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Thomas Saucède

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## BOOK REVIEW

**Martin Rauschert and Wolf E. Arntz:**

**Antarctic Macrobenthos: A field guide of the invertebrates living at the Antarctic seafloor**

Arntz & Rauschert Selbstverlag, Wurster Nordseekueste, Germany, 2015, 143 pp

**Reviewed by Thomas Saucède**

Diversity of Antarctic marine life is an endless source of fascination for biologists who work in the Southern Ocean. Beside emblematic marine mammals, sea birds, and fish, and all tenants of the water column, the Antarctic seafloor is home to a profusion of living forms dominated by macro-invertebrates, the macrobenthos. The Antarctic macrobenthos shows a remarkable variety of shapes and colours, as well as singular assemblages with no counterpart worldwide. Over the last 40 million years, these organisms have evolved in partial isolation from the rest of the World's Ocean and have acquired many original features. They have adapted to singular environmental conditions, established in the Southern Ocean in stages since the end of the Eocene, among which near-freezing sea waters, ice disturbance, and extreme seasonality in primary production are key factors. Formerly unexpected in polar seas, in which prevail harsh conditions for human perception, such a diversity is now revealed by underwater images and scientific catches to biologists who work in the Southern Ocean aboard research vessels or at established nearshore stations. It is yet concealed to other visitors of the Antarctic and Museum specimens preserved in ethanol and formalin do not render anymore the vivid colours of living forms. Martin Rauschert's and Wolf Arntz's book aims to portray the startling diversity of the Antarctic macrobenthos as the authors observed it in the field: by illustrating the original shapes and colours of the living forms.

The book is the product of a rich collaboration between two experts in benthic research who have led various expeditions to the Antarctic. During two overwinterings and a seasonal stay at the Soviet station Bellingshausen in the eighties Martin Rauschert explored the shallows of King George Island (South Shetland Islands) by scuba diving to observe and photograph benthic communities in their natural habitats. At the same time, Wolf Arntz led the first West German expedition of the polar research vessel *Polarstern* to the Weddell Sea and around the Antarctic Peninsula where he collected macrobenthos on the Antarctic continental shelf and upper slope by means of towed gears. After reunification of Germany, Rauschert joined several expeditions of RV *Polarstern* upon Arntz's invitation and photographed many organisms sampled in the catches. He understood the importance of colouration for identification of individual species, while it is rarely used by taxonomists, as species diagnostic features are based on morphological characters that are distinguishable on museum specimens.

After a short preface, an instructive introduction exposes the main singularities of Antarctic benthic communities: their "Palaeozoic-like" composition dominated by sessile filter feeders, the eurybathy of many species, endemism, original life strategies such as the prevalence of brooding species, and adaptation to freezing conditions. The composition of communities is the result of both *in situ* evolution and immigration of species coming from the north and the deep sea. The authors highlight the influence of tectonic, climatic, and oceanographic histories on marine evolution, such as the parts played by past glaciations and by the Antarctic Circumpolar Current in the isolation of populations. They also emphasize the importance of adaptation to the characteristics of Antarctic environments, namely cold waters,

ice disturbance, low sedimentation rates, extreme seasonality of primary production, and lack of durophagous predators otherwise common in the oceans.

Underwater images and picture plates constitute the central part of the guide. It is composed of a first collection devoted to living communities of the seafloor with pictures taken in the shallows of King George Island and in deeper areas of the Scotia Arc and the Weddell Sea. Representative catches were also photographed upon their arrival on deck to show sampling work onboard RV *Polarstern*. More than 1,100 species are illustrated individually in a second set of 80 colourful plates organized according to the systematics. This impressive catalogue documents about 25% of the macrobenthic species ever described in the investigated area. The secret for the vivid colours and nice shapes of the shots is that specimens were photographed alive or fresh at very low temperatures immediately after sampling. All taxonomic groups are depicted but some of them are treated in more details depending on their prevalence in Antarctic ecosystems and on the authors' expertise. Plates only mention taxon names, while supplementary information on location, size, and systematics of specimens is condensed in the following section. For each taxonomic group, short paragraphs written in a simple style give the main systematic clues. The guide ends with a short suggestion of publications.

Documenting such a diversity of living forms is unavoidably open to taxonomic uncertainties, omissions, and mistakes. A certain proportion of Antarctic species is not named yet, others are being revised, and many taxa include cryptic species that by definition cannot be distinguished based on morphological features alone. The reader is repeatedly notified about these taxonomic limitations, and taxonomists are invited to suggest corrections when needed. The book could also benefit from more consistency in the naming of taxa, and the section devoted to systematics, although written for non-specialists, could be refined. Despite the impressive number of species illustrated and the enormous task it represents, incompleteness remains a real weakness for a field guide. Here, it is partially compensated by the wide taxonomic coverage of the catalogue and by the fact that common taxa are illustrated. More than a mere field guide, the book is a captivating catalogue for the reader curious to learn about diversity of life. Whatever the imperfections, the fascination of all the readers who will open the book, be they taxonomists or not, is the best evidence that the authors have reached their goal.

**Thomas Saucède**

Université de Bourgogne Franche-Comté, Dijon, France

Email: [Thomas.Saucede@u-bourgogne.fr](mailto:Thomas.Saucede@u-bourgogne.fr)