

Octocoral Communities of the Deep Gulf of Mexico



**Andrea M. Quattrini¹, Cheryl Doughty¹,
Peter Etnoyer², & Erik E. Cordes¹**

¹Temple University & ²NOAA, Charleston SC

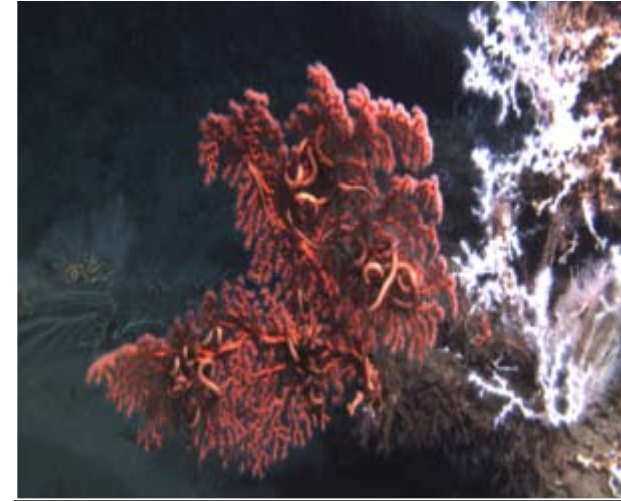
Cnidaria: Anthozoa: Octocorallia



Clavularia rudis



Anthomastus sp.



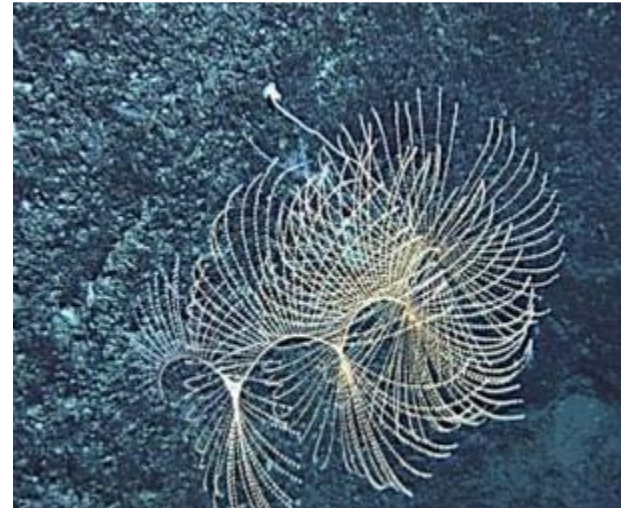
Paragorgia sp.



Paracalyptrophora carinata

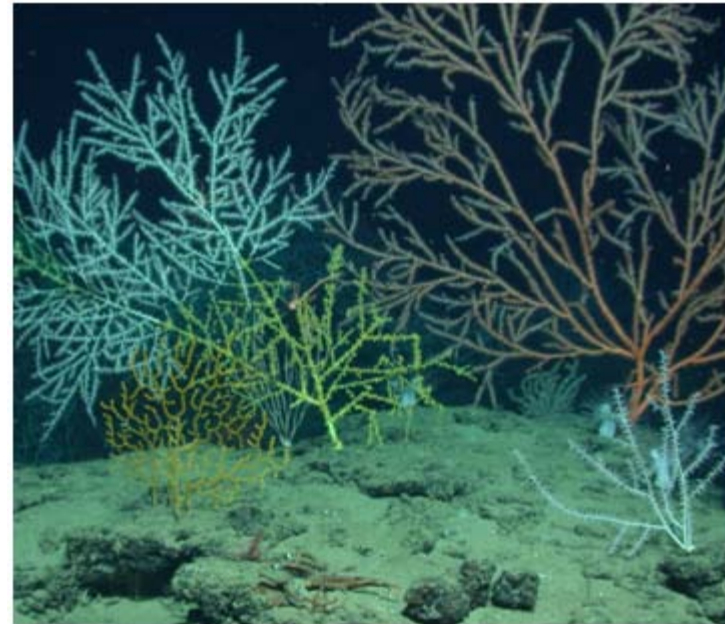
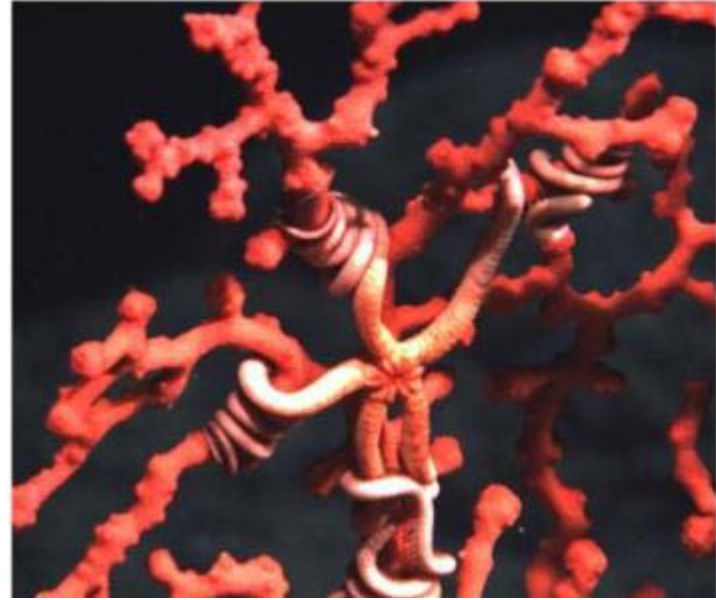
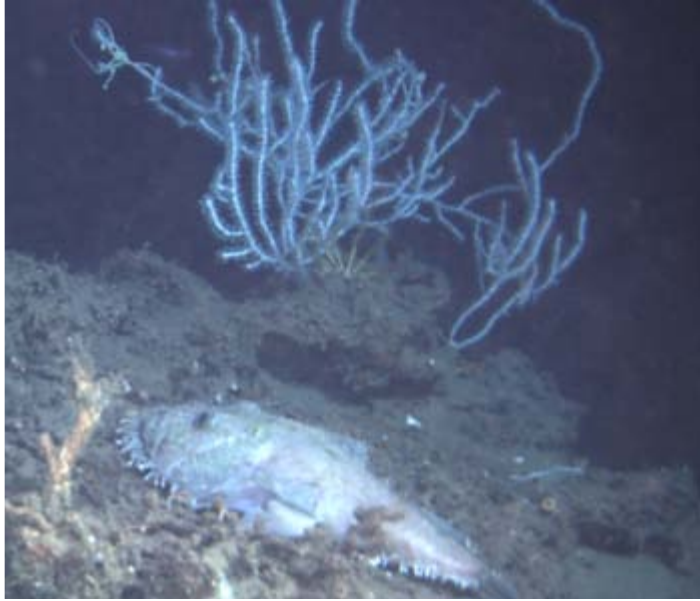


Paramuricea ?*biscaya*



Iridogorgia magnispiralis

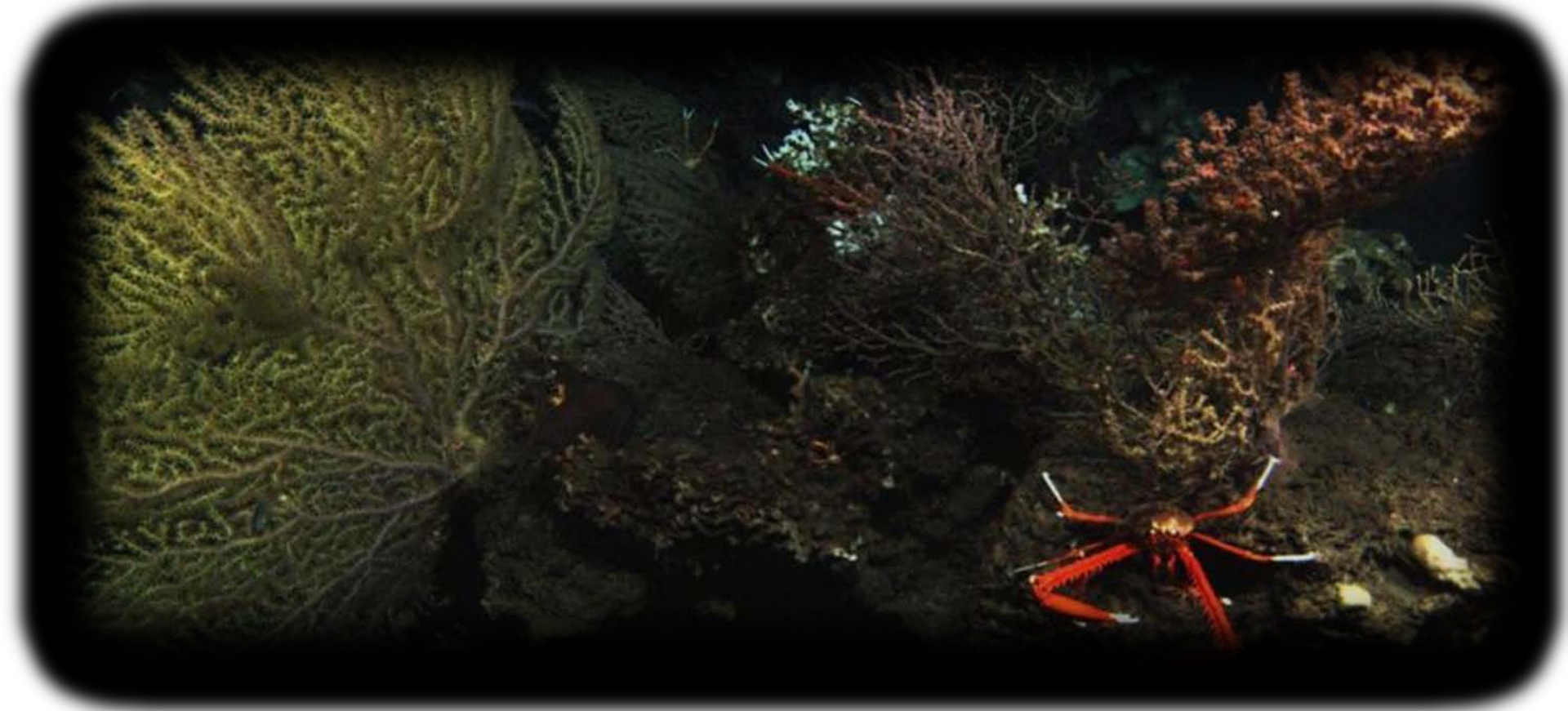
Cnidaria: Anthozoa: Octocorallia



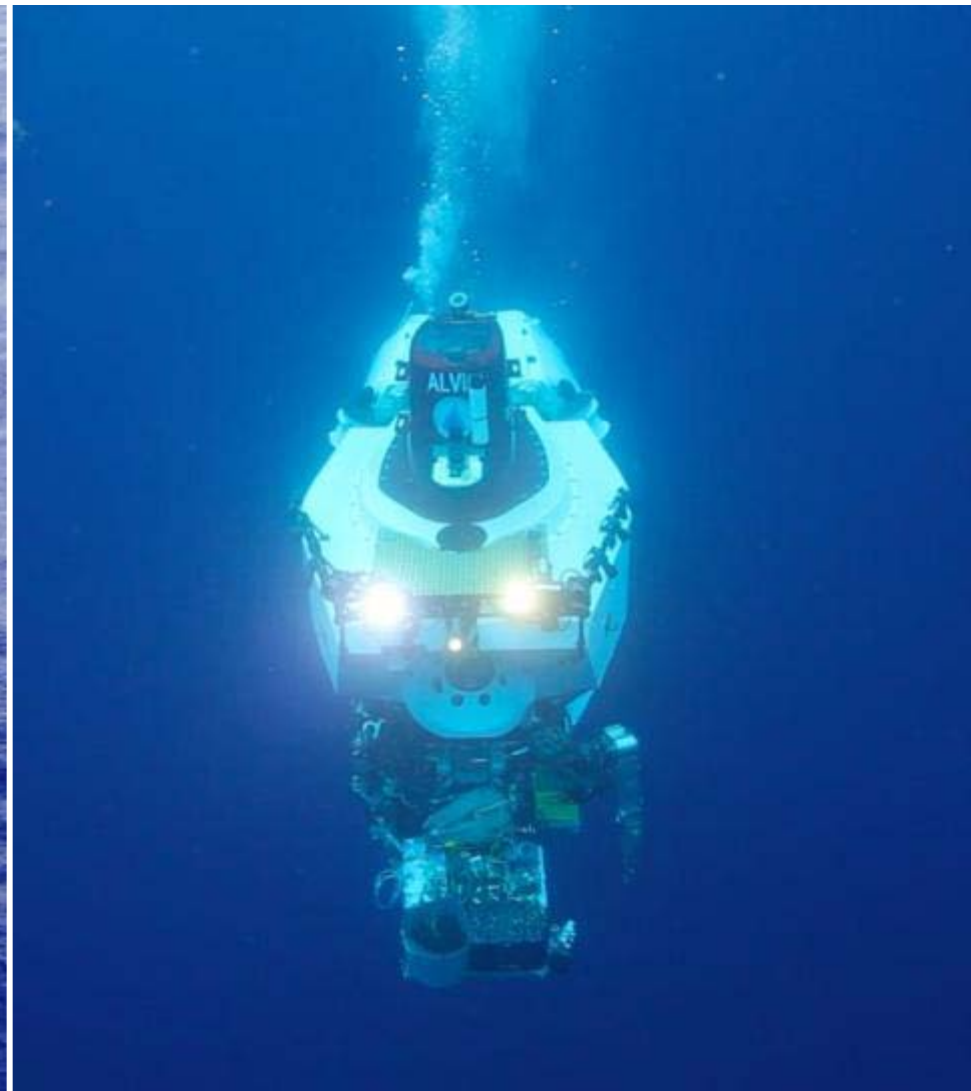
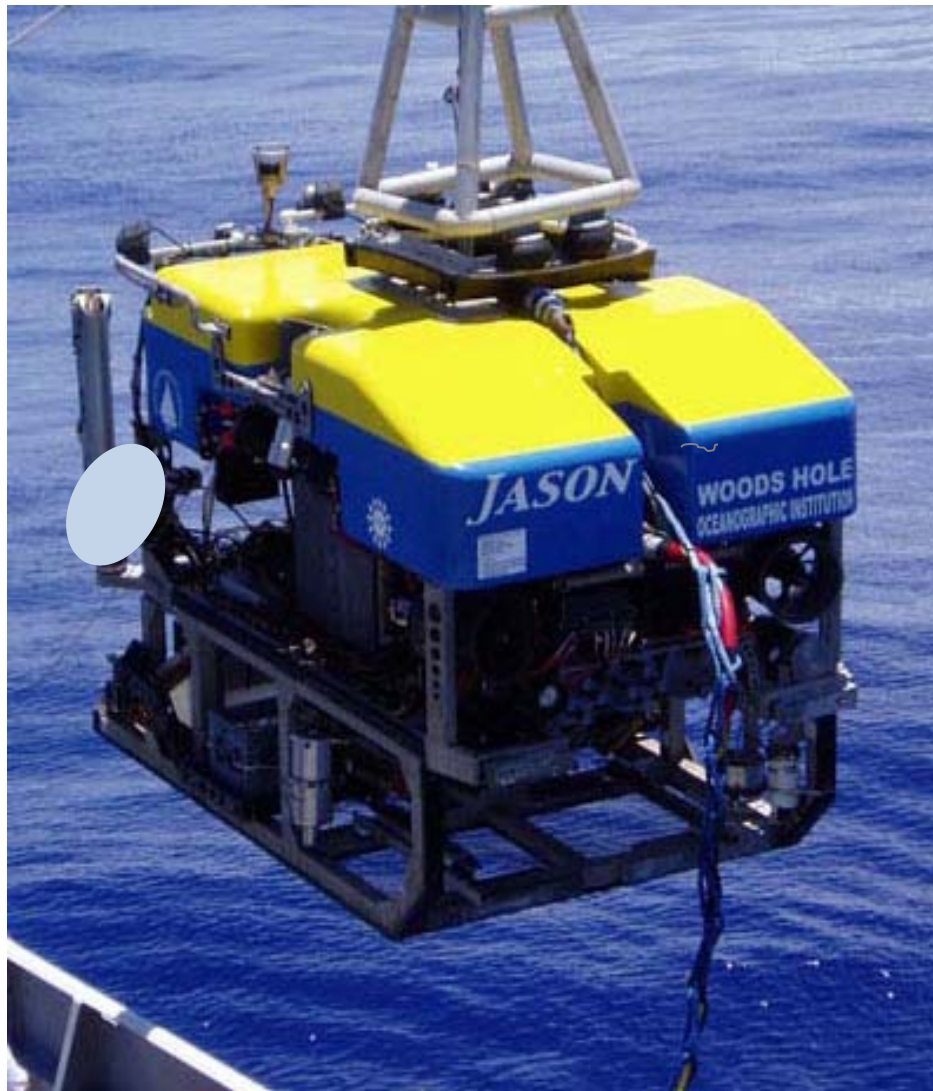
Overarching Goal

To Determine Boundaries in the Deep GOM :
from population differentiation to phylogenetic community structure

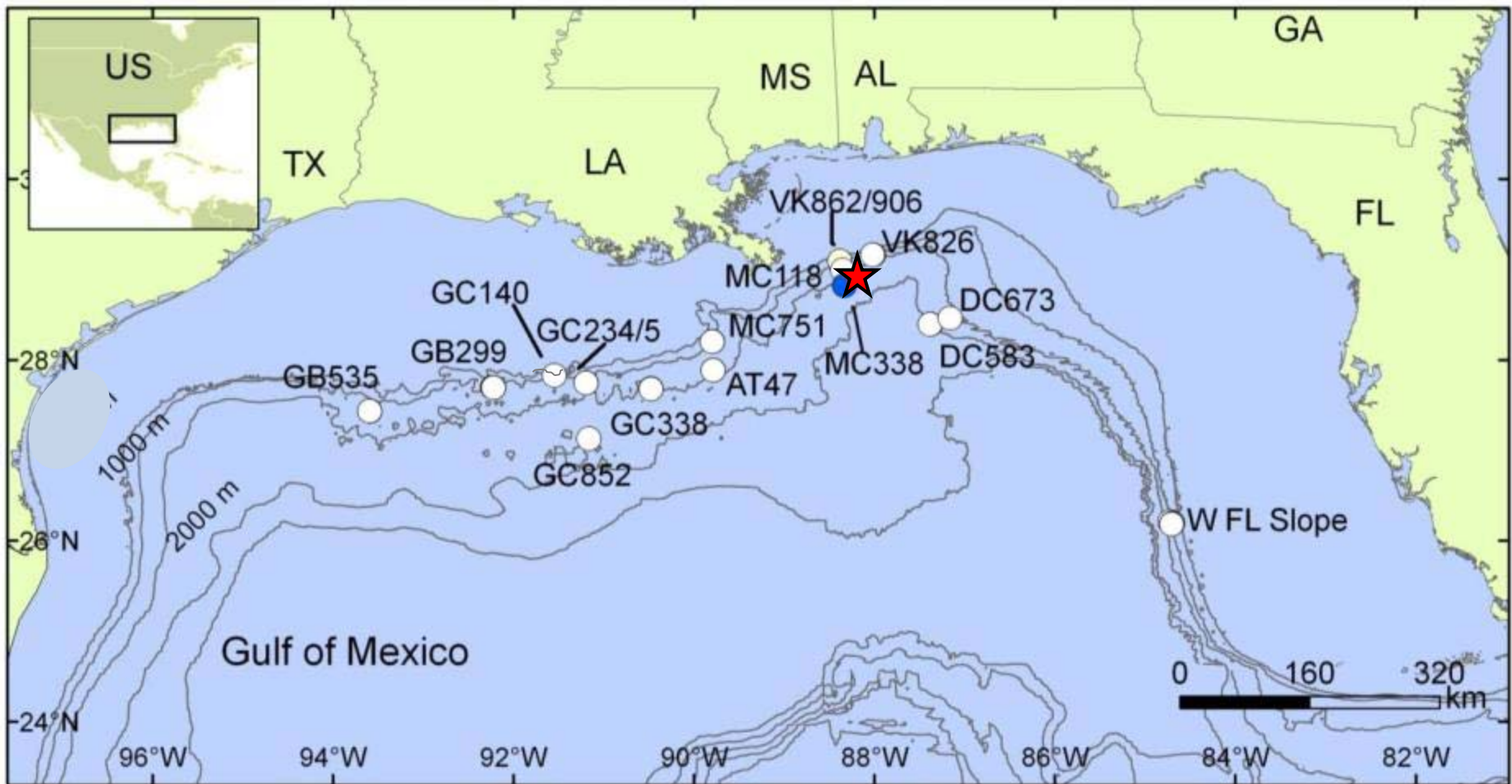
*Determining pathways of genetic exchange will help effectively conserve
deep coral habitat in the Gulf of Mexico*



GOM Sites: Octocoral Collections 2008 – 2010



GOM Sites: Octocoral Collections 2008 – 2010



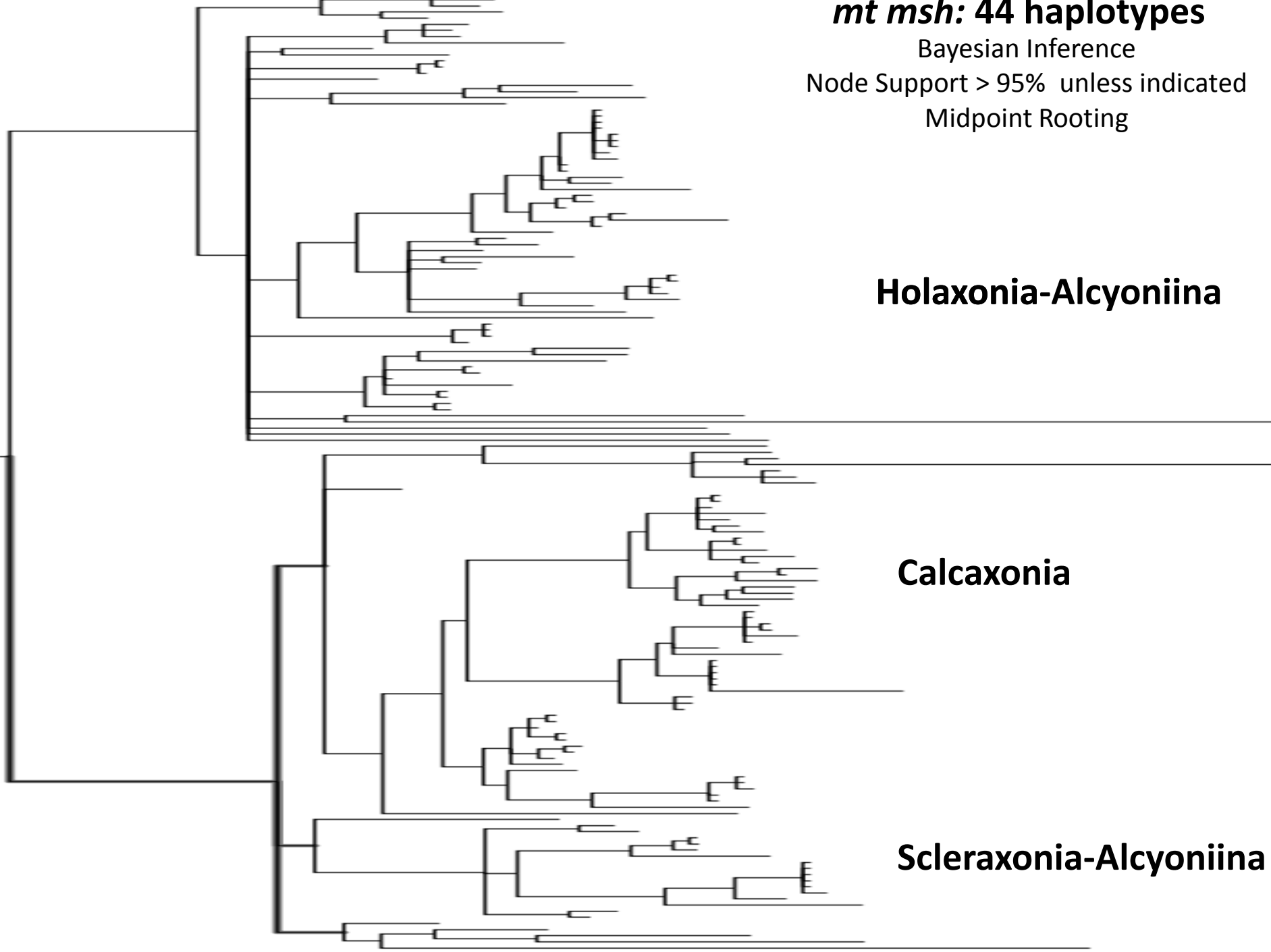
24 sites (250–2500 m): 380 specimens

mt msh: 44 haplotypes

Bayesian Inference

Node Support > 95% unless indicated

Midpoint Rooting



Holaxonia-Alcyoniina

Calcaxonia

Scleraxonia-Alcyoniina

mt msh: 44 haplotypes

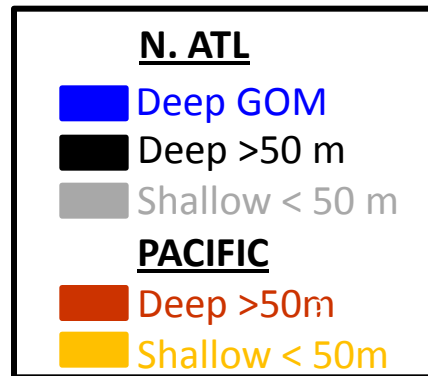
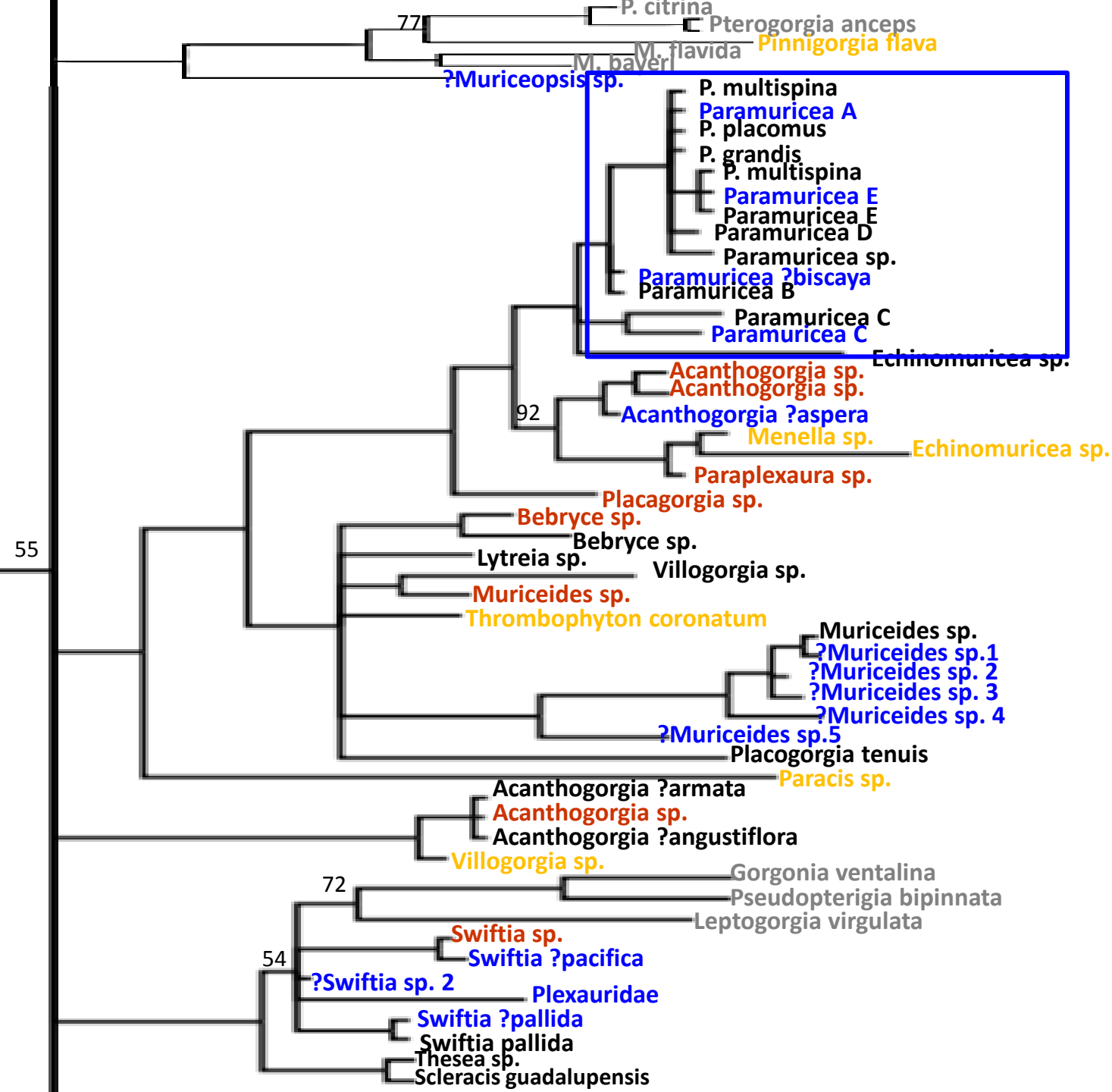
Bayesian Inference

Node Support > 95% unless indicated

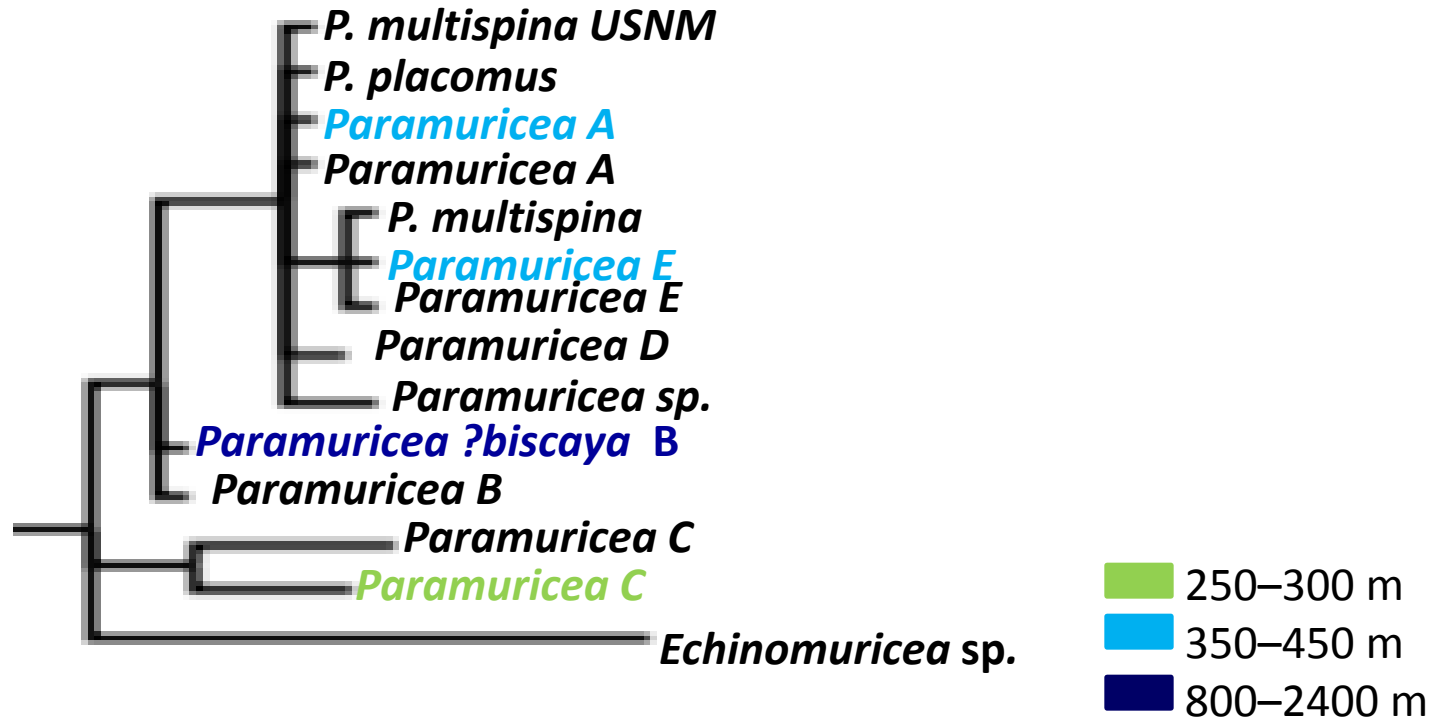
Midpoint Rooting



Holaxonia



Widespread occurrence of *Paramuricea* in the N Atl, and bathymetric separation of sister spp in the GOM



P. ?biscaya



Paramuricea Type C



P. ?biscaya

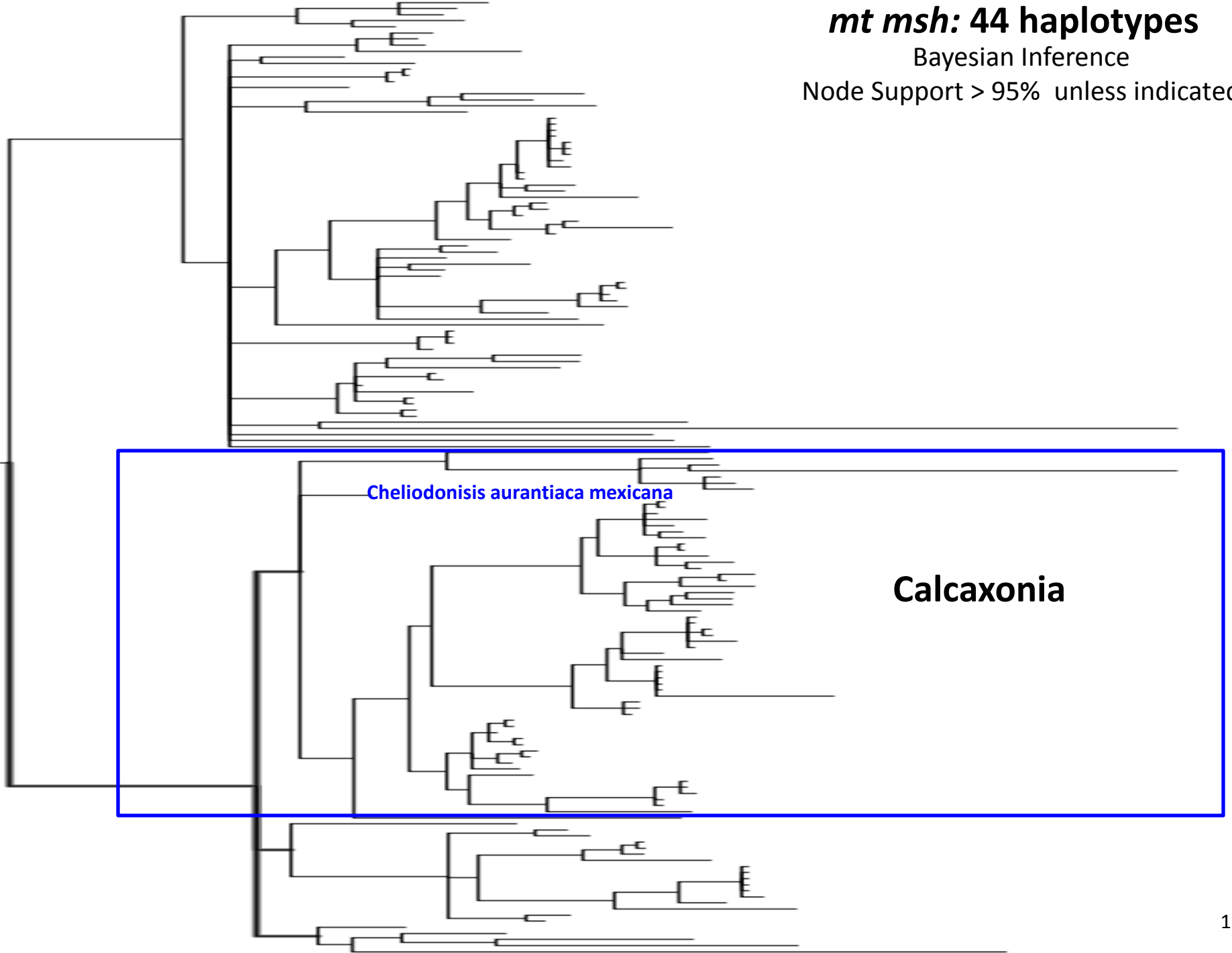


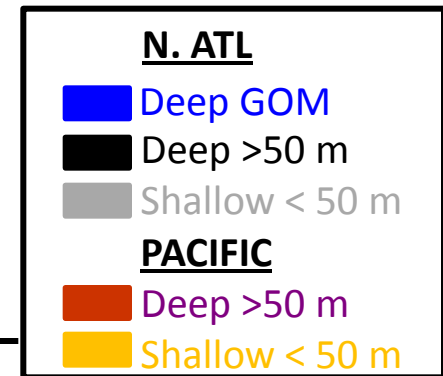
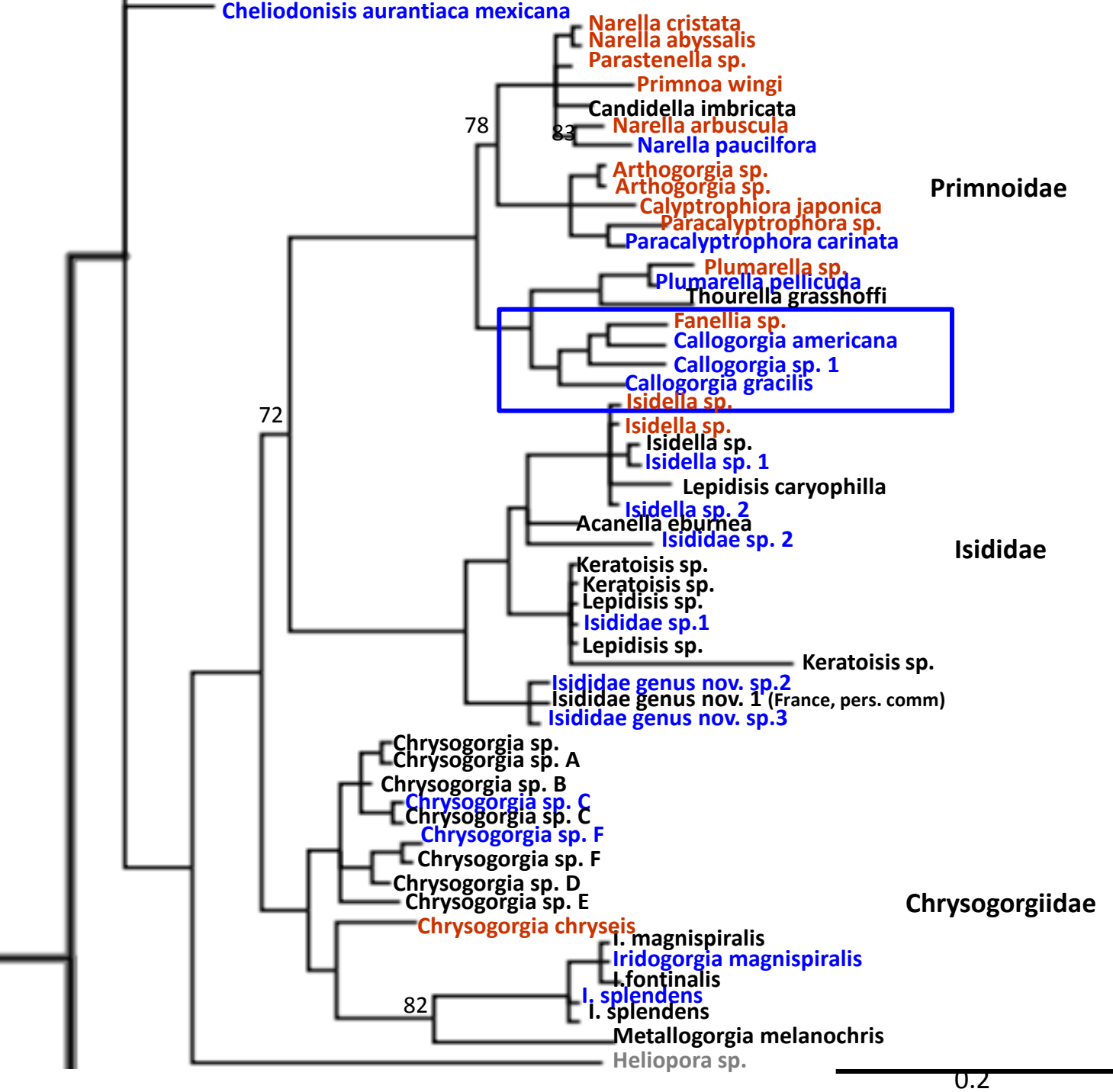
Paramuricea Type E

mt msh: 44 haplotypes

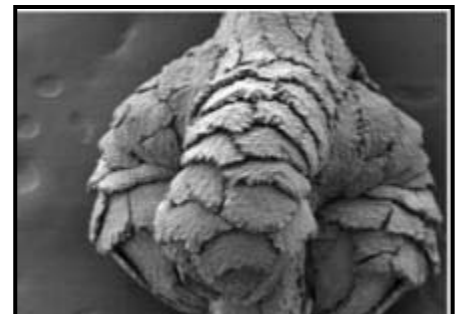
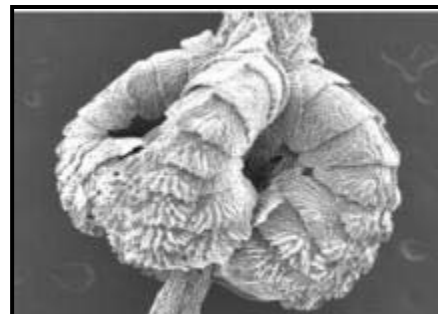
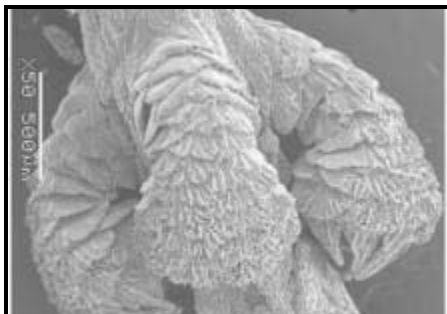
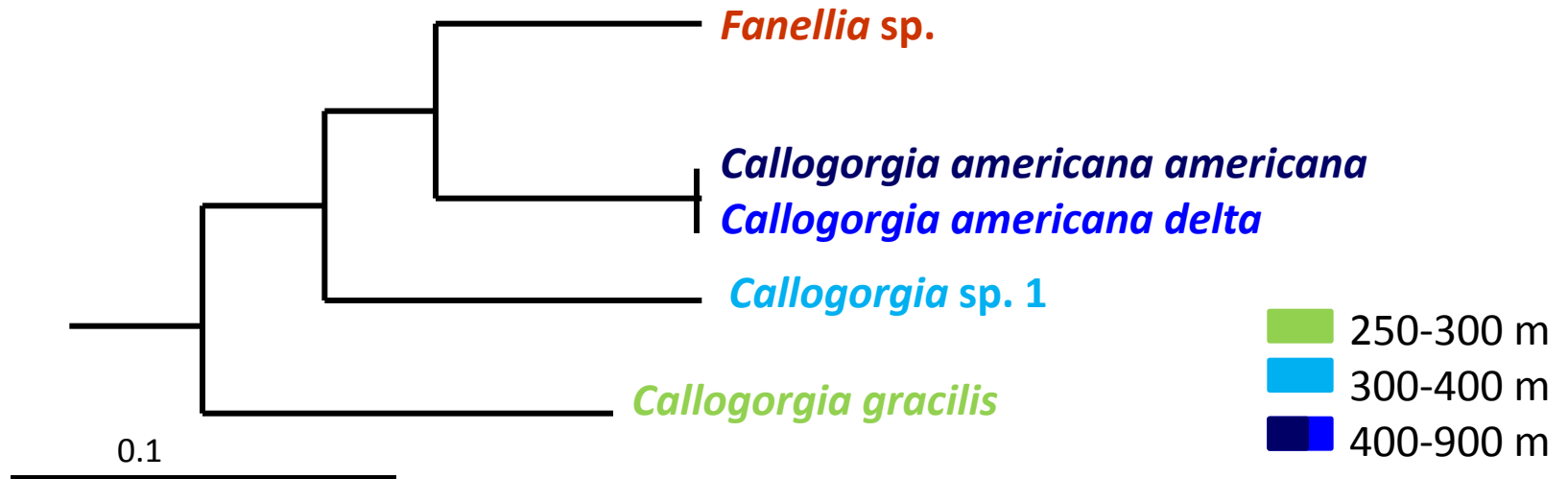
Bayesian Inference

Node Support > 95% unless indicated





Diversification of *Callogorgia* spp. in the GOM occurs along bathymetric and longitudinal gradients



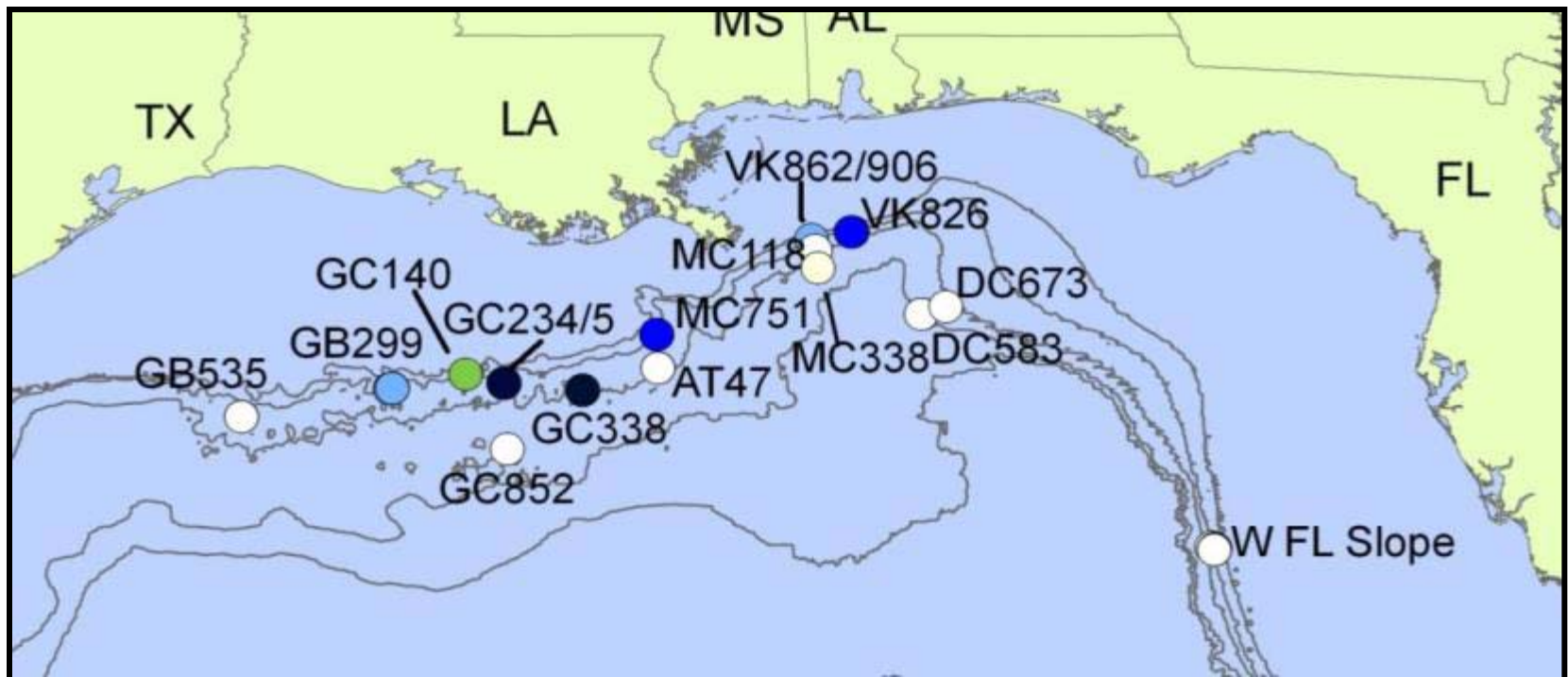
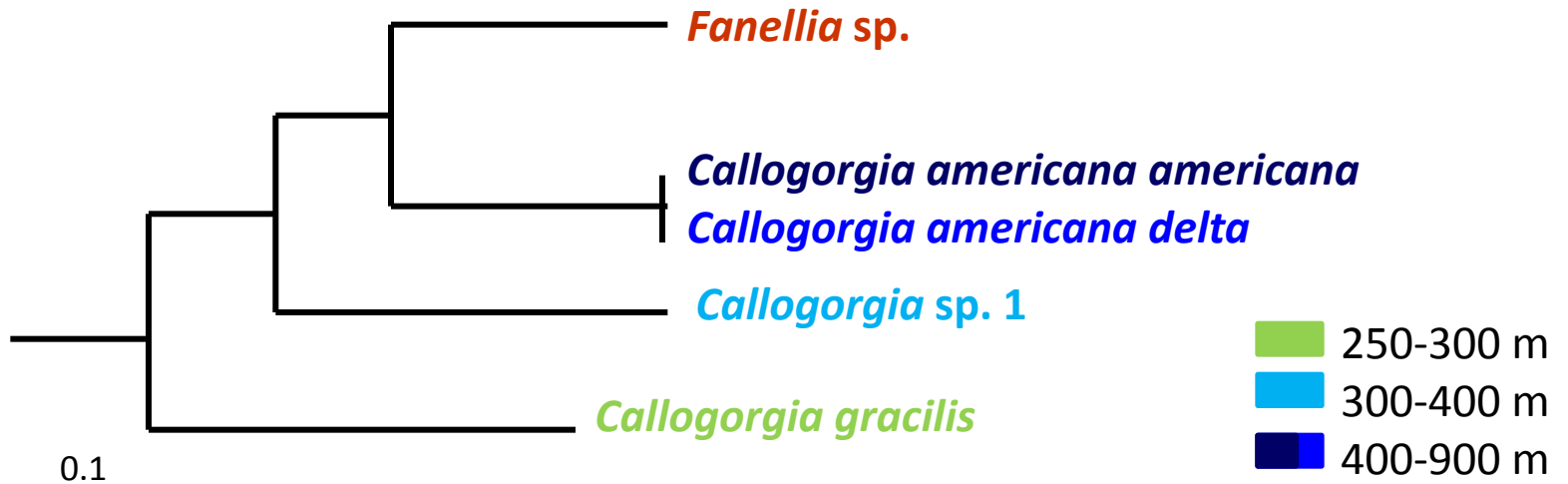
C. a. americana

C. a. delta

Callogorgia sp. 1

Callogorgia gracilis

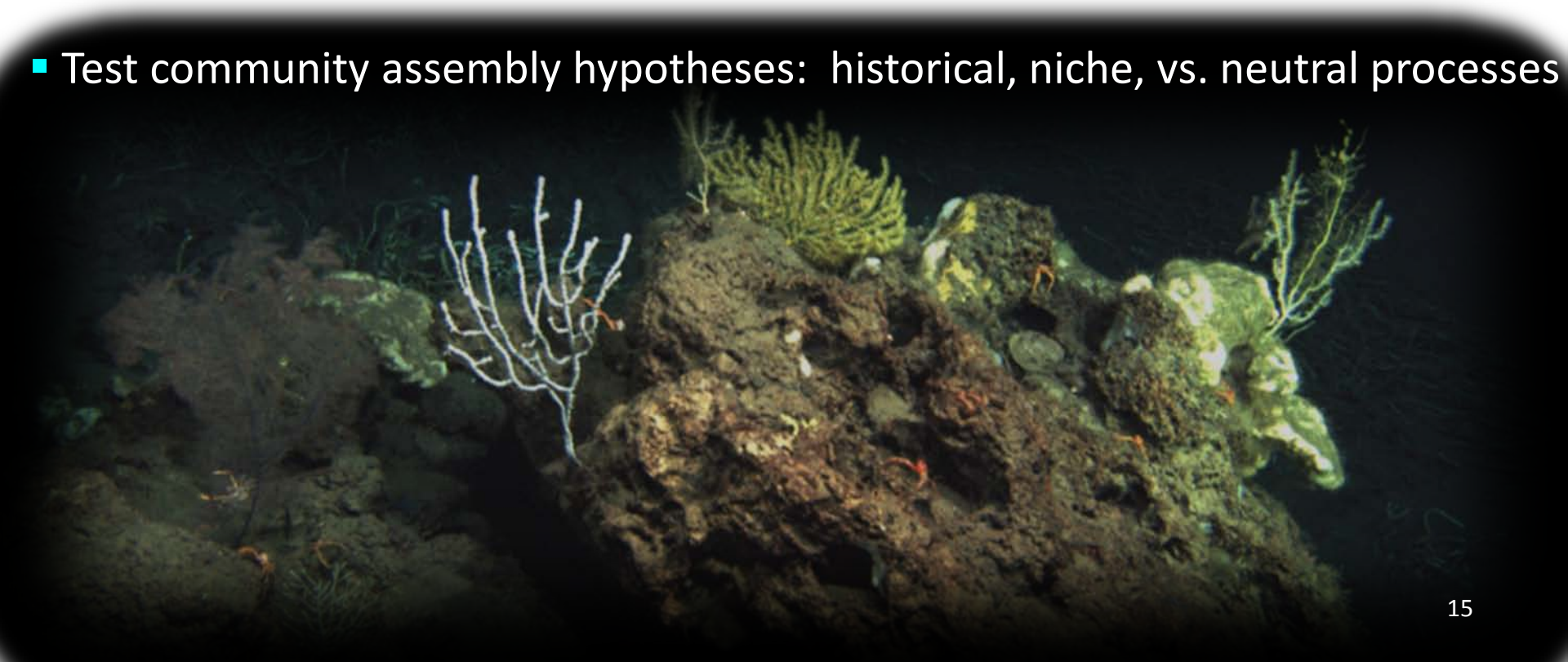
Diversification of *Callogorgia* spp. in the GOM occurs along bathymetric and longitudinal gradients



Community Phylogenetics

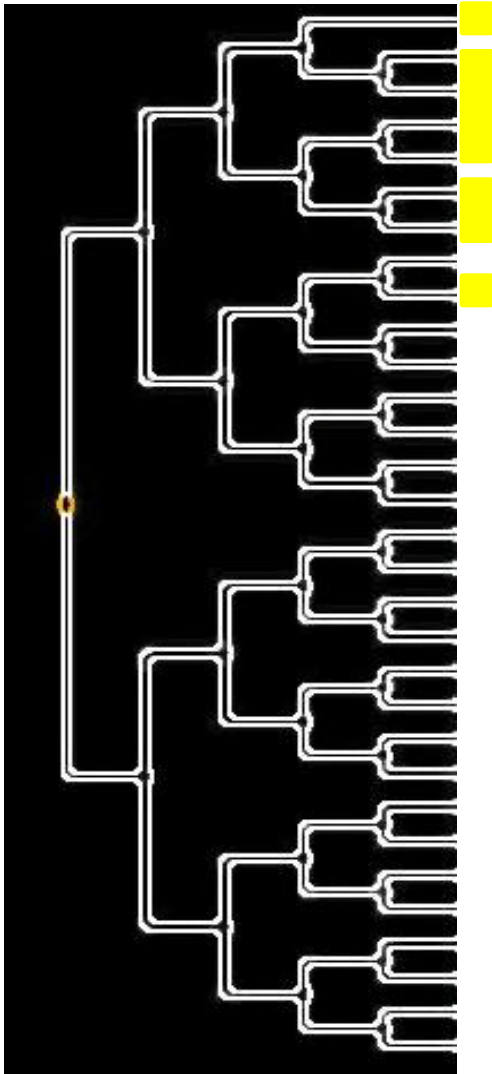
Community: “Co-occurring assemblages of trophically similar species” (Hubbell 2005)

- Framework that integrates evolutionary history and community ecology
- “The pattern of phylogenetic relatedness of species distributions within and among communities” (Cavender-Bares *et al.* 2009)
- Test community assembly hypotheses: historical, niche, vs. neutral processes

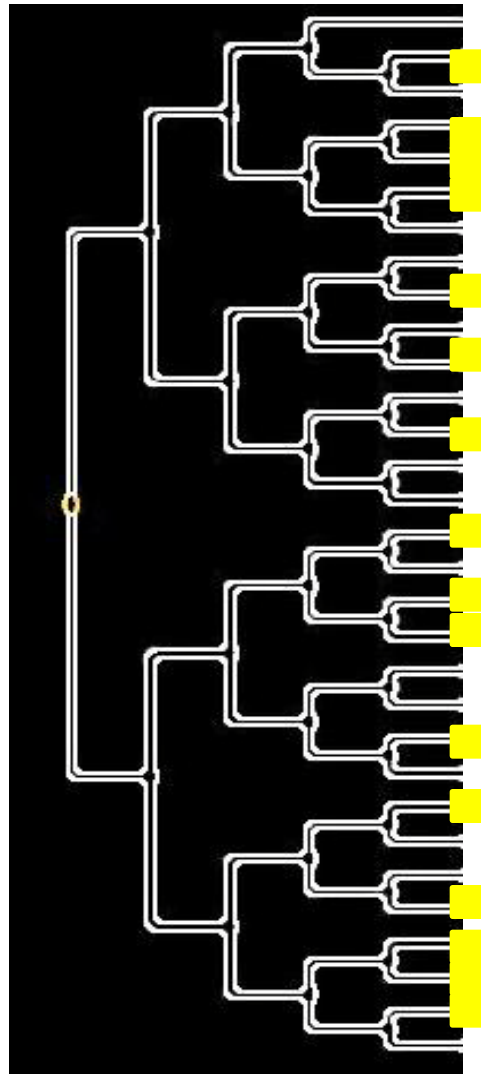


Phylogenetic Relatedness Differs from a Null Model?

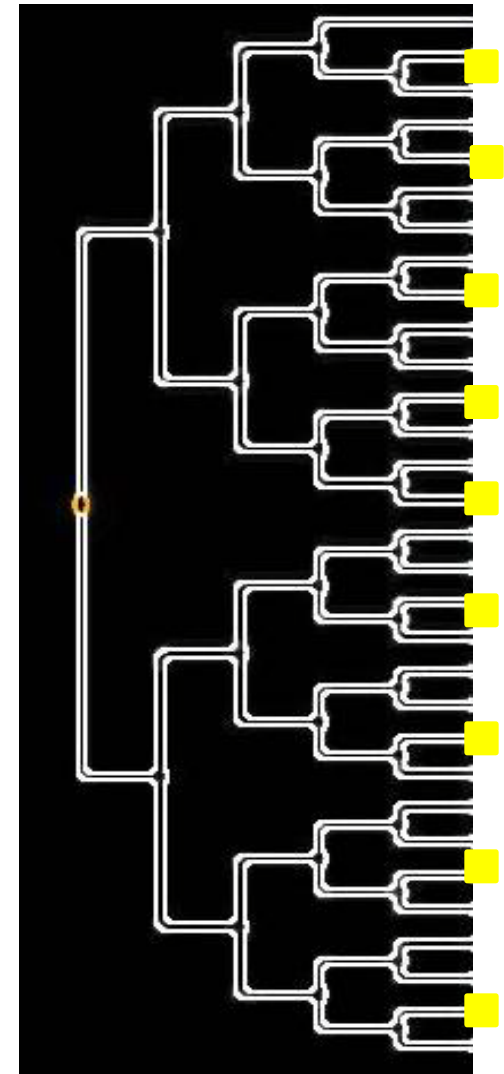
● Clustering



● Random



● Overdispersion

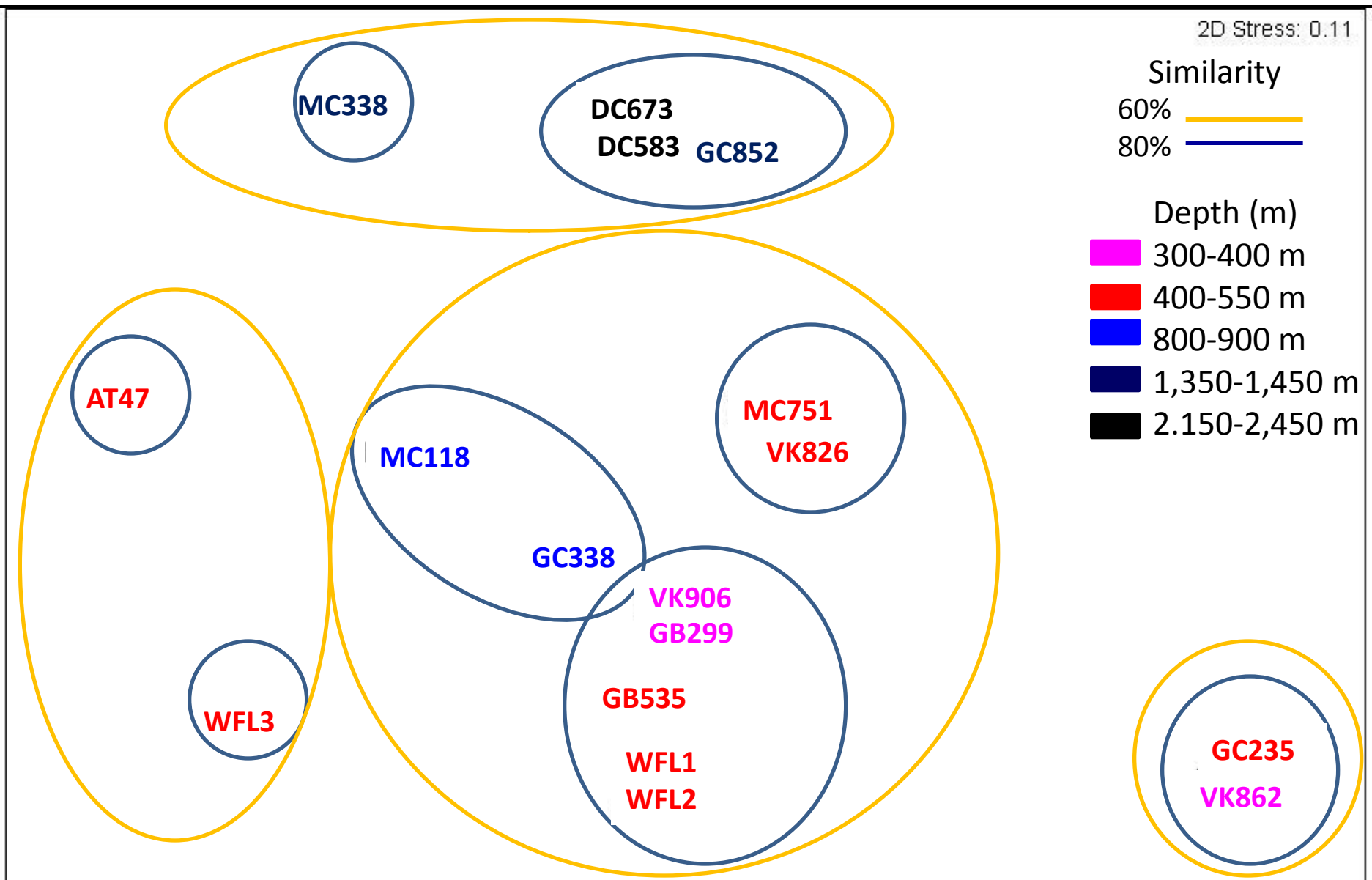


Non-Random Phylogenetic Structure in Two Depth Zones



SES: ● Clustered ● Random ● Overdispersed

Phylogenetic Turnover Between Depth Zones



Summary

Depth-related patterns observed in the phylogenetic structure of octocorals

Clades restricted to depth zone, but also shallow & deep sister taxa

- Evidence for deep to shallow water diversification?

Further bathymetric separation of sister species in the GOM

- *Callogorgia* diversification down slope?

Phylogenetic community structure changes with depth in the GOM

- Phylogenetic turnover ca. 900–1,300 m

Community assembly processes may differ between depth zones

- Competitive interactions (Overdispersion) to environmental filtering (Clustering) Processes?



Isididae



Paragorgia sp.



Paramuricea ?*biscaya*



Chrysogorgia sp.

Acknowledgments

**R. Falco, M. Rittinghouse, T. Shank, C. Fisher,
J. Lunden, K. Ilves, C. Morrison, D. Ruiz, W. Cho, A.
Demopoulos, L. Wickes, M. Nizinski, C. Ames, S. Ross,
T. Casazza, J. McClain, R. Kulathinal, A. Freestone, J.
Thoma, S. Herrera, J. Sanchez, S. Cairns, S. Morton
and TDI-Brooks**

**Funding: BOEMRE, NOAA-OER, USGS,
NSF RAPID, Temple University, &
the Dr. Nancy Foster Scholarship Program**

References

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- Hubbell, S.P. 2005. Neutral theory in community ecology and the hypothesis of functional equivalence. *Functional Ecology* 19:166–172.
- McFadden, C., J. Sanchez, S. France. 2010. Molecular phylogenetic insights into the evolution of Octocorallia: A review. *Integr. Compar. Biol.*, doi:10.1093/icb/icq056.