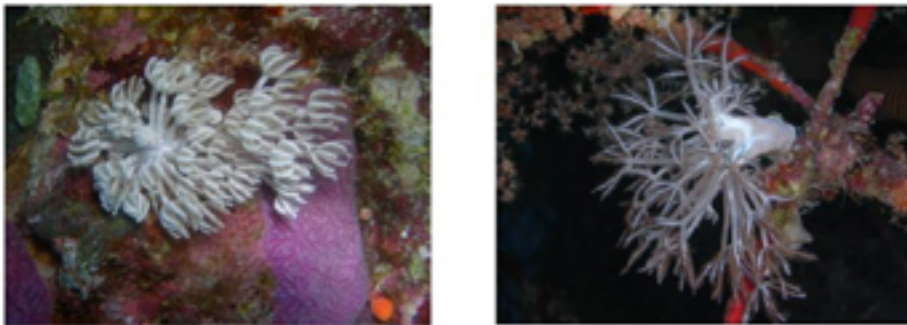


Introduction

Xeniidae is a family of soft corals that is abundant in Indian Ocean, Red Sea, and Pacific Ocean coral reefs¹. Xeniiids are opportunistic colonizers of reefs that have been degraded by bleaching and other environmental stresses, and some evidence suggests they may inhibit subsequent recolonization by scleractinian corals^{3,4}. Further ecological study of this group is, however, hindered by our poor understanding of species boundaries and higher taxonomic relationships among xeniids. Species and genera are distinguished based on morphological characters such as colony growth form, polyp dimorphism, sclerite characteristics, and color^{1,2}.

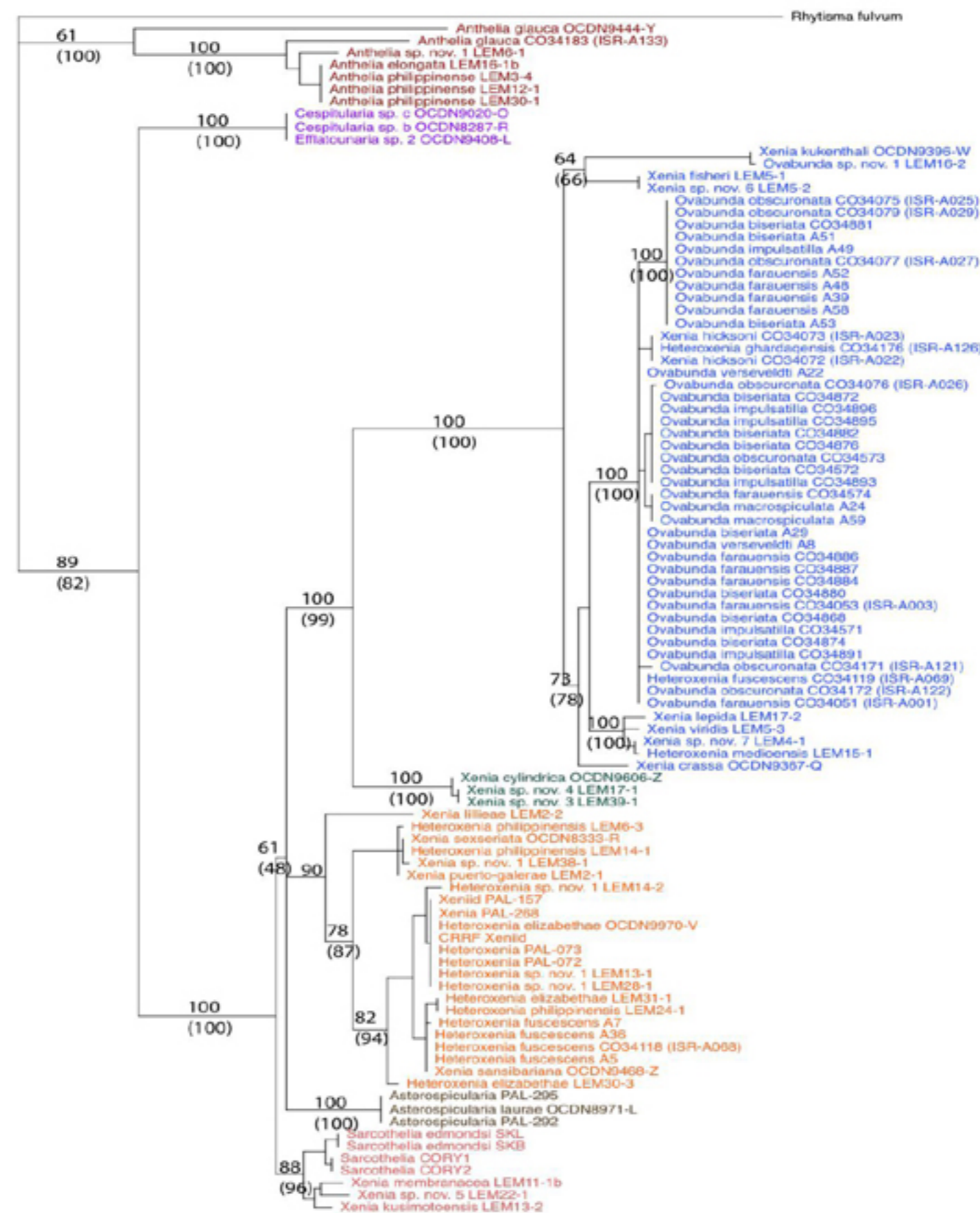
The goal of our study is to construct a molecular phylogeny for the family Xeniidae, with the hope that this phylogeny can then be used to identify new morphological characters that are phylogenetically informative and distinguish between genera.



Morphological distinctions among the common genera within Xeniidae

Genus	Colony Shape	Polyps	Sclerites
<i>Anthelia</i>	Small clusters of polyps connected by a membrane	Have autozooids. Slightly contractile.	Short, somewhat flattened rods
<i>Asterospicularia</i>	Short stalk surrounded by low rounded lobes.	Have autozooids. Contractile.	Small, stellate sclerites in colony. Minute disc or cupule-like sclerites in polyps.
<i>Cespitularia</i>	Few lobe-like branches.	Have autozooids. Slightly contractile.	Minute cupule-like platelets or spheroids
<i>Efflatounaria</i>	Lobe-like branches coming from a short stalk.	Has autozooids. Highly contractile.	Minute cupule-like platelets or spheroids
<i>Heteroxenia</i>	Cylindrical or clavate colonies, sometimes branched with dome-shaped summits	Have autozooids and siphonozooids.	Minute cupule-like platelets or spheroids
<i>Ovabunda</i>	Cylindrical or clavate colonies, sometimes branched with dome shaped summits	Have autozooids. Non-retractile.	Subspherical, like misshapen leaves
<i>Xenia</i>	Cylindrical or clavate colonies, sometimes branched with dome shaped summits	Have autozooids.	Minute cupule-like platelets or spheroids

Maximum Parsimony Tree for the Common Genera of Xeniidae based on the mitochondrial genes COI, msh1, and ND2



— 5 changes

*Bootstrap values above the node are for maximum parsimony and values below the node are for maximum likelihood

Methods

We have obtained partial sequences for the mitochondrial genes *COI*, *msh1*, and *ND2* for 100 samples, which represents 8 genera.

These sequences were then used to construct a maximum parsimony tree in PAUP and a maximum likelihood tree in phylml.

Results

- Xeniidae is divided into seven well-supported clades
- Asterospicularia* (brown), *Sarcothelia* (red), and *Anthelia* (dark red) form monophyletic groups
- Efflatounaria* and *Cespitularia* (purple) are not distinguished from one another
- Heteroxenia* and some *Xenia* occur together in a mixed clade (orange)
- Ovabunda* forms a predominantly monophyletic group within a clade that also includes some *Xenia* and *Heteroxenia* (blue)
- Morphospecies of *Ovabunda* are not distinguished reliably using these genetic markers
- Xenia* species occur in four different clades, and *Heteroxenia* species in two clades

Conclusions

Since we see multiple polyphyletic groups, we can conclude that the morphological characters being used to identify each genus are not supported by the molecular data. For instance, characters such as the presence or absence of siphonozooids are not sufficient to distinguish between *Xenia* and *Heteroxenia*. Using the molecular phylogeny as a guide, we are re-examining specimens to identify new sets of morphological characters that are phylogenetically informative and can be used to differentiate genera reliably.

Ongoing work is being done to obtain *COI*, *msh1*, and *ND2* sequences for representatives of additional species and genera. In addition, we will sequence one or more nuclear genes to provide support for the mitochondrial gene phylogeny.

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