

# Lumping and splitting at once: the interesting case of *Ephesiella* and *Sphaerodorum* (Sphaerodoridae, Annelida) in the North-East Atlantic

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## Are *Ephesiella* and *Sphaerodorum* valid genera? Is the chaetal morphology their distinguishing feature?

The long bodied sphaerodorids constitute a morphologically homogenous clade circumscribing members of the genera *Ephesiella*, *Ephesiopsis* and *Sphaerodorum*. Differences between these genera have been based on the chaetal morphology, being all chaetae compound in *Ephesiella* (except for the very first chaetiger where a simple chaeta may occur), all simple in *Sphaerodorum*, and both simple and compound in each parapodia in *Ephesiopsis*. Thorough examination of members of this clade from world-wide localities including the North-East Atlantic uncovered intermediate conditions, with pseudocompound chaetae in some of them, putting into question the systematic validity of this feature.

## Are the species *Ephesiella abyssorum* and *Sphaerodorum flavum* broadly distributed?

More over the two common species in the North East Atlantic, *Ephesiella abyssorum* and *Sphaerodorum flavum* show a broad geographic and bathymetric distribution, that needed to be assessed.

"*Ephesiella abyssorum*"



Compound chaetae

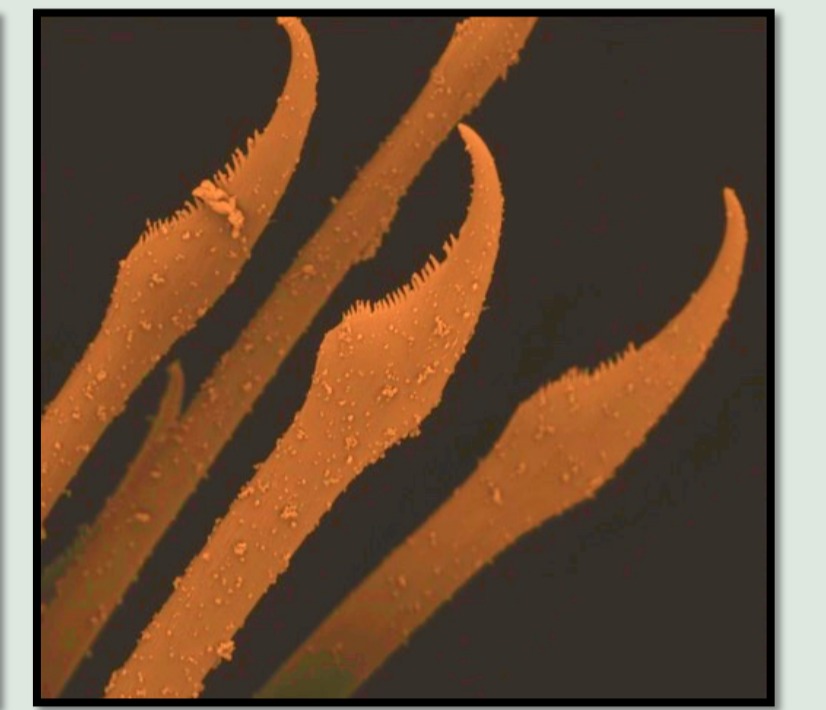
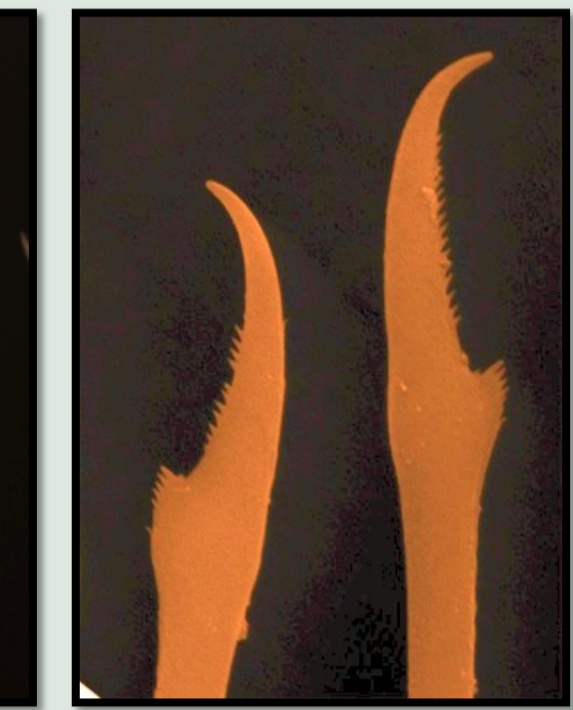
"*Sphaerodorum flavum*"



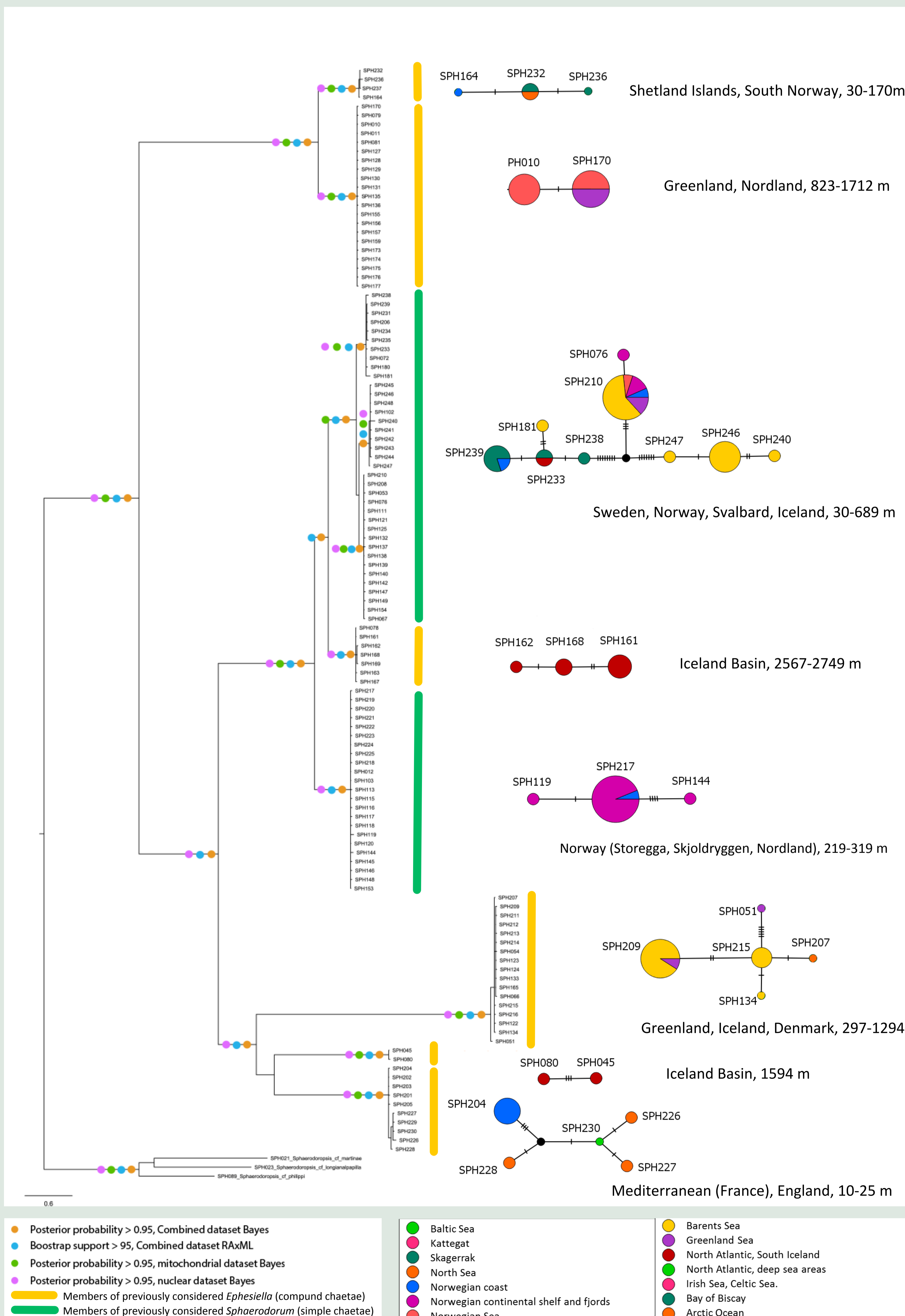
Pseudocompound chaetae



Simple chaetae



## Phylogenetic tree, resulting entities after GMYC analyses and haplotype networks



## Methods

- ✓ 124 specimens were collected from several localities in the North Eastern Atlantic, including the Mediterranean Sea
- ✓ Nuclear and mitochondrial DNA markers (i.e. 18S, 28S, *cox1* and 16S) were amplified and sequenced
- ✓ Different alignments algorithms were used, elimination of poorly aligned and divergent regions of the alignment (gblocks) was also performed and results compared.
- ✓ Phylogenetic methods (RAxML, Beast) were used to assess evolutionary relationships among specimens, rooting the tree with members of three species of *Sphaerodoropsis*.
- ✓ Statistical parsimony haplotype networks were calculated for *cox1*.
- ✓ Species delimitation methods (Generalised Mixed Yule-Coalescence - GMYC) were applied for each marker independently. In all cases (except for 18S that did not show much variation between terminals) the GMYC entities recovered for each marker varied between 9 and 11, were congruent and well supported.
- ✓ Genetic distances were also calculated.

## Results and conclusions

- The two genera *Ephesiella* and *Sphaerodorum* are not reciprocally monophyletic and should be synonymized.
- Species delimitation methods indicate that at least nine species, matching the *Ephesiella abyssorum* (7 species) and *Sphaerodorum flavum* (2 species) diagnoses, inhabit the North-East Atlantic.
- These well defined and supported entities have genetic distances (p-distance) between 5.1-11.9% in *cox1*. Genetic divergence within lineages is 0.2-1.4%.
- Most entities have very little genetic structure, regardless their apparently broad and disjunct distributions (e.g. Western Mediterranean and the UK, or Greenland to Skagerrak from 300 to 1300 m deep)