Application of molecular techniques (DNA) to the processing of benthic macrofaunal samples

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Centre for Environment Fisheries & Aquaculture Science

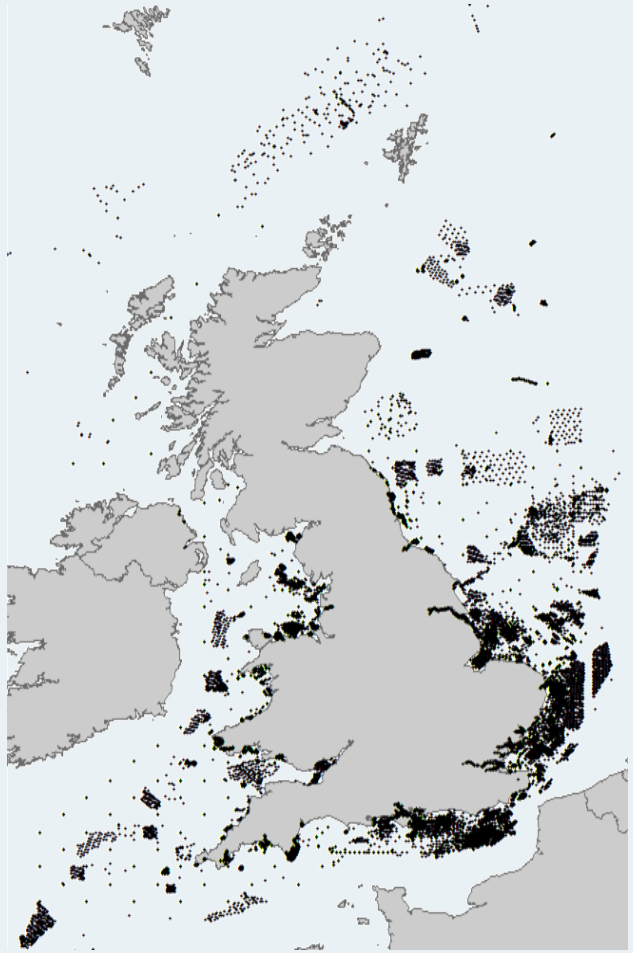
Premiam Conference 22/06/2016

Cefas

What are benthic macroinvertebrates and why are they important?

Reasons for collecting benthic samples

Offshore Windfarm
Marine Protected Areas SAC Marine Aggregates
MCZ Habitat mapping
Construction
Marine & Coastal Access Act OSPAR Monitoring
Disposal Biodiversity Assessment
WFD Research
Marine Strategy Framework Directive Characterisation
Government Nuclear CSEMP
Oil spill response



Collection and Processing of samples

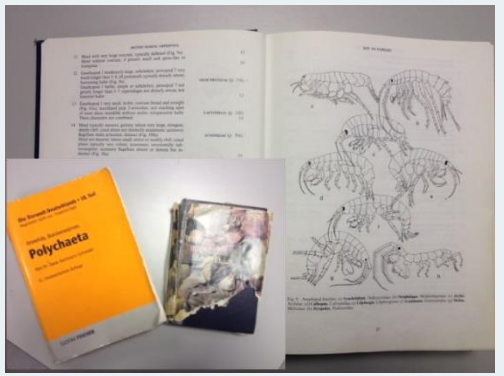
Field



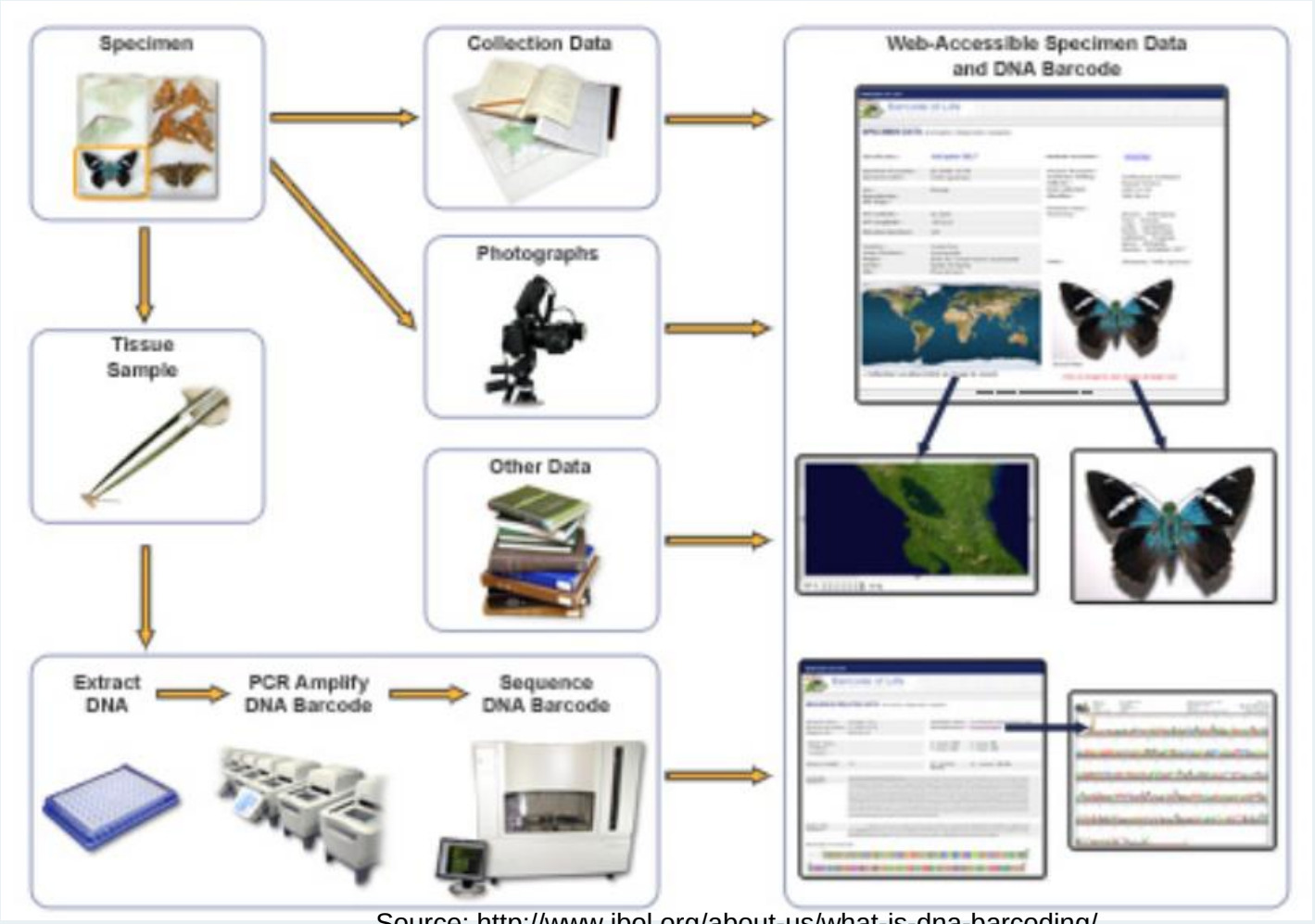


Laboratory



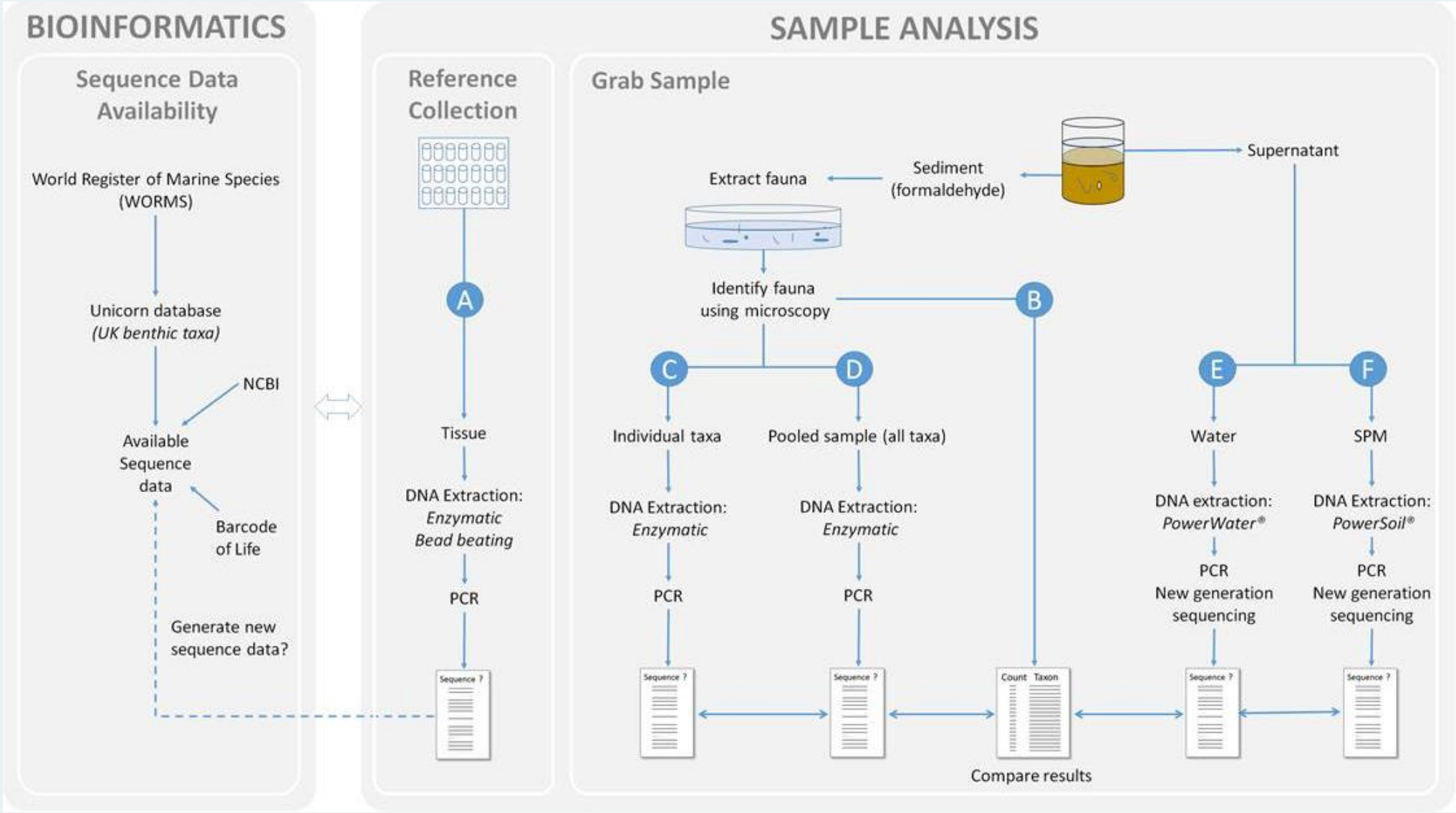



DNA Barcoding / Metabarcoding



Source: http://www.ibol.org/about-us/what-is-dna-barcoding/

CCTATACCTAATCTTCGGAGCATGGGGCATGGTAGGC....



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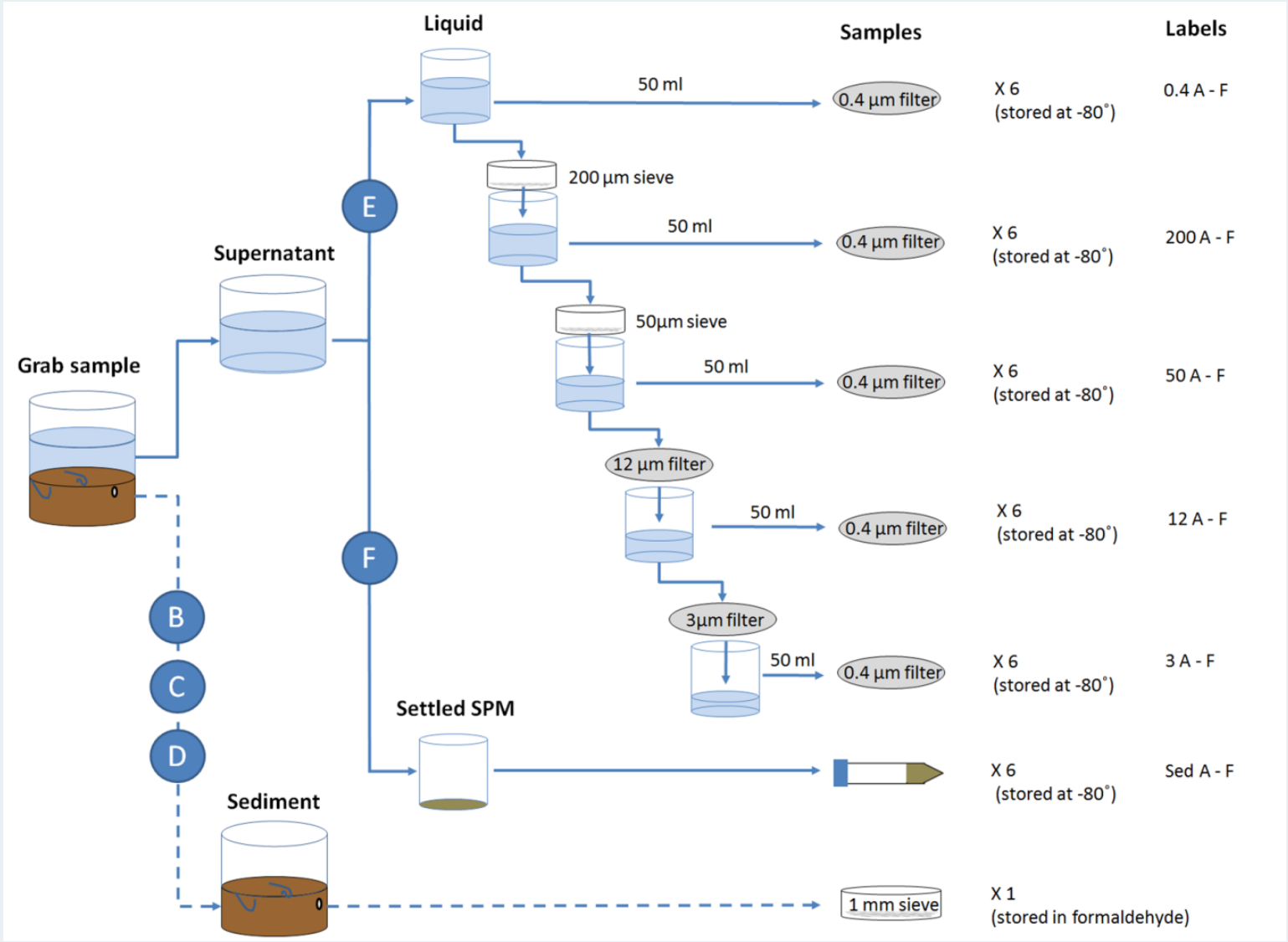
eDNA Approach



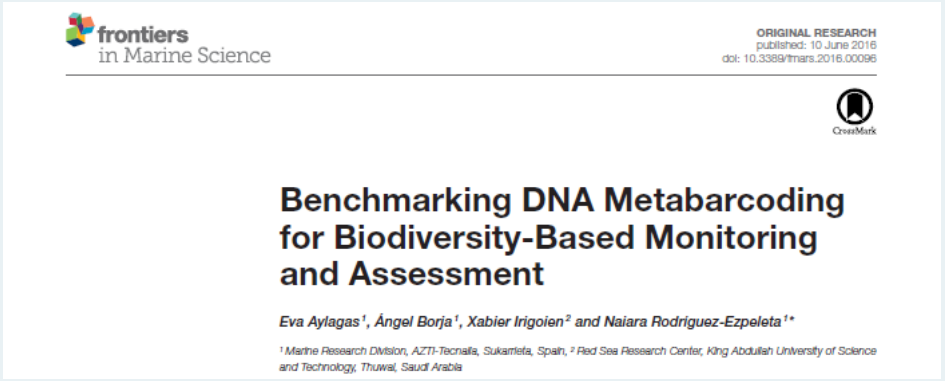
Conclusions

- Potential benefits:
  - speed of sample processing
  - lower costs
  - simultaneously look at microbes, meiofauna, macrofauna and megafauna

- Some success in soft sediments (muds/sands).

- More challenging in coarse sediments

- Further work required:
  - missing sequence data (~80% of relevant taxa)
  - primer development
  - DNA half-life
  - method development (issues of sample contamination and sample agitation)
  - validation studies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Benchmarking DNA Metabarcoding for Biodiversity-Based Monitoring and Assessment

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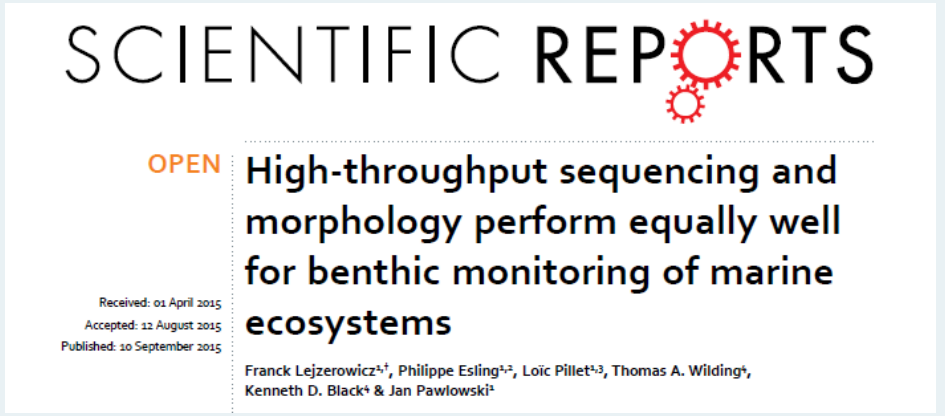
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High-throughput sequencing and morphology perform equally well for benthic monitoring of marine ecosystems

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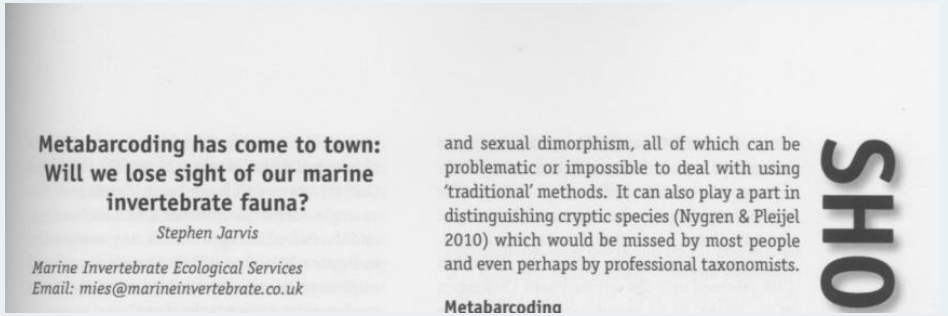
Metabarcoding has come to town: Will we lose sight of our marine invertebrate fauna?

Stephen Jarvis

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and sexual dimorphism, all of which can be problematic or impossible to deal with using 'traditional' methods. It can also play a part in distinguishing cryptic species (Nygren & Pleijel 2010) which would be missed by most people and even perhaps by professional taxonomists.

Metabarcoding

SHO

Thanks for listening