



## UFZ-Seminar „Wasser und Umwelt“



2. Juli 2012, 15.00Uhr

Saal, Brückstr. 3a, Magdeburg

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sprechen zu den Themen:

### **Biodiversity and molecular phylogeny of terrestrial green algae (T. Darienko)**

Terrestrial algae is ecological group of algae, which colonize non-aquatic habitats. They are primary producers of organic substances and nutrient source for many heterotrophic organisms, and are pioneers, which colonize different extreme substrata such as rocks of volcanic origin, or soils after fire.

At present more than 1000 species of terrestrial algae are known, which belong mostly to Cyanobacteria, Viridiplantae (Chlorophyta, Streptophyta), and Heterokontophyta (Xanthophyceae, Bacillariophyceae and Eustigmatophyceae).

The green algae are the dominant group of algae in terrestrial habitats. They have different morphological types of organization: monadoid, coccoid, sarcinoid, siphonal, filamentous (branched or unbranched), siphonocladal, and differ in cell and chloroplast shape, in presence/ absence of pyrenoid and in cell size. Terrestrial green algae mostly belong to three classes Chlorophyceae, Trebouxiophyceae and Ulvophyceae.

In the last 20 years the systematics of green algae have undergone dramatical changes. Many traditional terrestrial genera are polyphyletic. For example, the genus *Chlamydomonas*, one of the largest green algal lineage containing more than 800 described species, are phylogenetically subdivided into eight lineages within the Chlorophyceae. The species of the genus *Chlorella* (contains traditionally 11 species) are even distributed into different classes based on the phylo-genetic analyses of SSU rDNA sequences. Often terrestrial algae are closely related to species isolated from aquatic habitats; however, some lineages contain exclusively terrestrial species (most of Trebouxiophyceae s. str.). Surprisingly terrestrial algae occurred also in the Ulvophyceae, which are dominated by marine species.

Molecular methods have revealed a hidden diversity and a high phenotypic plasticity among the terrestrial algae. These results are supported by ecophysiological data. Using an integrative approach most of the terrestrial algae can be taxonomically revised, a process, which is still in progress.

und

### **ITS-2 as universal DNA barcode marker for protists (T. Pröschold)**

DNA sequences are a powerful tool in systematics and molecular phylogeny of protists and have given new insights into the evolution of this group of organism. However, it has not yet proven as rewarding for taxonomic categorization. DNA Barcoding might close this gap. The goal of the International Barcoding Initiative is to find a single, universal, short DNA fragment, which is easy to sequence and leads to a clear species identification. The mitochondrial cytochrome oxidase subunit I (coxI) was proposed by the barcoding initiative and is mostly used by zoologists. However, for certain groups like higher plants and several groups of microalgae coxI is too conserved to separate organism at the species level. In our study we used the second Internal Transcribed Spacer (ITS-2) of the nuclear ribosomal gene cistron. This locus has suggested a high degree of predictability across eukaryotes, is easy to sequence, and its secondary structure can be used for comparison at species and generic level. The main objection to the ITS-2 usage as barcode marker was the difficulty in aligning these sequences and the prediction of the secondary structure. However, with the help of the new computer programmes and the easy recognition of two hallmarks in the secondary structure, these problems are resolved. ITS-2 also gives additional information about the species concept. For example, compensatory base changes (CBC) in the 30 bp highly conserved region of Helix III of ITS-2 correlate with the extent of sexual compatibility. A difference of even one CBC in this region predicts a total failure of crossing. The question is whether use of addition of highly conserved region of ITS-2 can be used as DNA Barcode marker for describing species of protists.

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