

EMODNet Biology data grant: pilot project on collecting biological trait information

Defining biological trait information for plankton taxa – Sir Alister Hardy Foundation

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Introduction

This report gives an overview of the biological trait information that have been collected, and a reference list of the publications that have been used to derive this information. A brief summary of issues that have arisen during the work, how many taxa have been completed, and a definition of some of the traits used in the project is also included.

It must be noted that majority of the plankton taxa that have been covered by this project are from the list of taxa recorded by the Continuous Plankton Recorder survey. Results on distribution of taxa are based on this survey. Due to the number of taxa required to be reported on, and the diverse nature, a team of researchers has been used to collate the information (in addition to the authors of this report). These are: Gemma Brice, Claire Buckland, Dr. Astrid Fischer, Jennifer Skinner, Claire Taylor and Dr. Anthony Walne. A spreadsheet of biological traits was prepared in conjunction with VLIZ, with an associated list of trait names and their adjacent values. Each taxa has Authority and Aphia Id assigned to it, before populating the trait list.

It should be noted that the information given in this report is correct according to the references supplied and information available at this time. Traits may possibly change as more studies are carried out or as more references are found. In addition one should also note that some information on taxa is very sparse and terms used in the available literature are often not consistent, sometimes within the same publication. This makes consistency in compiling the information difficult, although we have attempted a consistent approach within this piece of work.

Notes on definitions used in the Biological traits spreadsheet

Most of the trait scores or values used within this piece of work are self-explanatory, but below are listed definitions which benefit from more detail.

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| All traits: | <i>Awaiting further info</i> – This is used as information cannot easily be found or is not readily available, but thought likely to be published. We would say that this is beyond time limitations of the current project. |
| | <i>Unknown</i> – Information genuinely thought to not exist in current scientific peer-reviewed literature. |
| Time in plankton | <i>Meroplankton</i> – This may include organisms that are usually benthic but regularly get swept up into the water column and are common in plankton samples. |
| Feeding method | <i>Predator</i> - All carnivores are predators, but not all predators are carnivores. Predators eat meat, but carnivores eat exclusively meat. |

Habitat *Neritic* – refers to taxa commonly found in an on-shelf area, i.e. shallow seas (such as the English Channel and North Sea)
Oceanic – refers to taxa found off-shelf, i.e. in deeper waters (such as the Labrador Sea and the Iceland Basin)
Cosmopolitan – refers to taxa found throughout the CPR survey region, regardless of water depth (i.e. in both shallow and deeper waters)

Toxicity This trait is of particular relevance to types of phytoplankton and is associated with an organism producing toxic compounds.

Non-toxic nuisance - does not directly produce toxic compounds but may be considered a 'nuisance' due to other environmental affects. These can include foam / slime production and general clogging.

Non toxic - This trait has been applied to an organism where there is a direct reference indicating its non-toxic status. An organism has been given the trait non-toxic indirectly i.e. when a comprehensive review of the group to which the organism belongs to has been consulted and in which there is no mention or indication of toxic tendencies. It has been assumed that, in such a comprehensive review, if an organism did possess any toxic tendencies it would have been of importance and hence included in the literature.

Life stage - Life stages other than the mature or adult form are named and number of stages or instars belonging to the life stage name given, where applicable and where info is known.

Reproductive / spawning method *Sac spawner/brooder* – eggs carried or brooded until hatching

Free spawner – (fertilised eggs released into water to hatch)

Broadcast spawner – eggs and sperm are released into water, hence fertilisation is external (ie opposite of internal fertilisation).

It must be noted that many of the taxa traits are inferred, as the majority have not been studied. In this case, traits have been inferred from similar taxa, ie. species within a genus, or in some cases not explicitly detailed in the reference but alluded to. For example reproduction method in *Ceratium* taxa: sexual reproduction is known to occur in some *Ceratium* species, however there has only actually been studies on a limited number of taxa, so where a study has been conducted and literature has been published for a species the relevant reference has been cited. Where there is no information, an assumption has been made that there is a possibility that sexual reproduction may well occur in all species

Summary of the project and future suggestions

This has proved to be a very useful piece of work, and has highlighted that for many of the 393 planktonic organisms, very little is actually known and/or published. For a number of taxa, the only information available on some traits, for example distribution, is from the CPR survey. In total, there were over 6710 traits collected for almost 400 taxa. There was an under-estimation of the amount of time required to complete the pilot project, mainly due to the lack of information available. In some cases with certain taxa, with more time / resources, it might be possible to assign further biological traits, but with the time limits for the pilot project, this was not possible. SAHFOS would be keen to work on this type of project in the future, as we have a clear understanding of the amount of work involved, and many of the issues that have been faced (for example, inconsistencies within references).

For future work, length and biomass values would be very useful assigned to as many taxa as possible, taking into account seasonal and distributional variations. At present, for the majority of biomass work, one value is given for a species, often based on biovolume, or possibly dry / wet weight. This neglects any seasonal and locale variation, for example it is well known that *Calanus finmarchicus* in the northwest Atlantic can be full of stored lipids (wax esters) prior to entering a diapause phase – this is not the case in the same species in the North Sea. Clearly there would be a large variation in biomass values in this case, and this would be the same for many taxa.

Another suggestion for future work would be the addition of a trait that deals with shell / carapace composition, in particularly whether an organism is calcareous (aragonite). This may have importance for ocean acidification work, such calcareous organisms would be coccolithophores, molluscs, foraminifera and some bryozoa larvae

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