Polar and Alpine Microbial Collection (PAMC): a culture collection dedicated to polar and alpine microorganisms

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Abstract

Microorganisms in polar areas may have important ecological roles in biogeochemical cycles and the food chain. They are adapted to polar environments by means of special physiological adaptation mechanisms that include cold-adapted enzymes and cryoprotectants such as exopolysaccharides. Culture collections for polar microorganisms can provide research resources for ecological and physiological studies. The Polar and Alpine Microbial Collection (PAMC) is a specialized culture collection for maintenance and distribution of polar and alpine microorganisms. A database system was developed to share important data fields with DarwinCore2 and OBIS database schemas. Approximately 1,500 out of 5,500 strains maintained in PAMC have been identified and belonged primarily to the phyla *Actinobacteria*, *Bacteroidetes*, *Firmicutes*, and *Proteobacteria*. Many of the microbial strains can grow at low temperature and produce proteases, lipases, and/or exopolysaccharides. PAMC provides search tools based on keywords such as taxonomy, geographical origin, habitat, and physiological characteristics. Biological materials and information provided by PAMC will be important resources for ecological and physiological studies on polar and alpine

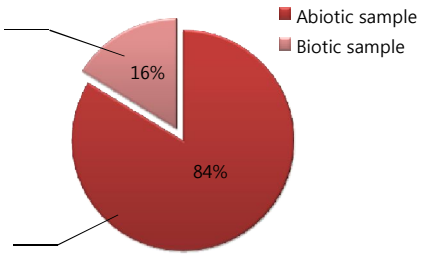
Overview of the PAMC

Taxonomy

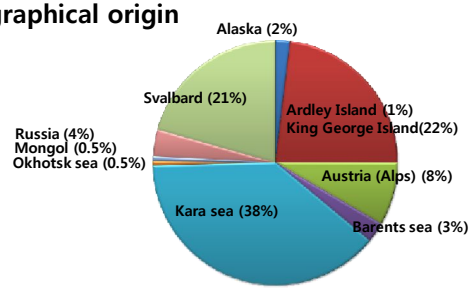
Phylum	No. of genera	No. of strains
Actinobacteria **(13.6%)**	**19**	**205**
Bacteroidetes **(13.3%)**	**24**	**200**
Deinococcus-Thermus **(0.1%)**	**1**	**1**
Firmicutes **(19.6%)**	**14**	**295**
Alphaproteobacteria **(3.9%)**	**16**	**60**
Betaproteobacteria **(5.6%)**	**11**	**85**
Gammaproteobacteria **(43.9%)**	**22**	**661**

Habitats

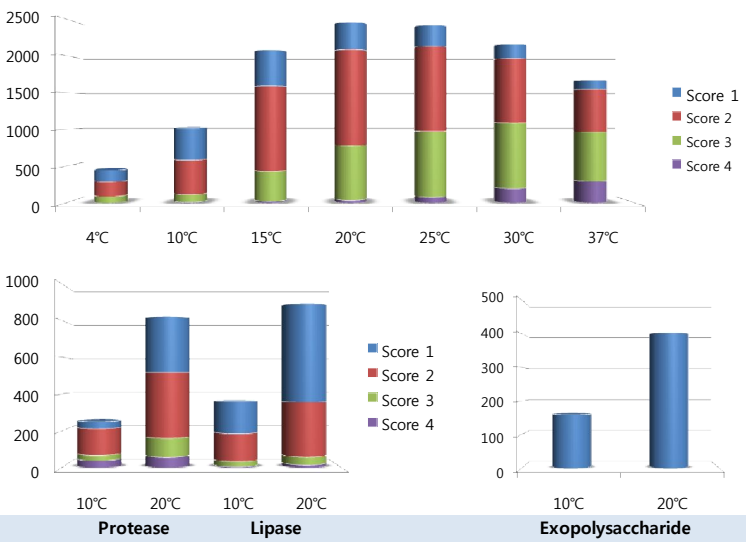
Biofilm	8.5%
Algae	3.6%
Lichen	1.3%
Debris of plant or animal	1.2%
Animal	0.8%
Moss	0.8%
Marine sediment	43.7%
Terrestrial soil	20.5%
Cryoconite	8.5%
Sea water	8.5%
Fresh water	1.2%
Rock	1.1%
Glacier/Snow	0.3%



Geographical origin



Physiological characteristics



Vision of the PAMC

Procurement
- Procurement of various polar and alpine microorganisms from diverse habitats and geographical locations

Maintenance
- Long-term conservation by applying various conservation methods and conditions
- Stable supply of strains for sustainable use

Information
- Acquisition of taxonomical, physiological, and genomic information
- Access to up-to-date information about the microbial strains

Cooperation
- Collaborations with other Bioresources centers worldwide to develop common standard, coherent policies, and a cost-effective, coordinated and sustainable development
- Collaborative research