**COMPARATIVE GENOMICS OF FREE-LIVING AND LICHEN ALGAE**

Julia Gerasimova1,2\*, Philipp Resl1, Andreas Beck2, Silke Werth1

1LMU München, 2Botanische Staatssammlung München, München; \*E-Mail: jgerasimova.lich@yandex.ru

Progress in genomic studies offers exciting prospects to gain new insights into the functional biology of lichens. More than 100 whole-genome sequences from algae are published or will be published soon and only few of them are lichen symbionts. *Lobaria pulmonaria* (L.) Hoffm. is among the ecologically and genetically best studied lichen species. It is widely distributed in the Northern hemisphere, tropical mountains, and in South America, being used as a flagship species for studying the conservation of primeval forests. It is a tri-partite lichen which contains the green alga *Symbiochloris reticulata* (Tschermak-Woess) Škaloud, Friedl, A. Beck & Dal Grande as the primary photobiont, and *Nostoc* sp. in internal cephalodia. The unicellular coccoid green alga, *Symbiochloris reticulata*, is widespread photobiont of Lobariaceae, namely *Lobaria pulmonaria*, and is characterized by having spherical or slightly ellipsoidal cells with parietal chloroplasts. We here report on the genome sequence of this algae in the context of additional algal genomes. The genome of *S. reticulata* obtained from axenic single-cell culture isolated from *L. pulmonaria* collected in Spain was sequenced using Illumina sequencing technology at DOE-JGI Joint Genome Institute (CSP-529). The assembled genome of *S. reticulata* is 58 Mb (Megabases) which is similar in size like the symbiotic algae *Trebouxia gelatinosa* (60.1 Mb) and *Asterochloris glomerata* (56 Mb), but larger than that of the free-living marine alga *Nannochloropsis oceanica* (29.3 Mb), and subaerial algae *Coccomyxa subellipsoidea* (48.8 Mb). We will present differences in gene families of free-living and algal symbionts. Our comparative analysis revealed differences in the distribution of protein domains and carbohydrate-active enzymes in both algal groups, indicating adaptations to a lichen-symbiotic lifestyle.