Deep sea dispersal and connectivity across the North Atlantic

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Rationale:
Corals are listed as Vulnerable Marine Ecosystems by the United Nations General Assembly. *Acanella arbuscula* is an arborescent octocoral (pictures below) found across the North Atlantic from 200-2000m depth. This octocoral is, unusually, often found in soft sediment; habitat that is heavily impacted by bottom contact gear. Genetics is currently the most tractable method in the deep-sea to determine the processes underpinning persistence in deep-sea populations. Specifically, population genomics can be used to determine the appropriate size of conservation units for responsible management, as well as testing long-held deep-sea hypotheses about genetic connectivity e.g. the Depth Differentiation Hypothesis. This PhD will investigate population genomic connectivity and structure of *A. arbuscula* using single-nucleotide polymorphisms (SNPs) isolated using RAD-seq next generation sequencing technology. These data, alongside environmental data such as temperature, oxygen and productivity, will be combined in seascape genomic analyses (something not yet undertaken in the deep sea) to answer long-standing questions about the drivers of connectivity across the North Atlantic.

This project has practical implications for marine protection as many specimens are from marine refuges off Canada and MPAs off the west coast of the UK. Larval dispersal models using Lagrangian particle simulators will be utilised to predict connectivity and source-sink dynamics; these results will then be ground-truthed with genomic connectivity data.

This project lends itself to candidates with knowledge of bioinformatics, mathematical modelling, and/or genetic laboratory experience – this could be gained through a Masters degree or practical laboratory experience. The successful candidate will however be trained in the latest laboratory, modelling, and bioinformatic analysis techniques. Should they wish, the candidate, through the supervisors' wide network of collaborations, will also be put forward for extra collection opportunities on sea-going research expeditions.

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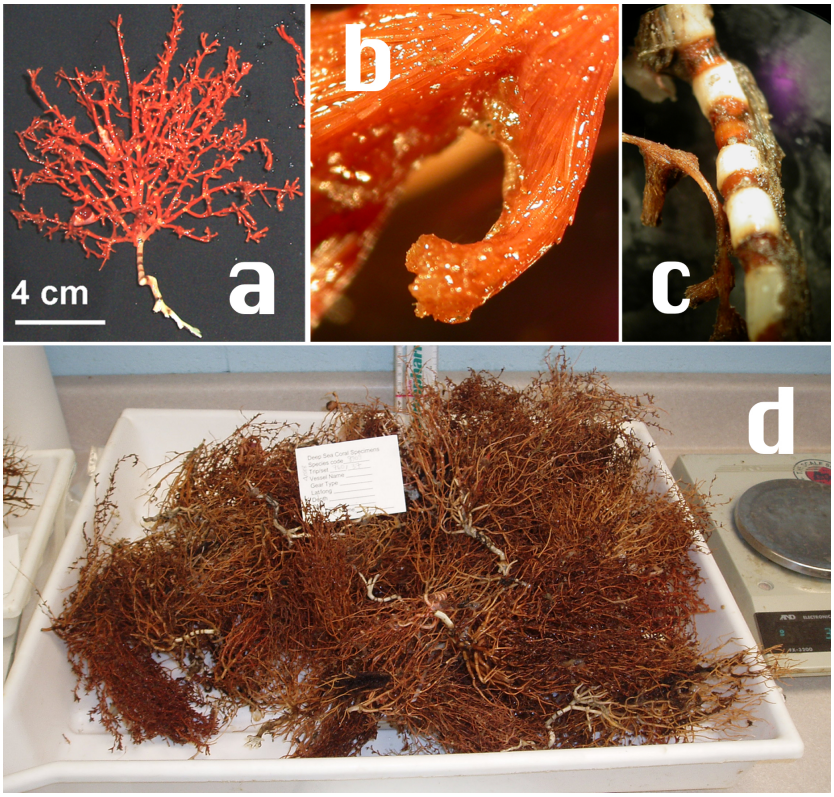
Funding notes

The start of this 3-yr fully-funded PhD studentship will be the 8th Oct 2018. The studentship will be to the value of £14777 per annum plus UK tuition fees. Please note that international students need to have additional funding to cover the difference in tuition fees, which is £11,815; evidence will be requested that you have these additional funds.

For questions about this PhD and submission of application documents (CV, cover letter including a 500 word description of why you are interested in this project - copies of transcripts and certificates will be requested if candidates are interviewed) please email Dr Michelle Taylor: michelle.taylor@essex.ac.uk. In addition please have two referees send references directly to me at the above address. Application material should be submitted by the 30th March 2018.



a – Colony of the octocoral *Acanella arbuscula*

b – close up of polyp

c – close up of axis

d – *Acanella* from research surveys off the east coast of Canada