



NIMBioS

Investigative Workshop
Individual-Based Ecology of Microbes: Observations and Modeling
June 8-10, 2011

Wednesday

8:00-8:30 Breakfast

8:30-8:45 Introduction to NIMBioS, *Lou Gross*

8:45-9:00 Introduction to workshop, *Ferdi Hellweger*

9:00-9:50 Q1: Interactions among populations

- The evolution of co-occurring protozoa species in response to competition and predation in natural microcosms (leaves of *Sarracenia purpurea*), *Tom Miller*
- Functional traits, trade-offs and community structure in phytoplankton and other microbes, *Elena Litchman* (**discussion leader**)
- Stochastic colonization and extinction of microbial species on marine aggregates, *Drew Kramer*

9:50-10:20 Coffee Break

10:20-11:25 Q2: Interactions within populations

- Mathematical model of infection control on medical implants, *Alicia Prieto L*
- Individual-based models of social evolution in biofilms, *Sara Mitri* (**discussion leader**)
- Invasive amphibian fungal skin disease dynamics, *Gabriela Rios-Sotelo*
- Within-biofilm interactions between alternative phenotypes with altered expression of extracellular "public goods", *Will Driscoll*

12:00-1:00 Lunch

1:00-2:05 Q3: Interactions with the environment

- Using IBM's to predict substrate use preference from pyrosequencing data in permafrost soils, *Jessica Ernakovich*
- Individual-based modeling of marine biogeochemistry, *James Clark* (**discussion leader**)
- Elucidating the bacteria responsible for utilization of dissolved organic matter in streams, *Phillips Akinwale*
- Evolutionary response of microbes to fluctuating environment: a mechanistic account, *Xiao Yi*

2:05-2:55 Q4: Intracellular biochemical networks

- Linking genes to ecosystems using systems bioecology, *Ferdi Hellweger*
- Single cell analysis on microfluidic platforms, *Alexandra Ros* (**discussion leader**)
- Variability in yeast sporulation, *Colin Maxwell*

2:55-3:25 Coffee Break

3:25-4:15 Q5: Heterogeneity, diversity and structure

- Continuum models of biofilms, *Isaac Klapper*
- Activated sludge floc modeling: structure formation and scale up, *Dana Ofiteru* (**discussion leader**)
- Individual-based microbial ecology of agricultural rhizosphere and phyllosphere populations with a focus on horizontal gene transfer and the ecology and evolution of plant pathogens, *Andrea Vu*

4:15-5:00 Breakout by session groups (Q1-5)

Thursday

8:00-8:30 Breakfast

8:30-9:20 T1a: Microscopy based methods

- Persistence of microbial communities (including aquatic pathogens) in marine snow-like organic aggregates, *Maille Lyons*
- Individual-based microbial ecology of plant leaf surface colonization, *Johan Leveau (discussion leader)*
- Extracting ecological information from complex biofilm spatial structures, *Nabil Mabrouk*

9:20-10:10 T1b: Flow cytometry, microfluidics, and other single cell methods

- Analysis of cell-cell and cell-environment interaction by integration of microfluidic devices and agent-based modeling, *Andre Levchenko*
- Importance of variation in elemental composition of marine protists to oceanic biogeochemical cycles and foodweb dynamics, *Stephen Baines (discussion leader)*
- Cyst germination and emergence flux of *Alexandrium fundyense* cells in shelf sea and coastal sediments, *Emil Vahtera*

10:10-10:40 Coffee Break

10:40-11:30 T1c: Community: Physiology and Sequencing

- Enhanced generation of biogenic methane from coal, *Lisa Gallagher*
- Syntrophic interactions in anoxic aquatic communities, *Caroline Plugge (discussion leader)*
- Cyanobacterial growth rate response to varying experimental environments, *RajReni Kaul*

12:00-1:00 Lunch

1:00-2:05 T2a: Model development and frameworks

- Agent-based modeling with Repast Symphony, *Jonathan Ozik*
- Individual-based modeling using the Lagrangian Ensemble Metamodel, *Tony Field (discussion leader)*
- Mechanistic prediction of fermentation by rumen microbes, *Chris Topping*
- Individual Based Modeling of rodlike bacteria in microfluidic device, *Kami Koleva*

2:05-2:55 T2b: Model application

- Integrating experimental soil community ecology and modeling techniques, *Kirstin Holfelder*
- Individual-based modeling: the role of patterns and standards, *Volker Grimm (discussion leader)*
- Individual-based modeling of interactions between microbes in biofilms and the effect of spatial structure, *Jan Kreft*

2:55-3:25 Coffee Break

3:25-4:15 T2c: Modeling methods

- Essential community interactions supporting organohalide respiration by *Dehalococcoides*, *Kirsti Ritalahti*
- Individual based modeling of *Toxoplasma gondii*, *Xiaopeng Zhao (discussion leader)*
- The impact of bacterial dispersal networks on biodegradation performance, *Thomas Banitz*

4:15-5:00 Breakout by session groups (T1&2)

Friday

8:00-8:30 Breakfast

8:30-9:30 Report of session groups

9:30-10:00 Synthesis, *Caroline Plugge & Andre Levchenko*

10:00-10:30 Coffee Break

10:30-12:00 Future directions discussion, *Jan Kreft*

12:00 Lunch and Adjourn