

**Proposed concepts for research activities**

**Title :** Decoding processes structuring biogeography and biodiversity of the Antarctic benthic fauna

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**Concise description outlining the possible national contribution in terms of efforts :**

This rather specified research project fits within several international research initiatives that aim at understanding the biogeography and the biodiversity of the Antarctic fauna. The University of Ghent has a strong expertise in the taxonomy and ecology of the free-living marine Nematoda the most abundant and diverse metazoan group of the benthos in most marine environments. Especially towards the deep-sea they are increasing in importance in terms of abundance and species richness in comparison to other taxa. However, in addition to their high local (alpha) biodiversity, little is known on the geographic distribution of deep-sea species. Because of the lack of taxonomic descriptions of deep-sea species, no information is available on how widely species are distributed and thus how regionally to globally integrated biodiversity estimates are increasing in relation to local biodiversity. The few studies on deep-sea nematode biodiversity are restricted to estimating total species numbers without providing any information on which species are present since almost all of them are new to science. It would mean a tremendous task to describe taxonomically the unknown deep-sea species within the Nematoda, but giving it a start seems the only mean to get some insight in the distribution ranges of species and thus the present deep-sea species realm.

The Antarctic deep-sea is especially interesting as a case study in relation to the biodiversity and biogeographical distribution of species. Antarctica and the Southern Ocean are characterized by an extremely constant, homogenous physical environment with permanent low temperatures, a long polar night, a short summer, a wide ice cover and a marked seasonality of primary production. In contrast to this homogenous environment, the Antarctic marine fauna is very diverse. From the deepest environments in the southern ocean (> 1000m) however nothing is known so far. A few papers have dealt with the Antarctic meiofaunal diversity but for nematodes especially from deeper waters all ecological studies from this area were performed until today at the genus level. These studies have confirmed the so-called meiofauna-paradox which says that in completely divergent areas many identical meiofauna taxa are found. This paradox strongly contrasts with the trend observed in fish and macrofauna communities which show a high degree of endemism at genus and at species level.

By studying the fauna along possible exchange routes from the Southern ocean to adjacent seas including the continental slope and the Scotia Arch, a shallow land bridge connecting the Peninsula with South America, insight in processes structuring the biodiversity and distribution ranges of species can be obtained. Therefore focusing on species distribution patterns along both bathymetric and geographical transects in the Weddell

sea area, the following aspects of biogeography and biodiversity should be dealt with:

1. Particular areas are source or sink of species diversity?
2. How does regional Antarctic biodiversity relates to local biodiversity?
3. Through molecular analysis the importance of cryptic species along both bathymetric and geographic transects is estimated
4. Collecting species information on morphology, taxonomy, genetics, ecology and distribution in a digital database should speed up integration of data in order to obtain a better understanding of processes structuring biodiversity and biogeography of the Antarctic fauna;
5. The investigation of different taxa from micro-, meio-, macro- and megabenthos, nekton, plankton,.... in parallel should increase insights in ongoing processes. Because of their abundance and diversity, and the lack of a pelagic life stages the Nematoda are of particular interest as model organism to test several hypothesis on the origin and the distribution of the Antarctic fauna.