# Biophysical properties of ladderane lipids derived from anammox bacteria

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Abstracts

# Oral Presentations

## SO 1
## Biophysical properties of ladderane lipids derived from anammox bacteria

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Anammox bacteria, originally isolated from wastewater treatment systems, play an essential role in the biogeochemical nitrogen cycle by anaerobically oxidizing ammonium to dinitrogen gas. This anammox metabolism takes place in the anammoxosome, an intracytoplasmic compartment enclosed by an exceptionally dense membrane that may serve to prevent diffusion of toxic intermediates and protons. The core lipids of this membrane comprise extraordinary stair-case like 'ladderane' hydrocarbon chains that have three or five linearly concatenated cyclobutane structures. Recently, we have determined the full identity of the intact membrane lipids. Mass spectrometry analysis revealed a wide variety of ladderane lipid species with either a phosphocholine or phosphoethanolamine polar headgroup attached to the glycerol backbone. In addition, we have reconstructed the in silico biosynthetic pathway for the phosphoethanolamine and phosphocholine headgroups of the anammox phospholipids from the genome assembly of K. stuttgartiensis. Subsequently, we have isolated substantial amounts of intact ladderane lipids to examine these molecules in membrane-like environments. In agreement with molecular modeling studies, Langmuir monolayer experiments demonstrate that ladderane lipids pack very well. Similar to fluorescence depolarization results, the monolayer data also indicate that the rigid ladderane lipids are in the liquid state at physiological relevant temperatures. The purified ladderane lipids have also been reconstituted into bilayer membrane vesicles and visualized by fluorescence and cryo-electron microscopy. On-going studies include micropipette aspiration to determine the mechanical properties of the ladderane lipids assembled in giant unilamellar vesicles and monitoring the proton permeability of ladderane membranes. The combined outcome will shed further light on the function of the ladderane lipid structures in the membrane of these environmentally important organisms.

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## SO 2
## X-ray diffraction and calorimetric study on the influence of sterols on the phase properties of phospholipids

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The effect of cholesterol, stigmasterol and ergosterol on the formation of liquid ordered $L_o$ phase in the equimolar mixtures of dipalmitoylphosphatidylcholine (DPPC) and dioleoylphosphocholine (DOPC) mixtures was investigated by differential scanning calorimetry and

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