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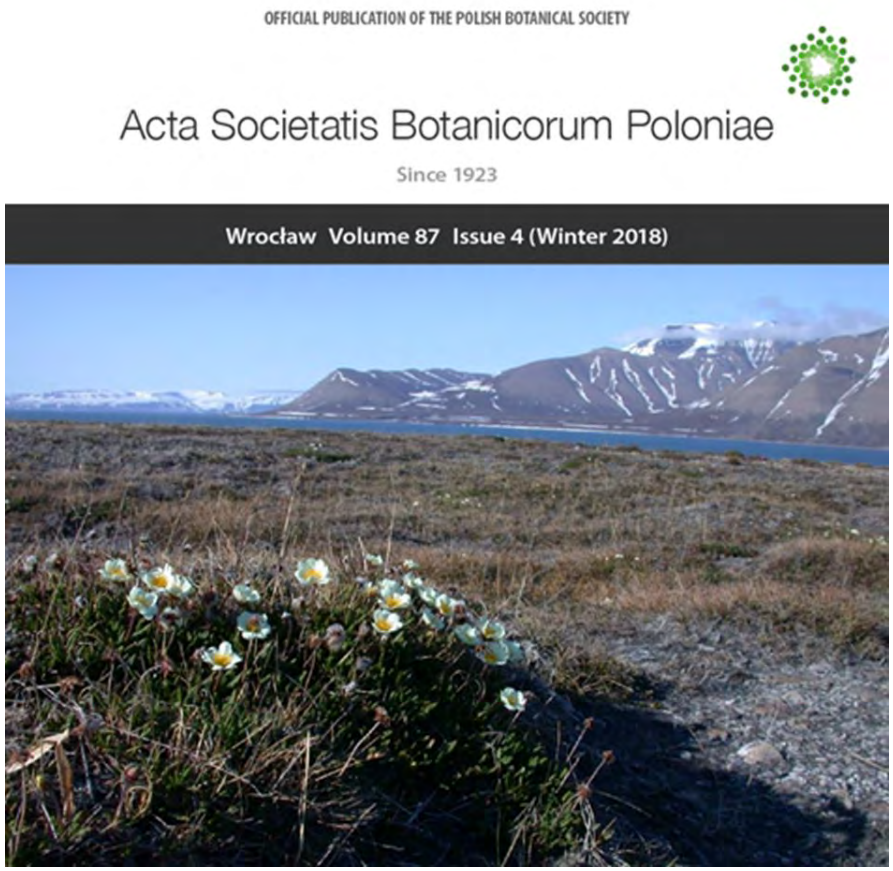
A BRIEF SUMMARY OF SCIENTIFIC HIGHLIGHTS:						
See the following pages						

***Polar terrestrial ecosystems: ecology, diversity, and biogeography. Special issue of* Acta Societatis Botanicorum Poloniae**

In 2017, Polish polar research celebrated the 60th anniversary of the Polish Polar Station in Hornsund, Svalbard and the 40th anniversary of the *Arctowski* Polish Antarctic Station in the King George Island. As meaningful landmarks in Polish Arctic and Antarctic studies, these anniversaries inspired a special issue of *Acta Societatis Botanicorum Poloniae*, the oldest Polish botanical journal, guest-edited by Bronisław Wojtuń and Michał Ronikier and published in 2018 (vol. 87 no. 4). The issue contains 14 articles, which provide a fair overview of botanical research carried out in the polar regions, aiming at better describing and understanding the biodiversity, ecology, and biogeography of these exceptional and fragile environments.

Six articles in the issue address diverse aspects related to the Antarctic biome. Three papers contribute to the basic knowledge of biodiversity and phytogeography of the southern polar region. Wierzgoń *et al.* report on two newly discovered rare moss species in the South Shetland Islands archipelago, one of the biologically richest regions of the Antarctic. Their findings are discussed in relation to rapid deglaciation processes and the possible population history. Bednarek-Ochyra *et al.* report a new moss genus recorded in the Subantarctic and discuss biogeographical implications of this finding invoking the moss's possible ancient origin dating back to Gondwana. The authors also provide a historical overview and an up-to-date account of moss diversity in the Subantarctic region. In turn, Alstrup *et al.* present an overview of diversity and taxonomy of a peculiar group of lichenicolous fungi in the South Shetland Islands, including several new taxa and a comprehensive identification guide. Ronikier *et al.*, by applying DNA sequence analysis, provide evidence for distinctness of *Didymodon gelidus*, an endemic moss of the austral polar region. This case study shows the utility of molecular tools in solving taxonomic problems in the polar regions, well illustrated by several Antarctic moss species, whose only gametophytic phase is known, limiting the availability of taxonomically relevant characters.

Two papers in the issue represent studies on Antarctic ecology. Koc *et al.* compared the effects of methanesulfonic acid, derived from marine ecosystems, on seed germination and morphophysiological changes in the seedlings of two *Colobanthus* species. Finally, Rudak *et al.* address the problem of non-native flora. As part of multifaceted studies of *Poa annua*, an alien vascular plant in the Antarctic, they examine the germination and seedling establishment of this species in the context of its invasion success in Antarctica.



More on https://pbsociety.org.pl/journals/index.php/asbp/issue/view/673

Galera H., Chwedorzewska K.J., Korczak-Abshire M., Wódkiewicz M. 2018. What affects the probability of biological invasions in Antarctica? Using an expanded conceptual framework to anticipate the risk of alien species expansion. Biodiversity and Conservation 27: 1789–1809.

The article is a theoretical work on the ecology of biological invasions in the Antarctic. Its novelty is the application of an existing unified conceptual framework, describing *post factum* the invasion history of *Opuntia stricta* var. *dillenii* in Kruger National Park, South Africa, to predict invasion by any species in the Antarctic and assess the probability of biological invasions in the future.

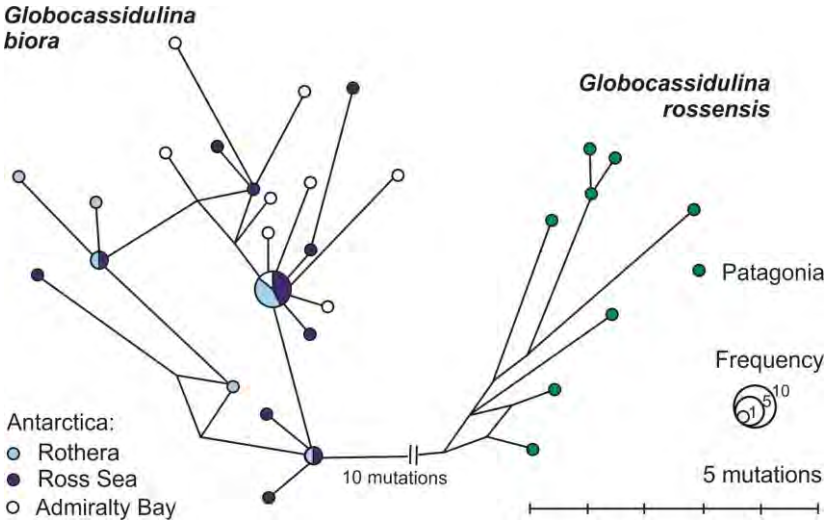
Mechanisms influencing the likelihood of invasion were analysed in Point Thomas Oasis on King George Island, West Antarctica. Of the three groups of factors distinguished in this framework, we focused on habitat invasibility and system context. Strong spatial isolation of the Point Thomas Oasis and human activities around the *Arctowski* Polish Antarctic Station, located in the oasis, enabled an assessment of key driving factors for a successful invasion. The resulting predictions provide that breaching of geographical and ecological barriers due to increased human penetration favors alien species invasions. Severe environmental conditions hamper the invasion success of many arrived propagules and the anticipated climate change may highly alter resistance of local community to invasions. An effective way of preventing invasions in Antarctica seems to lie in reducing propagule pressure and eliminating alien populations as early as possible.

The unified conceptual framework has a great potential as a universal tool for assessing the probability of invasions. The analysis of such a specific system, i.e. terrestrial ecosystems in the maritime Antarctic, gave the opportunity to explore the relationship between the factors that make up the external context and the specific features of Antarctic habitats that are crucial for the region's vulnerability to invasion. The framework opens up wider possibilities in analyzing invasions taking place in different systems and with multiple taxa.

Tourists visiting *Arctowski* Station in the austral summer. Photo by M. Wódkiewicz.

Majda A., Majewski W., Mamos T., Grabowski M., Godoi M.A., Pawłowski J. 2018. Variable dispersal histories across the Drake Passage: The case of coastal benthic Foraminifera. Marine Micropaleontology 140: 81–94.

For the first time, SSU rDNA sequences of benthic foraminifera were analyzed across the Drake Passage. The molecular population structures of eight taxa with the same or similar morphotypes in shallow waters of West Antarctica and southern Patagonia suggest presence of several molecular operational taxonomic units (MOTUs) indicating cryptic species. Recent gene flow across the Drake Passage is likely in two species/MOTU but not in the remaining majority of taxa.



Haplotype networks constructed using SSU sequences of benthic foraminiferal genus *Globocassidulina*. Note very different topologies in Antarctic and Patagonian species reflecting different histories during Pleistocene glaciations.

The molecular population structures of different taxa, shown by haplotype networks, is highly variable, indicating different dispersal histories. Antarctic species/MOTUs show star-like topologies reflecting bottle neck and post-glacial demographic and/or spatial expansion from limited refugia on the Antarctic continental shelf. Some Patagonian species/MOTUs show reticulate topologies suggesting more steady and prolonged evolution, while others show star-like topologies that could reflect impact of South American glaciations.

The time-calibrated Bayesian phylogenetic reconstruction suggests that the isolation between Antarctic and Patagonian species/MOTUs postdates the Eocene/Oligocene boundary. Large differences in divergence times between the examined foraminifera support the hypothesis that separation of ecosystems on the opposite sides of the Drake Passage was a gradual process that started >30 Ma. Not surprisingly, it seems that the shallow-water monothalamids were the first to be impacted. Among the calcareous forms, the majority of the divergence ages were at 15 Ma or younger, suggesting that the mid-Miocene was the most important period concerning the separation between Antarctic and Patagonian shallow-water benthic biota.

Clearly, more geographically extensive sampling, including sub-Antarctic locations, is capable of providing deeper insight into foraminiferal evolutionary patterns. They reflect a unique history of Antarctic biota that were strongly impacted by geographical and environmental isolation and repeating glaciations.

PUBLICATION LIST FOR 2018

Life sciences

Genetics, ecology and physiology of Antarctic and sub-Antarctic terrestrial organisms

1. Androsiuk P., Jastrzębski J.P., Paukszto Ł., Okorski A., Pszczółkowska A., Chwedorzewska K.J., Koc J., Górecki R., Giełwanowska I. 2018. The complete chloroplast genome of *Colobanthus apetalus* (Labill.) Druce: genome organization and comparison with related species. *PeerJ* 6: e4723.
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16. Galera H., Chwedorzewska K.J., Korczak-Abshire M., Wódkiewicz M. 2018. What affects the probability of biological invasions in Antarctica? Using an expanded conceptual framework to anticipate the risk of alien species expansion. *Biodiversity and Conservation* 27: 1789–1809.
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23. Wierzgoń M., Suchan T., Ronikier M. 2018. Two additions to the moss flora of the South Shetland Islands in the maritime Antarctic. *Acta Societatis Botanicorum Poloniae* 87: 3598.
24. Wódkiewicz M., Chwedorzewska K.J., Bednarek P.T., Znój A., Androsiuk P., Galera H. 2018. How much of the invader's genetic variability can slip between our fingers? A case study of secondary dispersal of *Poa annua* on King George Island (Antarctica). *Ecology and Evolution* 8: 592–600.
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29. Majda A., Majewski W., Mamos T., Grabowski M., Godoi M.A., Pawłowski J. 2018. Variable dispersal histories across the Drake Passage: The case of coastal benthic Foraminifera. *Marine Micropaleontology* 140: 81–94.
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Geosciences

Post-LGM records

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