

TITLE: Proposal to support the 4th International Conference on Nitrification and Related Processes (ICoN4)

APPLICANT/INSTITUTION: Dr. Martin G. Klotz, University of North Carolina, Charlotte

LEAD PI: Dr. Martin G. Klotz,

DOE/OFFICE OF SCIENCE PROGRAM OFFICE: Office of Biological and Environmental Research, Biological Systems Science Division

PROJECT NARRATIVE

Meeting Program

The following information describes the conference logistics, scientific program, and confirmed program advisors, speakers, and session conveners.

a) Dates: June 27-July 1, 2015

b) Location: University of Alberta campus, Edmonton, Alberta Canada T6G 2E9

c) Organizers:

Conference Chair: Dr. Lisa Y. Stein

Scientific Organizing Council (<http://icon4.biology.ualberta.ca/scientific-organizing-committee/>):

Dr. Martin G. Klotz, University of North Carolina, Charlotte USA (ICoN1)

Dr. Ir. Mike S.M. Jetten, Radboud University, Nijmegen The Netherlands (ICoN2)

Dr. Yuichi Suwa, Chuo University, Tokyo Japan (ICoN3)

Dr. Lisa Y. Stein, University of Alberta, Edmonton Canada (ICoN4)

Dr. Michael Wagner, University of Vienna, Vienna Austria (ICoN5)

Scientific Advisory Committee (<http://icon4.biology.ualberta.ca/sac/>):

Kartik Chandran (Columbia Univ., USA), Holger Daims (Univ. Vienna), Hongyue Dang (Xiamen Univ., China), Jennifer Glass (Georgia Institute of Technology, USA), Jidong Gu (Univ. Hong Kong, HK), Sara Hallin (Swedish Univ. Agricultural Sciences), Martin G. Klotz (Univ. North Carolina, USA), Riks Laanbroek (Univ. of Utrecht & Netherlands Institute of Ecology, NL), Frank Loeffler (Univ. Tennessee, USA), Jeanette Norton (Utah State Univ., USA), James I. Prosser (Univ. Aberdeen, UK), Christa Schleper (Univ. Vienna, Austria), Barth Smets (Tech. Univ. Denmark), Bongkeun Song (Virginia Inst. Marine Sci., USA), and Yuichi Suwa (Chuo Univ., Japan)

d) Schedule and invited, confirmed, speakers/conveners:

June 27, 2015

6:00 PM-9:00 PM Welcome Reception, Early Investigator & Graduate Student Workshop attendees

June 28, 2015

9:00 AM-4:00 PM Early Investigator and Graduate Student Workshop

7:00 PM-9:30 PM Opening Session – N-Cycle Ecogenomics
Conveners – James I. Prosser and Christa Schleper
Keynote – Dr. David A. Stahl, Univ. Washington (Eminent Speaker)

June 29, 2015

9:00 AM-12:30 PM Session – N-Cycle Ecology and Niche Differentiation
Conveners – Jeanette Norton, Riks Laanbroek, Hongyue Dang
12:30 PM-3:00 PM Lunch and focused group meetings
3:00 PM-5:00 PM Poster Session
5:00 PM-6:00 PM Short Poster Oral Presentations
6:00 PM-7:30 PM Dinner
7:30 PM-9:30 PM Session – Biotic/Abiotic Processes of the N-Cycle
Conveners – Jennifer Glass and Frank Löffler

June 30, 2015

9:00 AM-12:30 PM Session – Diversity and Modularity of N-Cycle Processes
Conveners – Holger Daims, Martin G. Klotz
Keynote – Dr. Lisa Y. Stein (Host of ICoN4)
12:30 PM- 3:00 PM Lunch and focused group meetings
3:00 PM- 5:00 PM Poster Session
5:00 PM- 6:00 PM Short Poster Oral Presentations
6:00 PM- 7:30 PM Dinner
7:30 PM- 9:30 PM Session – Engineered Environments
Conveners – Barth Smets, Kartik Chandran

July 1, 2015

8:30 AM-12:00 PM Session – Anaerobic N-Cycle
Conveners – Sara Hallin, Jidong Gu, Bongkeun Song
12:00 PM- 4:00 PM Group photo, lunch, group meetings, free time in River Valley
4:00 PM- 5:00 PM Reception
5:00 PM- 6:00 PM ICoN Business Meeting
6:00 PM- 7:30 PM Closing banquet
7:30 PM- 9:00 PM **Keynote** – Dr. Michael Wagner (host of ICoN5)
Closing of meeting

e) Anticipated number of attendees: 120-150 (including ca. 50 students)

2) Relevance of Conference to DOE Missions

The focus of this conference is on nitrification, which has long been considered the rate-limiting part of the nitrogen cycle. Although the classical definition of nitrification is the oxidation of ammonium to nitrite and nitrite to nitrate, we now know from genome sequences, application of ‘omics technologies, microbial ecology, biogeochemistry, and microbial physiology that the transformation of ammonium is not confined to a few particular groups of microorganisms nor is it confined to oxic environments. The past ICoN conferences have explored the interconnections between ammonium- and nitrite-consuming processes in all ecosystems, the control of greenhouse gas emissions by these processes, and intersection between nitrification and other elemental cycles to bring our understanding to a much more comprehensive viewpoint.

The ICoN conferences have a long-standing and close connection the Genomic Science Program of the

DOE in its missions of Carbon Cycling and Climate and more recently, to Knowledgebase. The JGI sequenced the first ammonia-oxidizing bacterium, *Nitrosomonas europaea* ATCC 19718, in 2001, which was a monumental achievement for our field. Since then, the JGI has sequenced, or is in the process of sequencing over 50 additional genomes from ammonia-oxidizing bacteria, nitrite-oxidizing bacteria, and ammonia-oxidizing archaea. The autotrophic ammonia- and nitrite-oxidizing microorganisms play a critical role in carbon cycling and sequestration in nearly all ecosystems as they control the concentration and speciation of biologically available N to plants and other microorganisms. Nitrification is the source of nitrate pollution, and hence eutrophication, from over-fertilization of managed soils. Nitrification also results in emission of NO_x to the atmosphere and is considered a major source of greenhouse gases. Anaerobic ammonia oxidation (anammox) and denitrification transform ammonium, nitrite, and nitrate back to N₂, acting as mitigating processes to nitrification.

Although the N-cycle is complex and interwoven with a multitude of ecosystem functions, genome-enabled research provided by the JGI revealed that individual modules in the N-cycle (e.g. ammonia oxidation to nitrite, nitrite reduction to nitrous oxide, anammox) are tractable in an evolutionary context such that we can now generate predictive models of how N-cycle processes operate within particular environmental contexts (e.g. based on O₂ levels, ammonium concentrations, pH, etc.). This viewpoint has allowed us to escape our prior organism-centric mentality to focus on the processes and their modularity. For instance, a related project substantially supported by the JGI is the sequencing of nearly 50 genomes and transcriptomes from methane-oxidizing bacteria, many of which possess modules for ammonia oxidation to nitrite and nitrate reduction to nitrous oxide. Genome-enabled research on methane oxidizers as critical players in N-cycle processes has opened new and exciting linkages between the C and N cycles and has again opened new insight to how microorganisms and processes interrelate. All of the genome-enabled projects by the JGI and the Genomic Science Program have connection to K-base as our community constructs and improves predictive models to uncover interconnections between N-cycle modules and biogeochemical cycles.

The ICoN conference brings together academic, government, and industrial investigators to share insights and cutting-edge discoveries on nitrification and its connection to other processes. Encouragement and inclusion of early career investigators and graduate students is a hallmark of the ICoN conferences and is viewed as critical to the continued success of our discipline.

3) Conference Budget

a) Total funding estimate for meeting	
Early Career/Grad Student workshop - 1 night lodging	\$3,000.00
Food & Beverage	\$68,402.00
Conference Management	\$9,900.00
Speaker bursaries	\$1,800.00
Audio/Visual	\$200.00
Miscellaneous (e.g. poster boards, tables, taxes, etc.)	\$10,395.00
Conference materials - program, printing (\$20 ea.)	\$3,000.00
Nametags (\$2.50 ea.)	\$375.00
Facilities Rental	\$3,000.00
TOTAL (tentative)	\$100,062.00

b) Amount **requested and received** from DOE: \$12,540 (12.5 % of estimated Total)

To be used to offset registration costs for Early Career Investigator/Graduate Student workshop, to subsidize registration costs for graduate student attendees, and to cover facility rental fees.

Amount expended:

Support for 45 participants of the Workshop:	\$ 7,500.00
Conference Services (registration support):	\$ 1,500.00
Equipment or Facility Rental/User Fees	\$ 3,540.00

	\$12,540.00
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c) Amounts from other funding agencies:

- \$ 5,000 CAD University of Alberta Faculty of Science (~5.0 % of estimated Total)
- € 1,000 International Society for Microbial Ecology (~1.5 % of estimated Total)
- \$10,000 Gordon and Betty Moore Foundation (10.0 % of estimated Total)

Total Fundraising: ~US \$29,000

4) Attendance

Participants 106 (36 female, 70 male)

Attendee Roles:

- 1 Conference Chair
- 5 Session Leaders
- 2 Keynote Speakers
- 32 Platform Speakers
- 61 Poster Presenters
- 5 Attendees

- All attended the entire meeting
- There were no parallel sessions
- 45 attendees also participated in the preceding workshop

Attendee Origins: Australia, Austria, Belgium, Canada, China (PRC), Denmark, Fiji, France, Germany, Hong Kong, Japan, Korea, Spain, Sweden, Switzerland, The Netherlands, UK, USA

The meeting voted unanimously to hold the 5th ICoN Meeting in July 2017 in Vienna, Austria.
The Conference Co-Chairs will be: Professors Christa Schleper and Michael Wagner