Exploring a new pathway of exogenous fatty acid incorporation in cyanobacteria

UCT-SANCOR Seminar

By Dr. Amaranta Kahn

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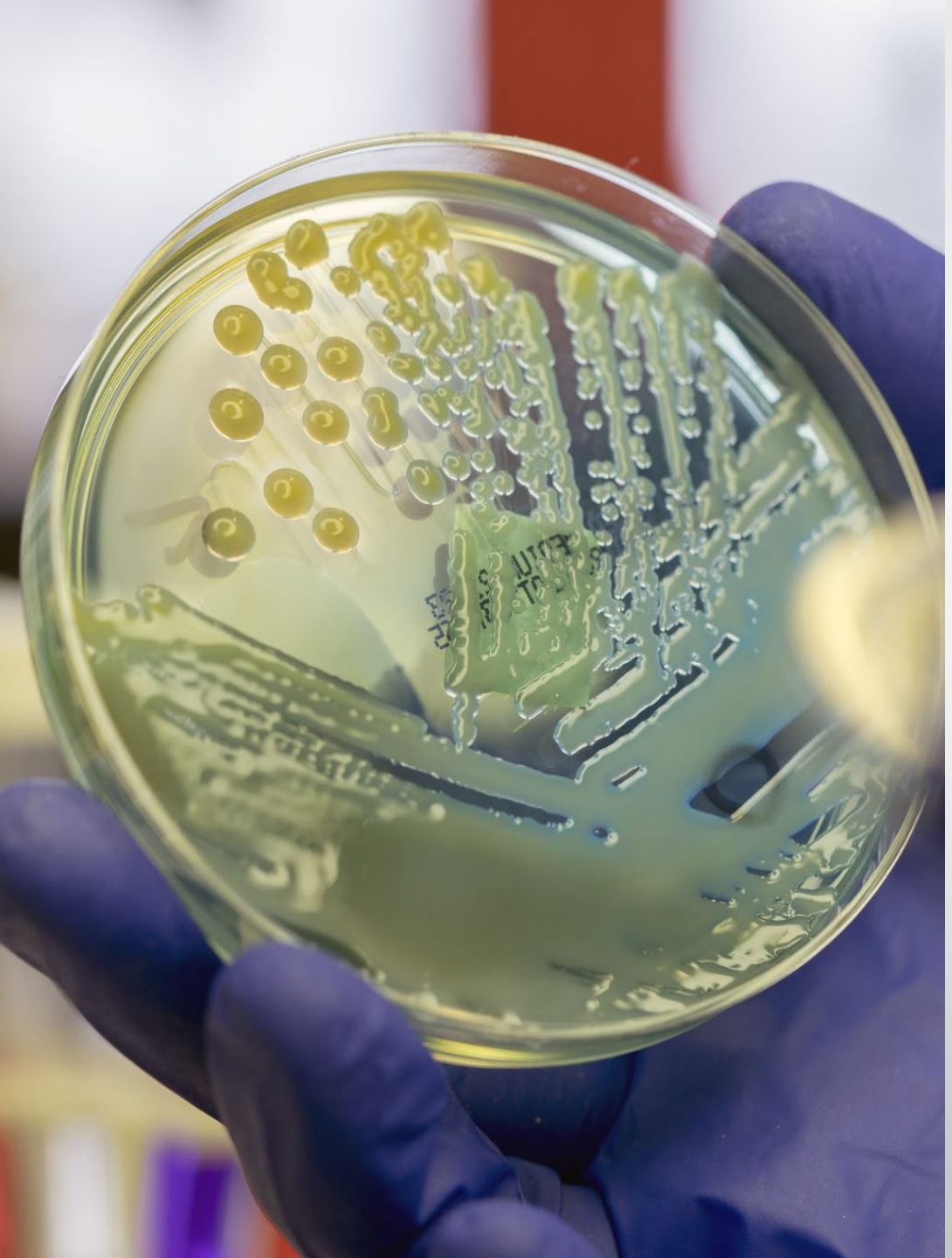
About the speaker:

Amaranta Kahn studies cyanobacterial fatty acid incorporation and its implication on aquatic ecology in cyanobacteria. She obtained her PhD degree (2019) in molecular biology and biochemistry at the Weizmann Institute of Science (Ed Bayer) and in collaboration with the National Renewable Energy Laboratory (Yannick Bomble). Her current research interests include molecular microbiology, biochemistry, metabolomic and lipidomic analysis.

Monday,
26 August 2024
at 1pm SAST

In person:
UCT Oceanography Seminar Room, RW James Building (map)

Online:
RSVP here to receive the link a week prior to the talk.



Exploring a new pathway of exogenous fatty acid incorporation in cyanobacteria

Fatty acids (FAs) are involved in multiple biological processes and are key metabolites in living organisms. Due to the high energetic cost of FAs biosynthesis, most organisms have evolved mechanisms to incorporate exogenous FAs (eFAs). By doing so, organisms reduce the energetic burden of FAs synthesis and increase their plasticity as to FAs source. Until recently, all characterized FA incorporation mechanisms were reported to involve activation of the FAs. However, our group recently reported a new cyanobacterial enzyme – BrtB – that directly esterifies free FAs with alkyl halide moieties found in the bartolosides. These are a group of abundant dialkylresorcinol glycolipids, whose biosynthesis is encoded by the brt gene cluster. We hypothesize that bartoloside esters (B-FAs) represent a new system of eFAs scavenging and/or storage. Using bartoloside producer cultures, supplemented with 18O2-labeled FAs, we showed that BrtB esterifies the eFAs without prior activation. We could also detect isotopic labelled B-FA hydrolyzed products, as well as a change of FAs composition in the B-FAs upon change of culture temperature, indicating that FAs can be recycled/exchanged from B-FAs. These confirm that i) the brt system indeed has a role in eFA capture and recycling ii) its action precedes that of Aas and suffers minor cellular energetic cost. As such, B-FAs producer strains would protect themselves from environmental extracellular stress such as free FAs, temperature, osmotic shock, light, CO_2 changes, by capturing eFAs and easily remodeling their lipidic membranes. However, the associated cellular locations and structural role of bartoloside, B-FAs and BrtB remain unclear and are the focus of our current work.