

Understanding the processes that shape diversity in marine ecosystems is not only important part for knowing their evolution, but it also provides the necessary knowledge for an effective and efficient conservation.

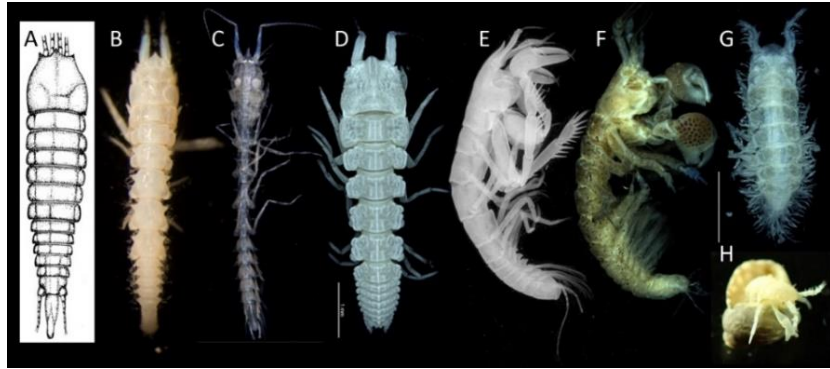
The tasks for the implementation of the **EHO-SHA** project will focus on the study of **small marine crustaceans of the Apseudomorpha** group (Fig. 1) lacking a planktonic larval stage, what makes them organisms with low mobility. Marine benthic ecosystems are commonly regarded as static habitats experiencing slow changes in their environmental conditions. Although in recent decades there has been increasing evidence showing that they are more variable than once thought, the evolutionary processes shaping them and determining their diversity still remains largely unclear.

During this project we will answer questions about:

- the geological time of evolution of crustaceans of the suborder Apseudomorpha;
- the place of radiation of the last common ancestor of Apseudomorpha
- the evolutionary relationships (phylogeny) of Apseudomorpha and their common morphological features (apomorphies);
- ecological factors causing morphological changes (adaptations);
- geological timing of the colonisation of the ocean depths by Apseudomorpha.

**Figure 1:** Diversity in Apseudomorpha.

A) Reconstruction of tanaid ancestor *Anthracocaris scotica* (Peach, 1882)†; B) Apseudidae, shallow water; C) Apseudidae, deep-sea; D) Whitellegidae, shallow water; E, F) Metapseudidae, shallow water; G) Sphyrapodidae, deep-sea; H) Pagurapseudidae. Photo Credit: all M. Błażewicz, except H: J. Landschoff (seachangeproject.com)



In order to answer the above questions, we will test the following **research hypotheses**:

**H1a** The Tanaidacea, like the other major groups of peracarids, are an evolutionarily old group whose origin preceded the formation of Pangea in the Permian.

**H1b** The suborder Apseudomorpha originated in the early Jurassic.

**H2a** The most recent common ancestor of Apseudomorpha inhabited the shallow waters of the Laurasian coast in the Tethys Ocean.

**H2b** Shallow-water Mediterranean Apseudomorpha survived the Messinian salinity crisis (> 5.3 Mya).

**H3** The evolution of Apseudomorpha families is the result of adaptation to different environments.

**H4** Colonisation of the deep sea by Apseudomorpha has occurred at least twice, in two colonisation independent events colonisation that took place probably in the Jurassic and Cretaceous.

Research material for the EHO-SHA project has been collected during numerous international expeditions of oceanographic campaigns in remote and hitherto unexplored areas of the world, i.e. the North and Western Pacific, the Kuril-Kamchatka and Aleutian trenches, off the coasts of New Caledonia and Mauritius, but also in the Mediterranean and North Atlantic, all the way to the Arctic. During the project we will examine morphologically and genetically > 8,000 individuals collected over a wide range of depths (0-10 000 m). Based on the results, we will reconstruct a complete picture of Apseudomorpha evolution and will gain knowledge of their evolutionary history (time and place of radiation).