# **Metavirome analysis of Baikal sponges**

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**Sponges** are the oldest multicellular invertebrates (phylum Porifera) that represent complex symbioses (holobionts). Associated communities of sponges include a variety of microorganisms: fungi, algae, archaea, bacteria and viruses. These unusual animals are active biofilters and play an important role in the ecosystem of Lake Baikal.

Despite active research in the field of aquatic virology, biodiversity and the role of viruses in sponges are poorly studied. The relevance of research in this area is also related to the worldwide problem of sponge diseases.

**The aim of this study** was to elucidate the genetic diversity of viruses in the communities of Baikal endemic sponges *Baikalospongia bacillifera* (diseased and visually healthy) using metagenomic approach. Sponges *B. bacillifera* – one of the most abundant in Lake Baikal, they have a massive globular shape.

### Samples of sponges Baikalospongia bacillifera

Visually healthy sponge, sample Sv 2478 (50T)



Diseased sponge, type of lesion: necrosis, sample Sv 2475 (55T)



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#### Biodiversity and richness indices for sponge viromes

Samples	Chao1/ACE	Shannon index	Simpson index
B. bacillifera_Sv2475	986/986	5.26	0.98
B. bacillifera_Sv2478	973/973	5.36	0.98

## Diversity and proportion of identified DNA viral families in sponge viromes



### Functional potential of dsDNA viral communities in Baikal sponges



Identified viral sequences belonged to 28 viral families that infect a wide range of organisms. Functional analysis has revealed 22 functional categories of proteins and enzymes, including those involved in host metabolism.

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## The main conclusions:

- We have shown for the first time a high genetic, potential taxonomic and functional diversity of dsDNA viruses in endemic sponges *Baikalospongia bacillifera*.
- Viral communities of visually healthy and diseased Baikal sponges were significantly different.
- The role of viruses in sponges may be both in the regulation of the number and diversity, and in the maintenance of the vital activity of their hosts and the associated community as a whole.

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