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Sacculina is the most common cirriped parasite in marine and brackish waters. It includes 85% of all rhizocephalan diversity although there is not a clear synapomorphy that gathers all these species together.

AIM

We revised the phylogenetic relationships within Sacculinidae and established limits and contents of genus *Sacculina*.

METHODS

Cytochrome oxidase I (COI) sequences were obtained from the Sacculinidae collection deposited at the Museum National d'Histoire Naturelle, Paris. All NCBI available sequences were integrated.

The 368 COI sequences were used to estimate a gene tree using Maximum likelihood and Bayesian inferences.

Subsequently, one individual per lineage was sequenced for the 18SrRNA.

Obj 1. To test Rhizocephala relationship with other Cirripedia

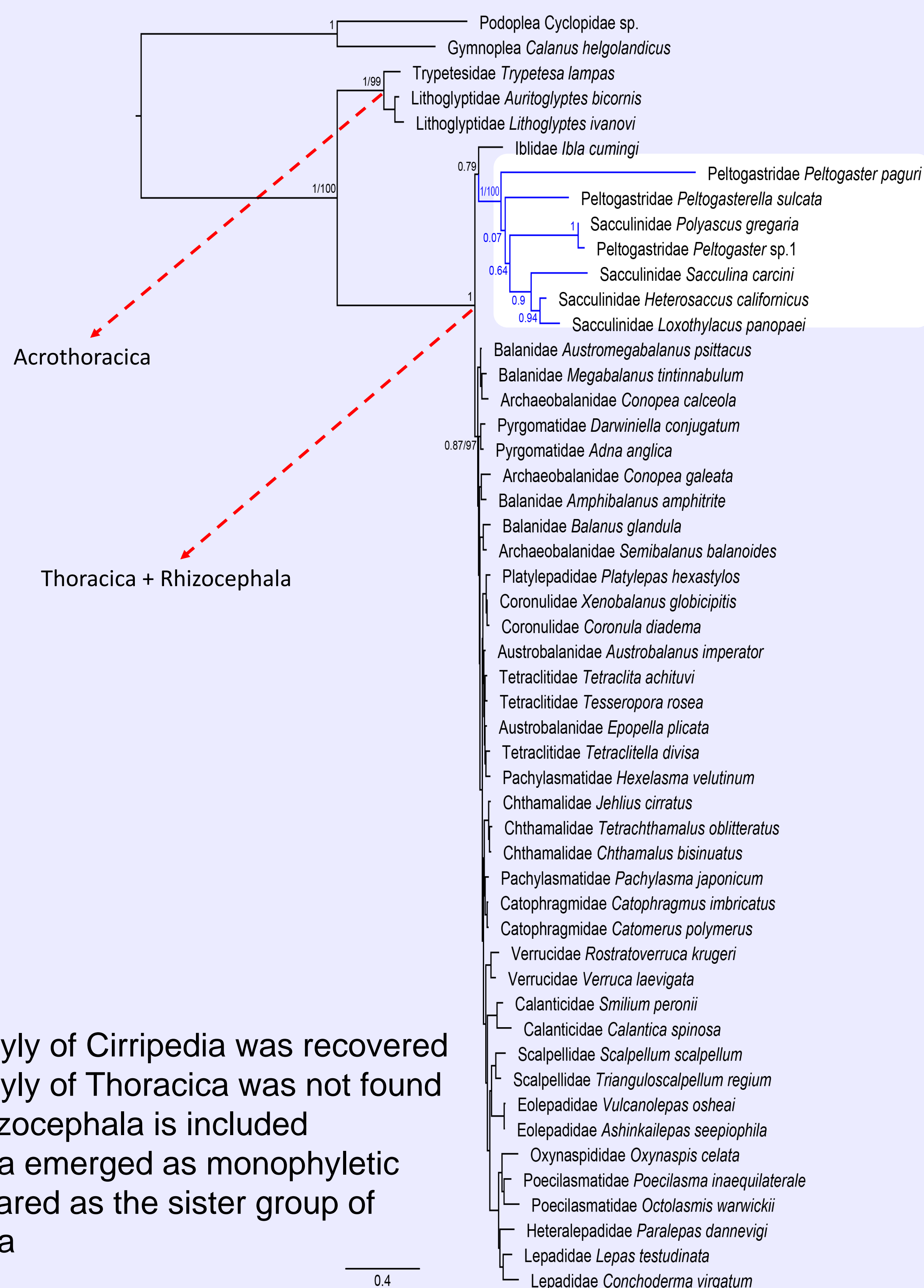


Fig. 1. Bayesian and PhyML inferences on a concatenated dataset from 18S, 28S rRNA and H3 gene fragments. GTR substitution model

Obj 2. To define Rhizocephalan lineages

Table 1. Comprehensive dataset of Rhizocephala, abstract of the results

Traditional classification		Genes included		Results	
Order	Family	COI	18S	Order	Family
A Kentrogonida	Chthamalophilidae			Monophyletic	Monophyletic
	Clistosaccidae				Monophyletic
	Duplorbidae				?
	Mycetomorphidae				?
	Polysaccidae				Monophyletic
	Thompsoniidae				Monophyletic
Kentrogonida	Lernaediscidae			Paraphyletic	Monophyletic
	Parthenopeidae				-
	Peltogastridae				Polyphyletic
					Septosaccus-clade
	Sacculinidae				Polyphyletic
					<i>S. gerbei</i> -clade

♣ included *Peltogaster paguri* and ♠ included *Sacculina carcini*, type species for each family

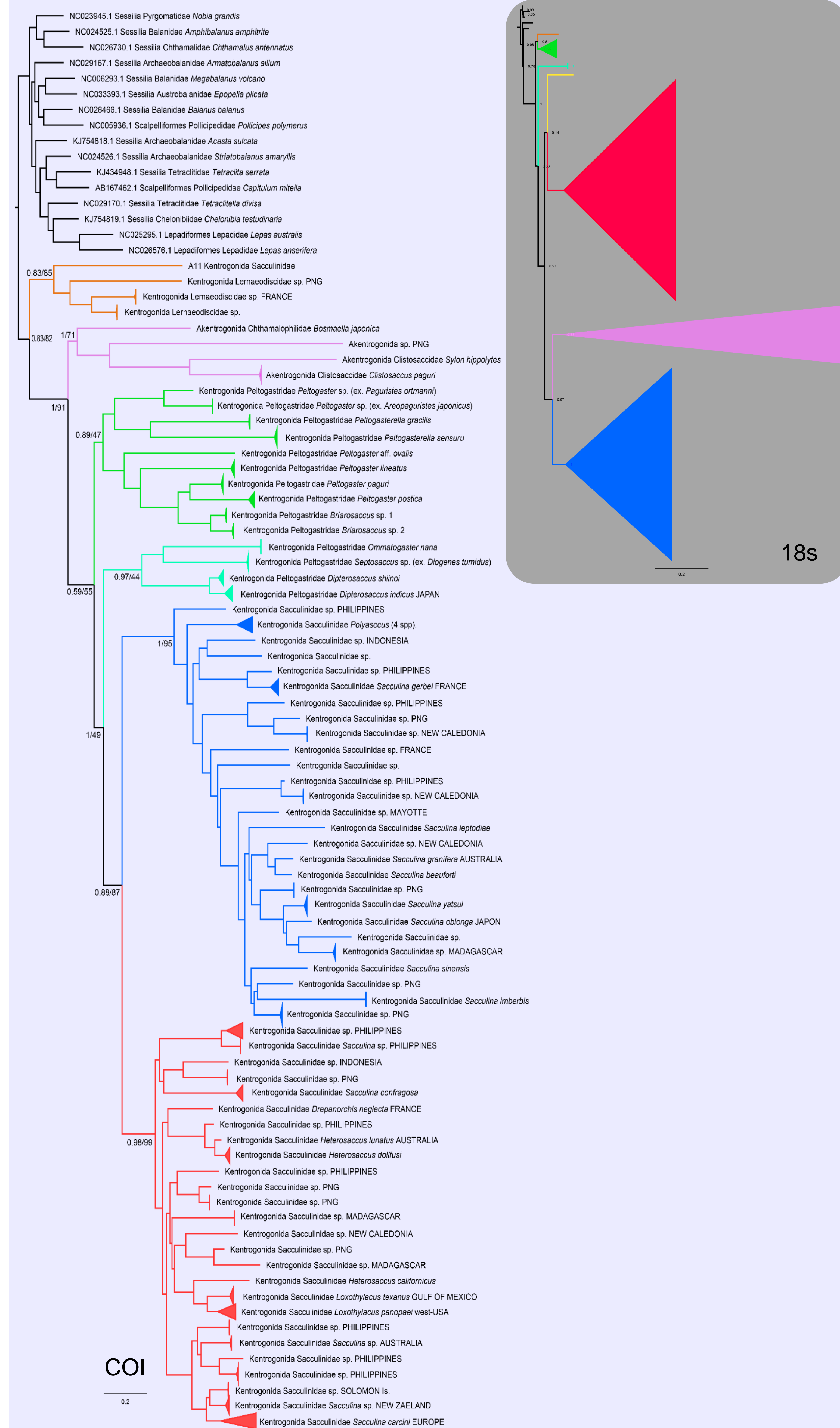


Fig. 3. Gene trees (COI mt, 18S and 28S rRNA) of a comprehensive dataset of Rhizocephala.

Results

- ✓ Akentrogonids are confirmed to form a clade, while Kentrogonids were paraphyletic.
- ✓ Within the "Kentrogonids", Peltogastridae was found to be paraphyletic.
- ✓ One clade included all species previously considered as *Sacculina* merged with other genera (ex. *Loxothylacus* or *Heterosaccus*), rendering the current concept of "*Sacculina*" as polyphyletic.
- ✓ Clearly, the tree showed three mayor diversification events within the *Sacculina*-clade, and only one (in red) contained *Sacculina carcini*, the type species of the genus. All other clade would need to be renamed.

Conclusion

- ✓ Not a clear biogeographic pattern was revealed from the phylogeny. Atlantic and Indo-pacific species can be siblings, and sympatric species may not be closely related, suggesting the occurrence of repetitive colonization events.
- ✓ Given that different lineages were found to parasitize the same decapod species, this suggests a strong convergence of the *Sacculina* phenotype traits adapted to parasitism.
- ✓ Clearly, the history of life traits of *Sacculina* are much more complex than expected and classification of this group does not reflect its evolutionary path.