Description/Abstract

The steering committee for the American Academy of Microbiology's colloquium, "Systems Microbiology: Beyond Microbial Genomics" met September 26, 2003, in Washington, DC, to plan the colloquium and discuss the report that would be produced following the colloquium.

The steering committee developed the intellectual approach to the issues relating to systems microbiology, including drafting questions for the colloquium participants to work their way through. The committee then identified the scientists that should be invited in order to ensure a comprehensive and thorough analytical report. Dates and a venue were decided upon.

The colloquium was held June 4-6, 2004 in Portland, Oregon. There were 35 scientists who spent the weekend discussing specific recommendations for how to capitalize scientifically on the advances in microbial genomics and progress towards a functional understanding of individual microorganisms and microbial communities. The issues discussed at the colloquium were timely and important, and we expect the report, which will be published in 2005, to be extremely well received. Once the report is available, a copy will be forwarded to you. The following items were discussed and will be included in our published report:

The focus of this colloquium was on how to capitalize scientifically on the advances in microbial genomics and progress towards a functional understanding of individual microorganisms and microbial communities. Colloquium participants discussed where the field is heading and identify scientific opportunities, challenges, and benefits of this research. An important aspect was the identification of resource and technology gaps that must be addressed in order to advance the field.

Making the Case for Systems Microbiology: 1) What can we learn about life processes through studying microbiological systems (sub-cellular, cellular, community)? 2) What important, new fundamental information and potential applications are likely to emerge from studying systems microbiology (e.g., environmental, agricultural, energy production, medical)? 3) Who should be working on systems microbiology?

Research Issues: 1) What kind of information is needed to understand how biological systems function? 2) What kind of information is currently available? 3) What information is not available? 4) How do we acquire additional information? 5) What defines a microbial species? 6) How do we measure "noise" in a biological system? 7) How are biological systems regulated? 8) How can a systems biology approach be applied to microbial communities?

Technical Challenges: 1) What are the technical bottlenecks that limit advances in systems microbiology? 2) What are the quantitative issues and problems that need to be addressed? 3) How much data do we need? 4) How do we best get those data? 5) What kind of data do we need? 6) How do we assure the quality of the data? 7) How do we

optimize utilization of the data? 8) How do we apply data from one system to another? 9) What are the questions we need to ask to determine functionality?

Education, Training, and Communications Issues: 1) Are we currently training scientists to utilize existing and emerging technologies? If not, how do we? 2) Should new collaborations be initiated to study systems microbiology? If so, what are they and who should participate (academics, research foundations, industry, government, etc.)? 3) How can these collaborations be encouraged? 4) How important is international collaboration? Why or why not? 5) What should the public know about the potential of this kind of research? 6) Are there commercial potentials? If so, what are they? 7) What can the scientific community do to better communicate these issues? How? 8) Is there a role for professional societies? If so, what?

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Systems microbiology, microbial communities, microbial genomics, microorganisms, biological systems, microbial species, ecology, genomics, environmental microbiology, earth sciences, molecular biology, mathematics, and computer sciences.