The Anomioidea (Saddle Oysters) of the British Isles

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Saddle Oysters (Anomioidea) are represented in the UK and most of the NE Atlantic by 4 species: Anomia ephippium, Heteranomia squamula, Pododesmus patelliformis and another form or variety known as Pododesmus sp. patelliformis. Trustees of the British Museum pp212.

Muscle scars and sculpture

Muscle scars have traditionally been used to identify the 4 British species. However, this is not a reliable character for separation of Pododesmus species.

- Anomia ephippium, three smooth muscle scars on the upper valve
- Heteranomia squamula, two separate smooth muscle scars
- Pododesmus patelliformis, two separate and distinct furrowed scars (according to Tebble (1966)).
- P. squama, two furrowed scars merged in form one continuos scar (according to Tebble (1966)).

However, the degree of separation of the scars is very variable within Pododesmus - even with specimens from the same population - so this does not provide a reliable character to separate species.

The four British species of Anomioidea showing the muscle scar formation of the left (top) valve.

P. squama (left) and P. patelliformis (right).

Anatomy

Several specimens each of P. patelliformis and P. squama were examined and the foot, byssus retractor, gill and labial palps compared.

The gills separate the genera of Heteranomia (V-shaped, non-reflected ctenidium) and Pododesmus (W-shaped, reflected, ctenidium) but show no differences at the species level.

However, differences in the mantle thickness and tentacle size on the outer edge of the mantle were observed. This formation does differ between the left and right mantle in one specimen, but by excluding the right (bottom) mantle from the animal, comparisons could quickly be made between specimens and species.

- The mantle of P. squama is thinner than P. patelliformis.
- Tentacles in Pododesmus can be categorised into 3 size categories: small, medium and large. The ratio for both species were 1:2:3 but between species there was a consistent size difference of 5:4 (P. squama:P. patelliformis).
- P. squama tentacles are more elongate and are in a single row, whereas P. patelliformis tentacles are fatter and are over crowded.

The more slender, elongate tentacles always occur with radial/sculpted shells.

Phylogenetics

Material

The two ‘species’ of Pododesmus were collected from Irish Sea, NW and NE of Scotland and divided into two groups based solely on the presence or absence of the radial sculpture to ensure that an equal number of each form was represented. A specimen each of Anomia ephippium (Anglesey) and Heteranomia squamula (NW Scotland) were also used in this study.

Pododesmus squama (green), Pododesmus sp. (yellow), Anomia ephippium (purple).

Methods

Mantle snips were taken, DNA extracted using QIAQuick Blood & Tissue Kit and the Cytochrome Oxidase I gene isolated using Palazzi et al.'s (2010) COIF and COIF primers. Bands were excised and cleaned using Sigma's Geneclean Gel extraction Kit and sequenced using Life Technologies' Prism 3130xl Genetic Analyzer.

Analysis

Two Pectinoidea species from GenBank were used as outgroups. ApE was used to compare the sequences and then CLUSTALW in SDCS Workbench to create a FASTA file which was then uploaded to Mafft (version 6) to create a neighbour joining tree. The tree was rooted in Figtreex3.1

Pododesmus sp. (left), Pododesmus patelliformis (right).

Pododesmus patelliformis (left), P. squama (right).

Results and Conclusions

Two Pectinoidea species were used as outgroups and Pododesmus s. athera (Anomia) was used to test species boundaries. Using evidence from examination of shell sculpture, tentacle formation and the COI gene it can be concluded that Pododesmus sp. athera is a distinct species from Pododesmus patelliformis.

Future work

This initial study was a small project to prove or disprove that Pododesmus sp. athera was a distinct species and to clarify which characters could be used to separate the two Pododesmus species. I would like to expand the study to include some southern UK populations of Pododesmus to look at the conserative geographical variation and to include representatives of the Anomios from other parts of the NE Atlantic and Mediterranean. Isomaiia aberti is the only Anomia species not included in the study due to lack of material and because it has not yet been discovered in UK waters. Any 100% ethanol preserved specimens of this rare species would be gratefully received.

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