



Międzynarodowa Środowiskowa Szkoła Doktorska
przy **Centrum Studiów Polarnych**
w Uniwersytecie Śląskim w Katowicach

ul. Bedzińska 60
41-200 Sosnowiec
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Reference No: IEDS/2020/IO PAN/07

Title of PhD project: Ancient environmental DNA: a new proxy of paleobiodiversity

Leading unit: International Environmental Doctoral School associated with the Centre for Polar Studies at the University of Silesia in Katowice (IEDS)

Mode of study: full-time

Degree to be obtained: PhD in the field of natural sciences, in the discipline of Earth and related environmental sciences

Duration: 4 years (8 semesters), from October 2020

Language: English

Scholarship: approx. 3500 PLN per month throughout the 36 months (3 years), with the possibility of extension for 12 months

Requirements and regulations: www.mssd.us.edu.pl/kandydat-mssd/

Registration online: www.irk.us.edu.pl

Requirements:

1. MSc in biology with specialization in oceanography/marine biology/molecular ecology/microbiology
2. Basic experience in molecular techniques (DNA extraction, PCR, High-throughput sequencing)
3. Strong interest in bioinformatic and biostatistics tools for analysis of DNA sequence data
4. High motivation for scientific work
5. Very good English written and verbal communication skills
6. Additional advantage: (co-)authorship of scientific paper and/or conference presentation
7. Experience in field research and research cruises will be appreciated



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Tasks description:

1. Preparation and conducting fieldwork, participation in research cruises in the Nordic Seas and Arctic
2. Collecting water samples and surface sediment samples for environmental DNA metabarcoding
3. Collecting sediment samples for paleogenomic analyses
4. Environmental DNA extraction, PCR amplification, Preparation of metabarcoding libraries for high-throughput sequencing
5. Analysis of metabarcoding data
6. Data integration and biostatistics analyses
7. Writing scientific publications
8. Presentation of the results at international scientific conferences

Abstract

Arctic marine ecosystems are radically changing due to global warming. The impact of rapidly increasing sea surface temperature (SST) and retreating sea-ice on modern Arctic marine biodiversity has been extensively studied. However, much less is known about the evolution of Arctic biodiversity in postglacial period, especially regarding the impact of past climate change on the diversity of microbial eukaryotes and meiofauna (animals < 1mm), which play a crucial ecological role at the base of Arctic food webs.

In this project we will use environmental DNA metabarcoding applied to modern and fossil marine sediments collected at Svalbard, Greenland and Jan Mayen shelves to reconstruct the history of marine life in Nordic Seas during the last 20'000 years. We will analyze water and surface sediment samples to check how well the extant marine diversity is preserved in sedimentary DNA archives. Then, we will analyze sedimentary ancient DNA (sedaDNA) preserved in selected sediment cores in order to explore biodiversity changes in Nordic Seas over time. By using multiple genetic markers, we will follow changes in composition of different groups of organisms, from microalgae to other single-cell eukaryotes and animals. We will integrate these historical biodiversity data with the information about environmental change provided by classical palaeoceanographic proxies. The results of our study will help understanding how the marine organisms responded to climate change in the past and whether this response is similar to what we observe today. In particular, we will analyze the



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impact of climate change on biodiversity during the mid-Holocene Thermal Maximum, about 5'000-9'000 years ago and compare it to the current global warming.

The main scientific objective of the dissertation will be to test the hypothesis that the past increase of sea surface temperature in Nordic Seas was associated with the increase of biodiversity, lower productivity and reduced carbon burial.

The PhD position is available at within the cross-disciplinary research project "Sedimentary ancient DNA - a new proxy to investigate the impact of environmental change on past and present biodiversity in Nordic Seas (NEEDED)", funded through the Norway and EEA Grants 2014–2021 under the Basic Research Programme operated by the National Science Centre.

Other information:

1. The supervisors will be prof. Jan Pawlowski, Institute of Oceanology Polish Academy of Sciences, Sopot, Poland janpawlowski@iopan.pl; dr Joanna Pawłowska pawlowska@iopan.pl, Institute of Oceanology Polish Academy of Sciences, Sopot, Poland;
2. The scholarship will be paid as a part of the Polish National Science Centre funded project in the frame of GRIEG programme – NEEDED.
Information about the competition procedure for the NEEDED project: <https://www.ncn.gov.pl/baza-ofert/?akcja=wyswietl&id=183497>
The candidate must additionally undergo competitive recruitment for the NCN project.
3. Contact to the Secretary of the IEDS Admission Committee: +48 32 3689 380, polarknow@us.edu.pl, www.mssd.us.edu.pl