically identical to parent individual



Development of fertilized oocyte (A) to early larvae (H). *L. pertusa*. Larsson *et al.*, 2014





Reproductive biology

Sexual Reproduction

Sexuality

Sexual allocation within the colony

- Most deep octocorals to date are gonochoric
- Sex ratio within populations varies; many female skewed ratios

Reproductive mode

Way in which mating occurs

- Both brooding and spawning have been reported
- Great flexibility of this trait within the Alcyonacea

Reproductive Seasonality

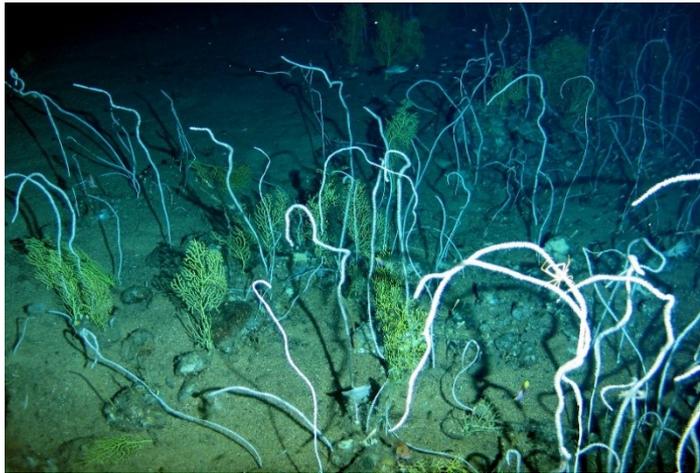
- CW octocorals display both seasonal and continuous reproductive activity



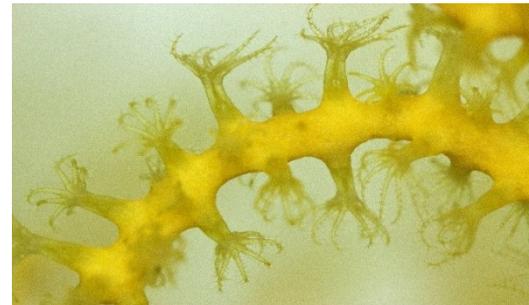
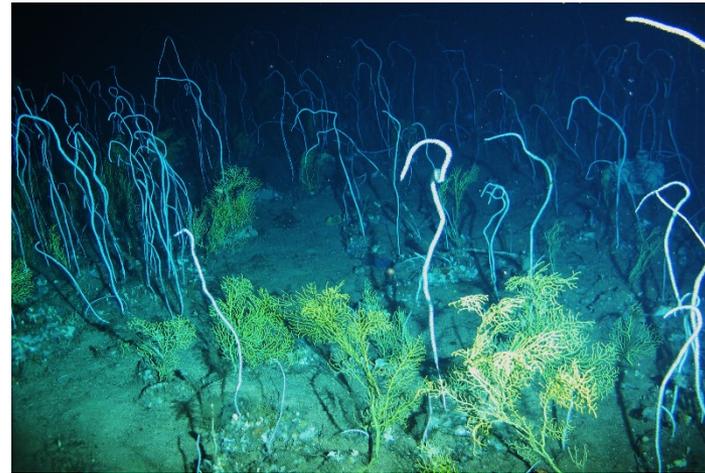
Sexual Reproduction

Target species

Viminella flagellum



Dentomuricea aff. meteor





Sexual Reproduction

Basic characteristics

Sexuality:

Both target species turned out to be gonochoric

Reproductive mode

No larvae have been successfully identified for the target species:
most probably broadcast spawners

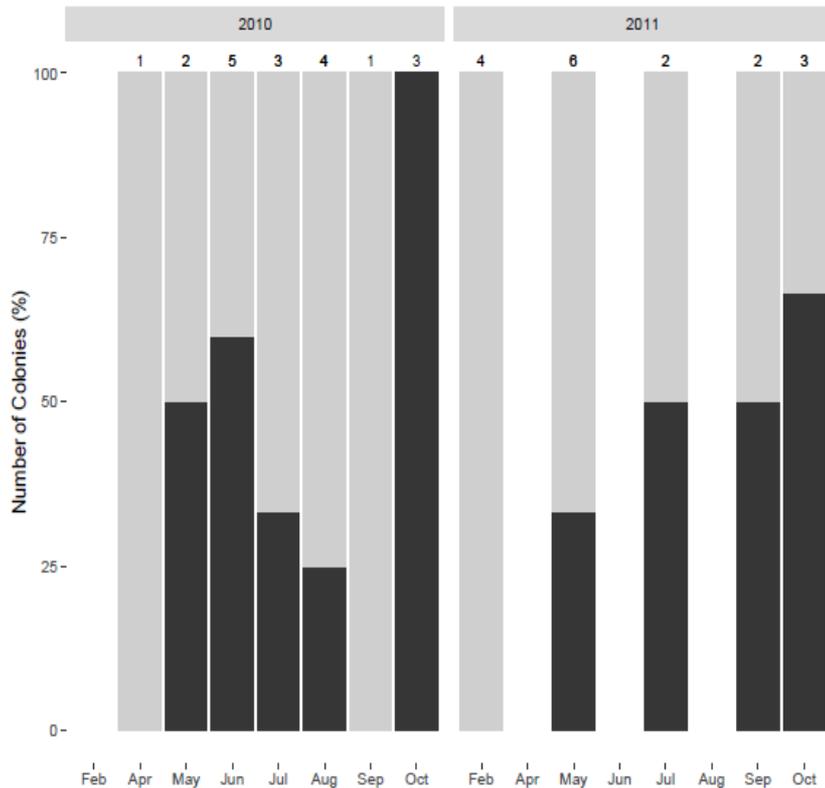




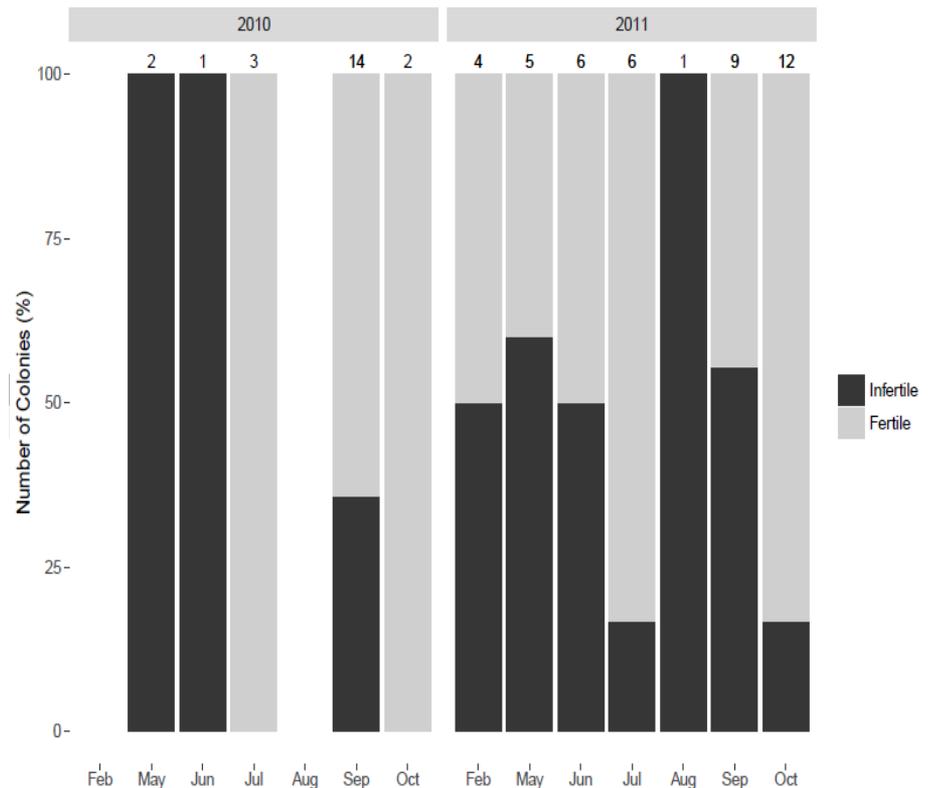
Sexual Reproduction

Seasonality-Reproductive timing

D. meteor



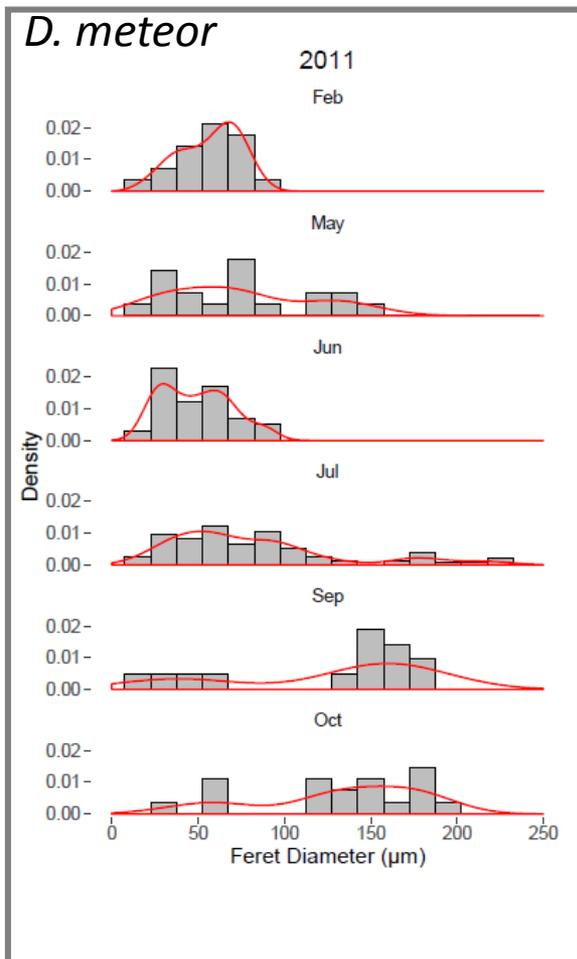
V. flagellum



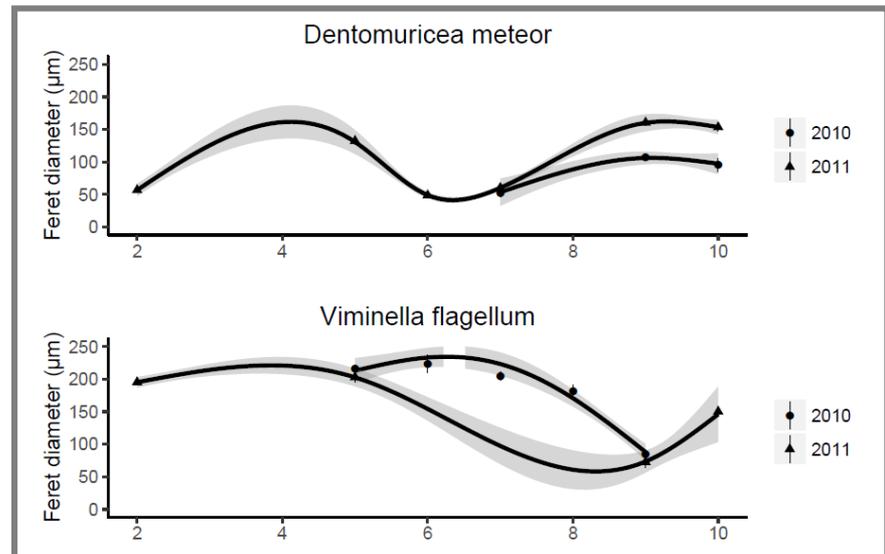


Sexual Reproduction

Seasonality-Reproductive timing



- Oocyte size distributions are not always uniform
- Continuous investment in reproduction with seasonal cycles
 - *D. meteor* 4-6 month cycles
 - *V. flagellum* 6-7 month cycles





Sexual Reproduction

Conclusions

Importance of reproductive knowledge

Sex ratio, fecundity: Important parameters for demographic studies and population biology

Reproductive mode; oocyte size: Dispersal, indication for larval duration

Reproductive timing: Prediction of disturbance impacts; important information for dispersal models



Reproductive Biology

Asexual Reproduction

Strategies of asexual reproduction known from shallow water octocorals:

- Fragmentation
- Fision
- Polyp expulsion
- Parthenogenetic larvae

Forms of asexual reproduction (budding, fission, parthenogenesis, etc.) that occur frequently in many shallow-water species have yet to be observed among deep-sea octocorals (Watling et al., 2011)

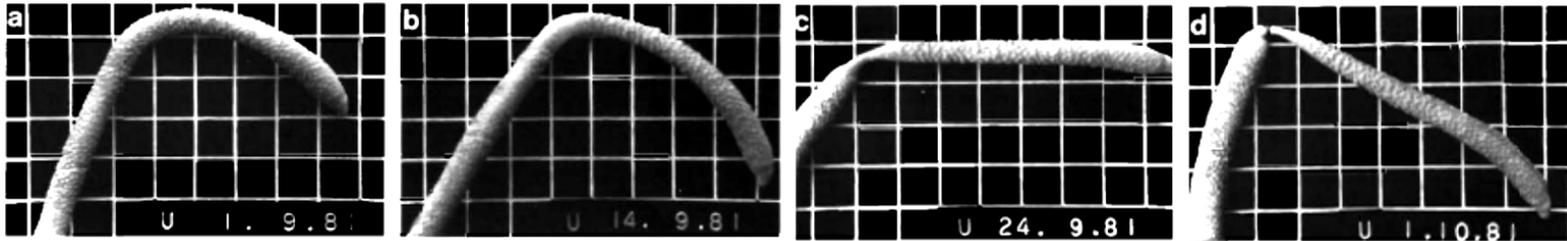
Asexual reproduction might be more important for the ecology of cnidarian species than it is usually thought (Fautin, 2002)



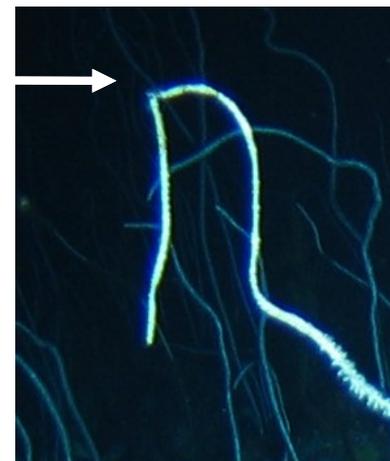
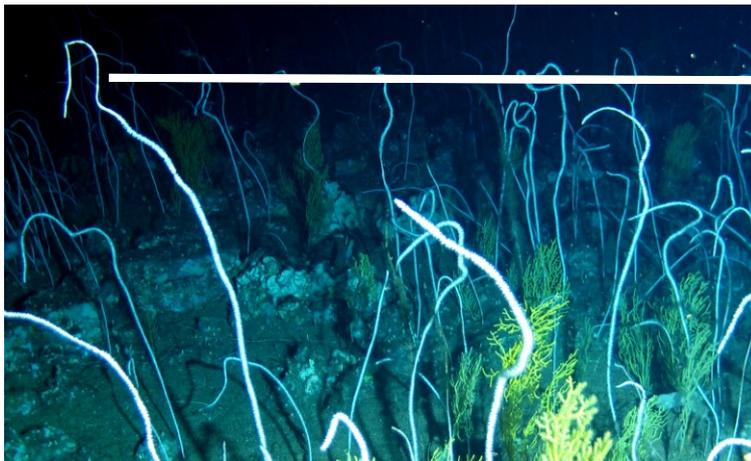
Asexual Reproduction

Indications of fision

Fragmentation-Fision in *Junceella fragilis*



Walker & Bull, 1984





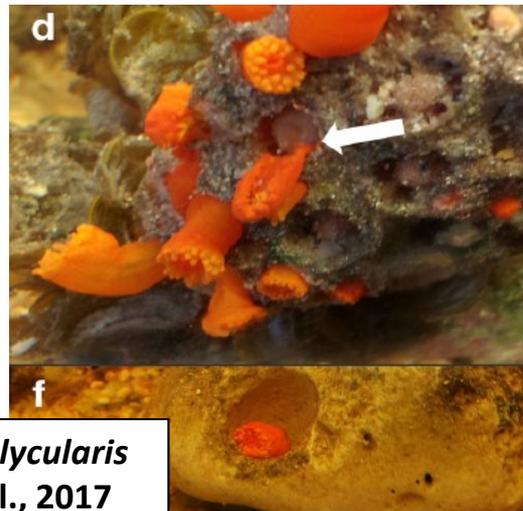
Asexual Reproduction

Polyp expulsion

Polyp expulsion

- Budding: Controlled expulsion of polyps which subsequently settle in new grounds
- Polyp bail-out: massive expulsion of live polyps, very often followed by subsequent death of the mother colony

Reverse development
Naked coral hypothesis



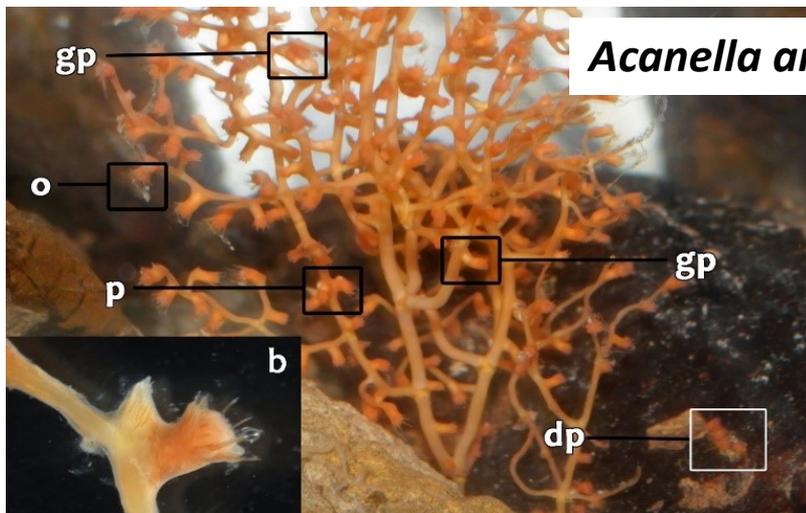
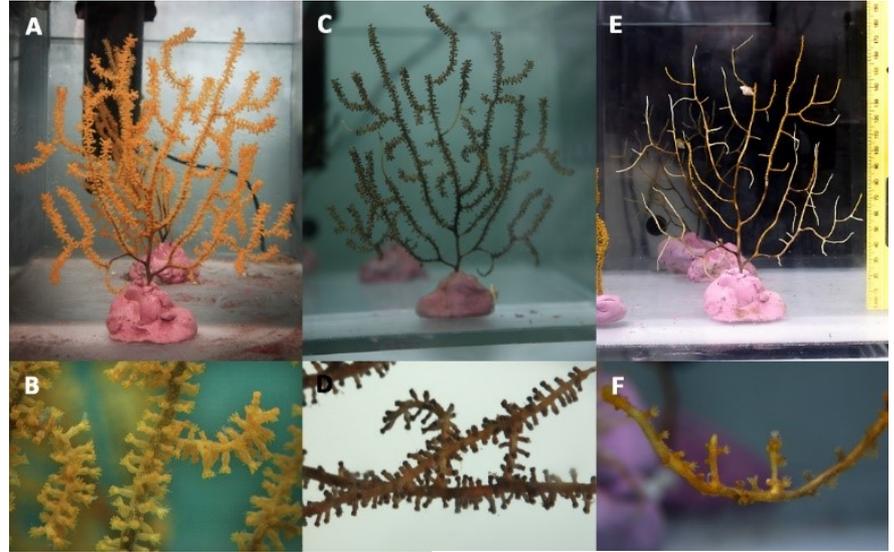
Astroides calycularis
Serrano et al., 2017

Dendronephthya hemprichi
Dahan & Benayahu, 1997



Asexual Reproduction

Polyp expulsion





Reproductive Biology

Sexual vs Asexual Reproduction

	Sexual Reproduction	Asexual Reproduction
Genetic Diversity		
Dispersal		
Disturbance		



Reproductive Biology

Future plans

Study of Sexual Reproduction

- Expand reproductive studies to other species, e.g. *Acanthogorgia armata*
- Determine aspects of larval biology
- Combine reproductive studies with ecological information/video transects in order to produce more complete snapshots of the status of coral gardens

Study of Asexual Reproduction

- Determine the extend to which fision is used in *V. flagellum* colonies (video transects)

Thank You!



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