Poster ID: 474

Building a comprehensive barcode reference library of the Norwegian Echinodermata through NorBOL - an ongoing effort

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Abstract

As part of the Norwegian Barcode of Life-project (NorBOL), the University Museum of Bergen and its collaborators mainly focus on the barcoding of marine invertebrates, including the Echinodermata. The echinoderms are considered to be a well-known group with 151 recorded species in Norway (55 Asteroidea, 37 Ophiuroidea, 36 Holothuroidea, 16 Echinoidea and 7 Crinoidea). Many of these are common and widespread and with the exception of the crinoids, which tend to fragment very easily, most echinoderms preserve species characteristic morphological characters very well. As such it should be feasible to build a high-quality reference library of most if not all the known species.

Results

So far, 570 specimens identified to 107 species have been attempted barcoded, resulting in 454 barcodes grouping into 121 BINs (Barcode Index Numbers). The group has a high sequencing success rate (80% of specimens, 87% of species) compared with most other marine invertebrates we have worked on.

	Species in Norway	Species with barcodes	Species with multiple BINs	Total # BINs
Asteroidea	55	30	3	36
		55%		
Crinoidea	7	4	1	5
		57%		
Echinoidea	16	12	1	14
		75%		
Holothuroidea	36	23	2	29
		64%		
Ophiuroidea	37	27	2	37
		73%		

Table 1: Barcoding results for the different classes of Echinodermata.

Taxonomic discrepancy

We see that several samples that were initially identified as one species were allocated to multiple BINs, or to BINs containing specimens with more than one name. This may be due to unresolved taxonomy (cryptic species, discordance in name use among labs), misidentifications, or sequence contamination. This highlights the ever present need for careful evaluation and revisions by taxonomists once the sequencing is completed. To resolve some of these cases, barcoding of material collected at or close to type locality is necessary.

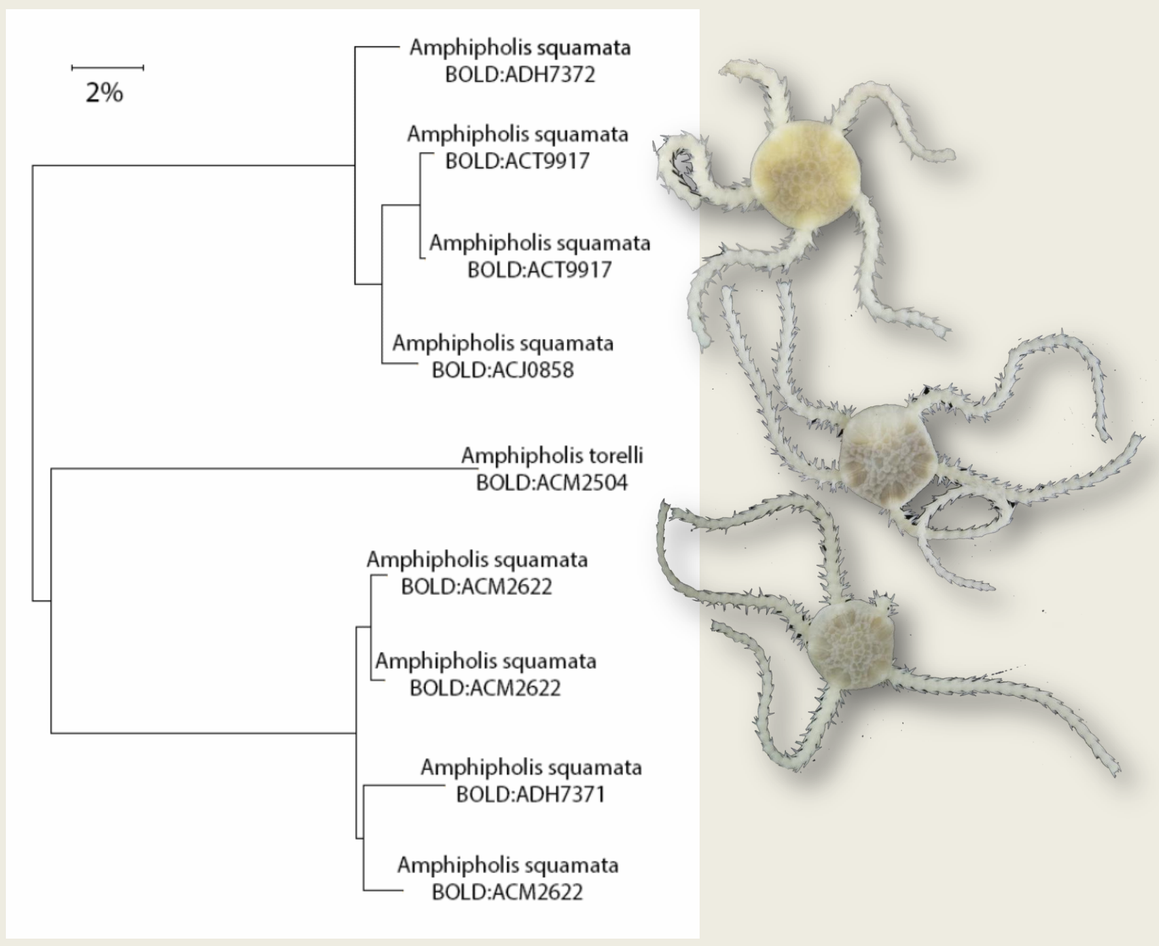

Figure 1: *Amphipholis squamata:* several genetically different clades (BINs) within the recognized species

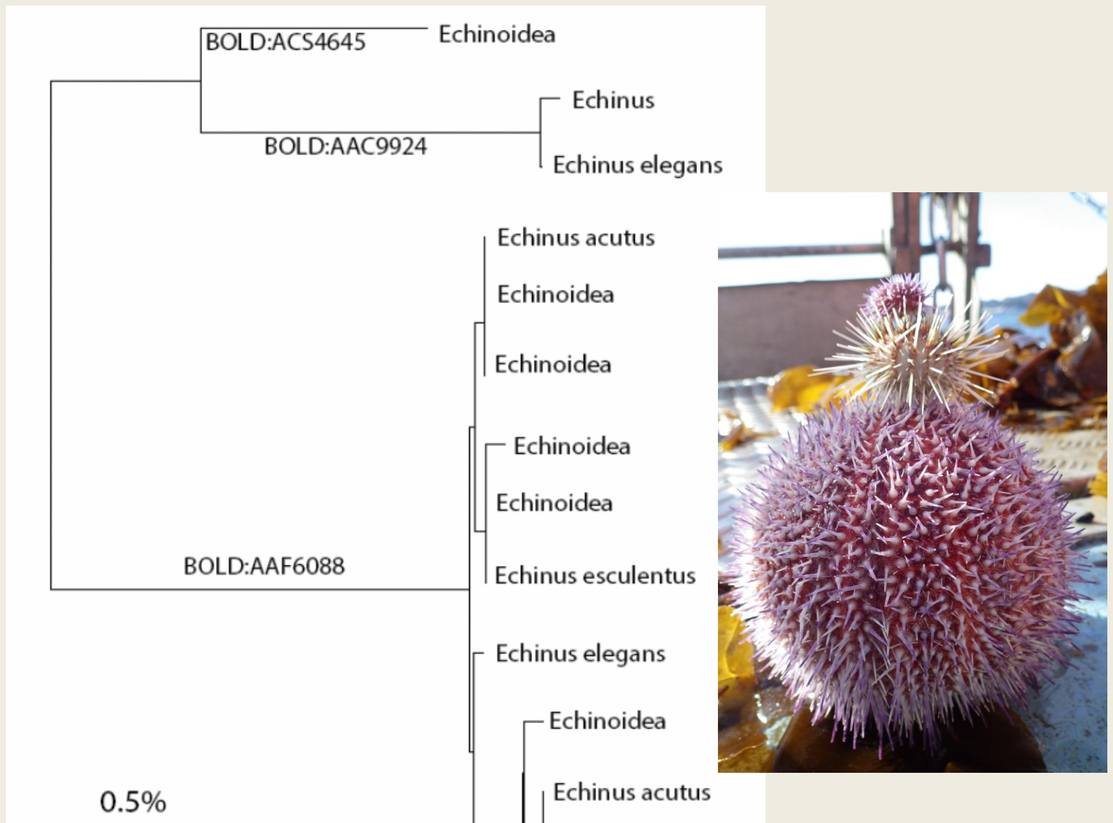

Figure 2: An example on multiple names in BINs. Species in the family Echinidae show a high degree of morphological variation. They are also believed to hybridize. Our results indicate that quick field identifications are inadequate!

Concluding remarks and future perspectives

High success rate and relatively few species make it achievable to build a comprehensive, validated reference library for Norwegian echinoderms. When completed, the library will be an objective way to validate identifications. It will also make it possible to identify juveniles and damaged specimens.

Limiting factors are the availability of material suitable for barcoding and of taxonomic expertise. Barcoding highlights some interesting cases of sequence clusters that will need to be resolved (e.g. Figs. 1 & 2).

Further sampling efforts and taxonomic work is needed.

References:
Madsen, F.J. & Hansen, B. 1994 Echinodermata Holothuroidea
Mortensen, T. 1927 Handbook of the echinoderms of the British Isles
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Sars, M. 1861 Oversigt af Norges echinodermer

Blog of the invertebrate collections: https://invertebrate.w.uib.no/

Acknowledgements: We are grateful for the contributions from the Norwegian Taxonomy Initiative projects, SweBOL, material supplied from MAREANO, CGB, G.K.Jebsen Centre, SponGES, IceAGE, and other projects.

Funding: The work is funded by NorBOL (www.norbol.org) with contributions from the Norwegian Biodiversity Information Centre, the Norwegian Research Council, BIO Guelph, and home institutions of cooperating partners.