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, Philips Akinwole
  - Evolutionary response of microbes to fluctuating environment: an 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, Raj Reni Kaul

12:00-1:00 Lunch

1:00-2:05 T2a: Model development and frameworks
- Agent-based modeling with Repast Simphony, 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**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>8:00-8:30</td>
<td>Breakfast</td>
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<tr>
<td>8:30-9:30</td>
<td>Report of session groups</td>
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<td>9:30-10:00</td>
<td>Synthesis, <em>Caroline Plugge &amp; Andre Levchenko</em></td>
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<td>10:00-10:30</td>
<td>Coffee Break</td>
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<td>10:30-12:00</td>
<td>Future directions discussion, <em>Jan Kreft</em></td>
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<td>12:00</td>
<td>Lunch and Adjourn</td>
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