10th Undergraduate Microbiology Education Conference
May 16–18, 2003
University of Maryland, College Park, MD

Conference Program

Friday, May 16th

7:30am – 1:00 pm
Conference Check-In

8:00 – 11:30am
Pre-Conference Workshops
*Note: Additional fee required to attend workshops*

Workshop 1
Using Online Bioinformatics Tools and Databases in the Undergraduate Biology Curriculum
Chuck Delwiche, University of Maryland, College Park, MD
Peter Cooper, The National Center for Biotechnology Information, Bethesda, MD

Workshop 2
Integration of Molecular Biology (PCR and recombinant DNA) Techniques in the Undergraduate Laboratory
Daniel C. Stein, University of Maryland, College Park, MD

Workshop 3
Biofilms in the Undergraduate Laboratory
John Lennox, Penn State University, Altoona, PA

Workshop 4
Designing Your Project in the Scholarship of Teaching and Learning (SOTL)
Spencer Benson, University of Maryland, College Park, MD
Alix Darden, The Citadel, Charleston, SC

11:30am
Orientation Meeting for On-Site Faculty Leaders

11:30am – 1:00pm
Lunch

1:00 – 2:00pm
Plenary Session 1
Biocomplexity's Spiral: Plotting the Course for Microbiology in the Next Decade
Rita R. Colwell, The National Science Foundation, Arlington, VA

2:00 – 2:15
Break

2:15 – 3:15pm
Plenary Session 2
Learning from Experience through a Scholarship of Teaching
Lee S. Shulman, The Carnegie Foundation for the Advancement of Teaching, Menlo Park, CA

3:15 – 3:30pm
Break
Friday, May 16th con’t

3:15 – 4:00pm  Concurrent Session Speaker AV Meeting

3:30 – 5:30pm  Discussion Group Sessions (See Binder: Group Session Tab for room assignments)
                Best Practice & Biggest Challenge in Assessment – Educator’s “Fermentation Tank”

5:30 – 6:00pm  On-site Faculty Leader Meeting

6:00 – 7:30pm  Dinner

7:30 – 8:30pm  Imagination Stage Theater Presentation

8:30 – 10:00pm  Reception

10:30pm  Last bus back to Greenbelt Marriott
          (bus will depart outside the Stamp Student Union)

Saturday, May 17th

8:00am  Poster Set-up (Note: Posters must be set up by 12:00 noon)

8:00 – 8:20am  Homeroom

8:30 – 9:30am  Plenary Session 3
                Beyond The Human Genome Project
                Eric D. Green, National Human Genome Research Institute, Bethesda, MD

9:30 – 9:45am  Break

9:45 – 12 noon  Saturday Working Session - Critical Thinking Exercises

Noon – 12:30  Lunch Pick-up

12:30 – 2:30pm  Poster Session

2:30 – 2:45pm  Break

2:45 – 3:45pm  Plenary Session 4
                Searching for Life on Earth and Off: Strategies for Life Detection
                Kenneth H. Nealson, University of Southern California, Los Angeles, CA

3:45 – 4:00pm  Break
### Concurrent Sessions I

**CS1** Safety in the Microbiology Teaching Laboratory  
Jackie Laxon, Community College of Rhode Island, Warwick, RI  
Erica Suchman, Colorado State University, Fort Collins, CO  

**CS2** Incorporating Bioethics into Existing Courses: Problems and Solutions  
Amy Vollmer, Swarthmore College, Swarthmore, PA  
Michael Dennis, Montana State University - Billings, MT  

**CS3** *(Saturday Only)* Acetobacter, Cellulose Production, and a K-12 Science Connection  
Robert Cannon, University of North Carolina - Greensboro, NC  

**CS4** *(Saturday Only)* The Scholarship of Teaching and Learning  
D'Maris Allen-Mierl, Austin Community College, Austin, TX  

**CS5** Microbes in the Media: Fact, Fiction, and Teaching Fodder  
Kim Finer, Kent State University - Stark Campus, Canton, OH  

**CS6** How Active Learning Works -- Applying Cognitive Psychology for Success in the Microbiology Classroom  
Marcia Cordts, University of Iowa, Iowa City, IA  

**CS7** Using Case Studies  
Kelly Cowan, Miami University of Ohio, Cincinnati, OH  
Rodney Anderson, Ohio Northern University, Ada, OH  

**CS12** *(Saturday Only)* Using Digital Libraries to Meet Your Teaching Needs: MicrobeLibrary, BiosciEdNet, and the NSF's National Science Digital Library  
Susan Musante, American Society for Microbiology, Washington, DC  

**CS14** *(Saturday Only)* Teaching HIV/AIDS: Developing Activities to Build Science Understanding and Civic Engagement for Majors and Non-Majors  
Marion Fass, Beloit College, Beloit, WI  
Sherryl Broverman, Duke University, Durham, NC  

**CS15** Bacterial Unknowns: Our Ways, Your Ways, New Ways, Sure Ways!  
M. Frances Hite, LSUHSC Gene Therapy Program, New Orleans, LA  
Indiren Pillay, Southwest Tennessee Community College, Memphis, TN  

**CS17** Strategies for Meaningful Assessment of Student Learning  
Judy Kandel, California State University - Fullerton, Fullerton, CA  

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5:00 – 7:00pm  
**Exhibit Showcase**  
* SSU Baltimore Room

6:45 – 7:15pm  
**On-site Faculty Leader Meeting**  
* SSU Lounge

7:00 – 8:30pm  
**Dinner**  
(bus will depart from the Stamp Student Union @ 7:10pm)  
* Art & Soc Atrium
10th Undergraduate Microbiology Education Conference  
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Saturday, May 17th con’t

8:30 – 10:30  
Reception “Microbes on Parade”  
Art & Soc Atrium

10:30pm  
Last bus back to the Greenbelt Marriott  
(bus will depart outside the Art & Sociology Building)

Sunday, May 18th

8:30 – 9:00am  
Homeroom  
Group Session Tab

9:15 – 10:15  
Concurrent Sessions II

CS1 Safety in the Microbiology Teaching Laboratory  
Jackie Laxon, Community College of Rhode Island, Warwick, RI  
Erica Suchman, Colorado State University, Fort Collins, CO

CS2 Incorporating Bioethics into Existing Courses: Problems and Solutions  
Amy Vollmer, Swarthmore College, Swarthmore, PA  
Michael Dennis, Montana State University - Billings, MT

CS5 Microbes in the Media: Fact, Fiction, and Teaching Fodder  
Kim Finer, Kent State University - Stark Campus, Canton, OH

CS6 How Active Learning Works -- Applying Cognitive Psychology for Success in the Microbiology Classroom  
Marcia Cordts, University of Iowa, Iowa City, IA

CS7 Using Case Studies  
Kelly Cowan, Miami University of Ohio, Cincinnati, OH  
Rodney Anderson, Ohio Northern University, Ada, OH

CS8 (Sunday Only) Roundtable: Mentoring, ASM Student Chapters, and the ASM Volunteer Community  
Jackie Black, Marymount University, Arlington, VA  
Cynthia Needham, ICAN Productions, Ltd., Stowe, VT  
Larry Hanne, California State University, Chico, CA

CS9 (Sunday Only) Development of an Online Learning and Assessment Tool: The Online Lab Practical  
Ann Smith, University of Maryland, College Park, MD

CS13 (Sunday Only) Techniques for Successful Submission to the MicrobeLibrary: Curriculum and Visual Resources  
Thomas Matt Walker, Southern Methodist University, Dallas, TX  
Sue Merkel, Cornell University, Ithaca, NY  
Kristen Catlin, American Society for Microbiology, Washington, DC

CS15 Bacterial Unknowns: Our Ways, Your Ways, New Ways, Sure Ways!  
M. Frances Hite, LSUHSC Gene Therapy Program, New Orleans, LA  
Indiren Pillay, Southwest Tennessee Community College, Memphis, TN

CS17 Strategies for Meaningful Assessment of Student Learning  
Judy Kandel, California State University - Fullerton, Fullerton, CA

10:15 – 10:30am  
Break  
BIOPY Lobby

Art & Soc – Art & Sociology Building  
MICB – Microbiology Building  
SSU – Stamp Student Union  
BIOPY – Biology Psychology Building  
PLS – Plant & Life Science Building
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10:30 – 11:30
Plenary Session 5
Microtrends: New Directions for Microbiology Education
Judy Kandel, California State University - Fullerton, CA

11:30 – Noon
Evaluation & Concluding Remarks

12:00 Noon
Adjournment & Lunch Pick-up
BIOPSY Lobby

12:30pm
Bus to General Meeting and Bus to Greenbelt Marriott
(buses will depart from Stamp Student Union)
Conference Session Descriptions

Friday, May 16th

Pre-Conference Workshops, 8:00 AM – 11:30 PM (optional: separate registration required):

1. Using Online Bioinformatics Tools and Databases in the Undergraduate Biology Curriculum
Chuck Delwiche, University of Maryland, College Park, MD
Peter Cooper, The National Center for Biotechnology Information, Bethesda, MD

Molecular databases and analysis tools available on the World Wide Web are now invaluable resources for biological research. Familiarity with these resources is expected for everyone working in the biological sciences. Undergraduate students in biology should therefore receive as much experience as possible in the use of these online resources. Moreover, the availability of well annotated complete genomes provides a rich area for exploration and valuable learning experiences that can be used to enhance and reinforce the key concepts in a wide variety of undergraduate life science settings. This workshop will provide participants with instructor-led hands-on practice using the molecular biology databases and tools available on the World Wide Web, emphasizing those at the National Center for Biotechnology Information (NCBI). Participants will gain experience using worked examples designed to be easily incorporated into undergraduate courses. The focus will be on complete genomes and will emphasize the integration of various types of data, including literature, sequence and structure, and analysis tools, such as the NCBI BLAST services.

2. Integration of Molecular Biology (PCR and recombinant DNA) Techniques in the Undergraduate Laboratory
Daniel C. Stein, University of Maryland, College Park, MD

This workshop is designed to show how various molecular biology procedures can be performed in an undergraduate laboratory class. The workshop will combine hands-on wet lab experimentation (PCR, gel electrophoresis, and Western blotting procedures) with theoretical considerations for performing these types of analyses. Computer modeling using various bioinformatic tools will be also be demonstrated.
3. Biofilms in the Undergraduate Laboratory
John Lennox, Penn State University, Altoona, PA

Recent work has made it clear that most bacteria live in complex communities called biofilms, attached to surfaces and embedded in an extracellular polymeric matrix that they themselves produce. These biofilms have properties quite distinct from their planktonic counterparts. This workshop will introduce teachers of microbiology to this interesting topic. All participants will construct equipment and master techniques that will enable them to introduce biofilms to their classes. These materials will include methods for the construction of biofilm reactors and flow cells, techniques for growing, measuring and quantifying biofilm populations, and exercises for determining the unique properties of biofilm associated cells, such as antimicrobial resistance.

A new educational resource, Biofilms On-line, will also be introduced (http://www.biofilm.org/).

4. Designing Your Project in the Scholarship of Teaching and Learning (SOTL)
Spencer Benson, University of Maryland, College Park, MD
Alix Darden, The Citadel, Charleston, SC

This workshop will focus on the basics needed to begin ones’ own research and scholarship in teaching and learning. Participants will engage in a hands-on minds-on workshop and are encouraged to bring questions, materials, and/or SOTL projects in which they are engaged or about which they are thinking. The main focus of the workshop will be on designing SOTL questions and assessments. Other topics that will be covered include basic background readings, human subject considerations, finding mentors and collaborators, qualitative and quantitative assessment of data, and getting the project published. The presenters, both microbiologists and Carnegie Fellows in the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL), are in the early stages of their own journeys along the SOTL pathway.

Opening Plenary Sessions, 1:00 – 3:15 PM:

1. Biocomplexity’s Spiral: Plotting the Course for Microbiology in the Next Decade
Rita R. Colwell, The National Science Foundation, Arlington, VA

In the past decade, microbiology has expanded to unimagined frontiers, connecting in countless ways to other disciplines to begin to define the complexity of life over space and time. At the same time, we stand on the threshold of momentous changes in the way we teach and learn--not only in microbiology but in all of science and engineering. As microbiologists today, we have a redoubled responsibility to connect our science to society.
2. Learning from Experience Through a Scholarship of Teaching
   Lee. S. Shulman, The Carnegie Foundation for the Advancement of Teaching, Menlo Park, CA

   All research is an attempt to transform experience into learning. When we engage in the act of teaching--from design to evaluation--we initiate a set of experiences whose purpose is learning, both for our students and ourselves. We have a professional and moral obligation to investigate the extent to which those purposes have been realized. In this session, we will examine the ways in which a scholarship of teaching and learning can support that quest, and can lead to more powerful forms of pedagogy as well as more responsible forms of professional development for faculty in the sciences and beyond.

Small Group Activity, 3:30 – 5:30 PM:

Discussion Group Activity

   Group Leaders and small groups will be identified. Groups will be organized by interest, type of student audience, and class size. During the small group session, participants will share their “best practice and biggest challenge” in assessing students.

Evening Session, 7:30 – 8:30 PM:

Theater Presentation

   BAMA’s Imagination Stage will present "Strange Intelligence," a play about biotechnology that provides information and prompts discussion about the many ethical questions that new technologies raise. There will be a moderated discussion after the play, followed by an evening reception.

Saturday, May 17th

Plenary Session, 8:30 – 9:30 AM:

1. Beyond The Human Genome Project
   Eric D. Green, National Human Genome Research Institute, Bethesda, MD

   The Human Genome Project recently reached an important milestone with the completion of a complete sequence of the human genome. This new and powerful foundation of genetic information is empowering investigators to tackle complex problems in human biology and disease. It will likely also change biomedical research and the practice of medicine in profound ways in the coming decades.
**Working Sessions, 9:45 – 12:00 PM:**

During this session, participants will refine ideas and activities to develop critical thinking exercises with corresponding assessment components. Each small group will develop one to three critical thinking exercises. Each group will display their exercises on a poster during the Exhibit Showcase from 5-7 p.m. on Saturday, May 17th.

**Poster Sessions, 12:30 - 2:30 PM:**

Two one-hour long sessions for poster presenters to share their research results in teaching and learning microbiology.

**Plenary Session, 2:45 – 3:45 PM:**

1. **Searching for Life on Earth and Off: Strategies for Life Detection**
   Kenneth H. Nealson, University of Southern California, Los Angeles, CA

   This session will involve thinking about the challenge of detecting unknown forms of life – as I call it, non-earthcentric life detection. The simple question is: could you detect life if none of the usual tools used by biologists were available to you? The goals and objectives are then to present what must be the fundamental features of life, to discuss which might be possible to measure and how to do it, and finally to develop a strategy that could be used on earthly samples, where it could be easily validated using earthcentric techniques, and, ultimately, on extraterrestrial samples, either in situ (on Mars, Europa, or other places), or upon their return to Earth. All of this will be put into a perspective of current and planned missions of the NASA space program.

**Concurrent Sessions, 4:00 – 5:00 PM : (each session repeats at 9:15 AM on Sunday)**

1. **Safety in the Microbiology Teaching Laboratory**
   Jackie Laxon, Community College of Rhode Island, Warwick, RI
   Erica Suchman, Colorado State University, Fort Collins, CO

   Attendees at this session will examine:
   1. The physical parameters and capital equipment necessary for a teaching microbiology laboratory.
   2. The administrative decisions that influence the quality of laboratory experience.
   3. The protective equipment and procedures each student must use in the lab.
   4. The manipulative skills each student should acquire with reference to the "ASM Recommendations For the Introductory Microbiology Laboratory Core Curriculum" (1997).
   5. The selection of suitable cultures with reference to the CDC/NIH Guidelines: Biosafety in Microbiology and Biomedical Laboratories (1999).
6. Good laboratory practices as taught and practiced in teaching laboratories.
7. Good teaching practices and the emphasis and documentation of laboratory safety.

2. Incorporating Bioethics into Existing Courses: Problems and Solutions
Amy Vollmer, Swarthmore College, Swarthmore, PA
Michael Dennis, Montana State University - Billings, MT

Instructors regularly discuss current events that have a relationship with science. Often these topics involve ethical issues, but fostering development of a defensible bioethic in students is more difficult. The purpose of this session is to develop methods that allow instructors to incorporate bioethics into their courses in a meaningful way. Following some brief introductory remarks, participants will be placed in groups based on the type of course that they teach, type of institution, and type of student. Session organizers will bring case studies, specific topics, and other activities that participants can brainstorm to see how such topics and ideas can be brought into their courses. For example, students might be encouraged to keep a journal with news clippings and their own summaries about the impact of science on society. Groups will share their ideas and concerns with the larger session. Participation in the session is open to instructors of microbiology and biology from all academic levels (undergraduate, graduate, and medical).

3. Acetobacter, Cellulose Production, and a K-12 Science Connection
Robert Cannon, University of North Carolina - Greensboro, NC

Saturday Only
Research with Acetobacter xylinum, a bacterium that secretes cellulose, has lead to collaboration with a high school biology teacher who uses the organism in her classroom as part of teaching science with an inquiry approach. We will also discuss ways to use Advanced Placement Biology as a way for college and university faculty to connect with K-12 teachers and students.

4. The Scholarship of Teaching and Learning
D’Maris Allen-Mierl, Austin Community College, Austin, TX

Saturday Only
What is the scholarship of teaching and learning and how does your educational institution "value" and measure your scholarship activities? Each educational institution places different values on the scholarship of teaching. In addition to the usual required microbiological research publications, teaching effectiveness is now being scrutinized. Publishing education research, a scholarly effort, can meet the dual demands of publication and documentation of teaching effectiveness through student learning outcomes. The education journal, Microbiology Education, is supported by the ASM and is one such venue to publish scholarship of teaching efforts. Other venues for publishing educational ideas and research will be discussed in this session.
5. Microbes in the Media: Fact, Fiction, and Teaching Fodder
Kim Finer, Kent State University - Stark Campus, Canton, OH

Currently there is heightened public awareness and interest in microbes as a result of ever increasing reports of food borne illness, bioterrorism, and biotechnology applications in the media. The general public looks to magazines, newspapers, radio, and television reports for accurate and reliable information. Although many major media sources have improved upon their science reporting, local radio, television, and regional publications often include confusing or incorrect explanations. In this session, attendees will discuss how inaccurate media pieces can be used either in the classroom as "teaching moments," or turned into case studies. Participants are encouraged to bring with them examples of inaccurate media pieces to share during the session. The objective of our session will be to develop at least one teaching resource for each participant from shared articles and session discussions.

6. How Active Learning Works -- Applying Cognitive Psychology for Success in the Microbiology Classroom
Marcia Cordts, University of Iowa, Iowa City, IA

What's happening in the student's brain during microbiology lessons constructed according to active learning techniques? Current models of mental processing, as defined by cognitive psychologists, predict that active lessons should retain long-term meaningfulness to our students. This session will outline a working model for cognitive function as I have applied it in several microbiology lecture and lab courses. I aim to encourage a common language for microbiology educators that will further our exchange of successful learning strategies. By specifically analyzing some examples from my classes, I will illustrate how actively learned lessons can inherently complement the way that the brain uses information. In the process, a strong argument for the importance of microbiology labs will be revealed.

7. Using Case Studies
Kelly Cowan, Miami University of Ohio, Cincinnati, OH
Rodney Anderson, Ohio Northern University, Ada, OH

The case-based method is a relatively recent arrival in science classrooms. We'll give participants practical microbiological examples of what has worked for decades in law and medicine (bastions of the case method) and what works for us in our microbiology classes. Topics to be covered include: what makes a good case, how to write cases that will be effective in your classroom, how to use them in small and large classes, and how to use them as pre-instructional and post-instructional tools. We’ll focus on the practical aspects of using cases.
8. Roundtable: Mentoring, ASM Student Chapters, and the ASM Volunteer Community
Jackie Black, Marymount University, Arlington, VA
Larry Hanne, California State University, Chico, CA
Cynthia Needham, ICAN Productions, Ltd., Stowe, VT

Join a roundtable discussion on these three topics:

- Yes, you, too, can be a mentor. Ideally a person will have more than one mentor--each with some special knowledge or talent.
- Volunteering can be both personally rewarding and career expanding. ASM offers opportunities for both, but it’s often difficult to know how to navigate within a complex organization like ASM.
- ASM currently recognizes 60 student chapters across the United States. The benefits of establishing a student chapter are numerous; some chapters have been instrumental in public education about contemporary topics such as bioterrorism, others organize field trips to microbiology clinical laboratories and biotech companies or host seminar speakers on their campus.

9. Development of an Online Learning and Assessment Tool: The Online Lab Practical
Ann Smith, University of Maryland, College Park, MD

Sunday Only
To assess comprehensive knowledge and understanding of lab material in general microbiology we have traditionally used a final laboratory practical exam. Technology has provided another option. An online lab practical satisfies our learning goals but decreases student stress and set up time as is coupled with online practice quizzes. The options provided in the online environment have facilitated establishment of question and image banks. The lab exam coupled with quizzes provides an assessment tool as well as a teaching and learning tool. We will discuss our online exam and how it may be used at other institutions.

Susan Musante, American Society for Microbiology, Washington, DC

Saturday Only
This session will introduce participants to digital libraries for teaching life sciences. ASM's MicrobeLibrary.org includes images, animations, and videos; classroom and laboratory activities; reviews of educational materials; and science and education articles. The MicrobeLibrary is the microbiology collection within the AAAS's BiosciEdNet.org, which is in turn a biology collection within the NSF's National Science Digital Library (nsdl.org). These portal sites are gateways to organized resources from the science research and education communities. Learn how to access and use the wealth of teaching
resources available in these digital libraries and provide feedback on features to help guide the continued development of these resources.

13. Techniques for Successful Submission to the MicrobeLibrary: Curriculum and Visual Resources
Thomas Matt Walker, Southern Methodist University, Dallas, TX
Sue Merkel, Cornell University, Ithaca, NY
Kristen Catlin, American Society for Microbiology, Washington, DC

Sunday Only
Do you have a lecture or laboratory activity that would be ideal for submission to the MicrobeLibrary? This session will describe strategies for submission to the MicrobeLibrary Curriculum Resources Collection (CRC) and help interested authors organize an activity for submission. The CRC contains innovative classroom and laboratory activities that can be used by educators to teach content, concepts, themes, or skills in undergraduate microbiology. Many classroom activities and laboratory exercises in the collection foster inquiry-based learning, promote active learning strategies, or suggest novel ideas for projects and research approaches. Content, process, instruction, and evaluation components are evaluated using a defined rubric and a peer review process.

The Visual Resources of the MicrobeLibrary provides access to over 300 peer-reviewed images, animations, and videos to students, educators, and researchers around the world. It provides authors a venue for demonstrating their scholarly work and allows them to share their efforts with a global teaching community. Yet we know there are many more high quality resources out there that others could use. The goal of this workshop is to encourage and assist people who would like to submit a visual resource to the MicrobeLibrary. Participants should bring a copy of their resource or ideas. We will provide examples of model submissions and walk each participant through the submission process, including how submissions are reviewed. At the end of the session, participants should have a visual resource suitable for submission.

14. Teaching HIV/AIDS: Developing Activities to Build Science Understanding and Civic Engagement for Majors and Non-Majors
Marion Fass, Beloit College, Beloit, WI
Sherryl Broverman, Duke University, Durham, NC

Saturday Only
Teaching about HIV/AIDS provides microbiology teachers with the opportunity to complement science teaching with a discussion of critical social issues. It also provides a context for non-majors to understand basic virology and immunology as they build an understanding of ways to combat HIV/AIDS. This session will explore strategies and activities that connect science and civic engagement, both locally and globally, to enhance the learning experience of non-majors and majors. Both presenters are involved with the Association of American Colleges and Universities Science Education for New
Civic Engagements and Responsibilities (SENCER) project and have also worked with universities in Kenya and Tanzania to develop courses on HIV/AIDS.

15. **Bacterial Unknowns: Our Ways, Your Ways, New Ways, Sure Ways!**  
M. Frances Hite, LSUHSC Gene Therapy Program, New Orleans, LA  
Indiren Pillay, Southwest Tennessee Community College, Memphis, TN

Are your Unknown Assignments exhausted and old-fashioned?

FEAR NOT, HARD WORKING EDUCATOR!! In this session we will describe current ways Unknowns are assigned, as well as review traditional Unknown practices. With audience involvement, we will detail benefits and pitfalls of the different ways of conducting Unknowns. The audience will be grouped to focus on strategies with peers who teach similar students.

This session will allow ALL educators to:
- Examine new Unknown Assignments, including innovative technologies and methods
- Evaluate assignments currently in use
- Share methods, discussing problems and benefits
- Create contacts for new methods they are interested in adopting

Join us to learn and share innovative ways of conducting Unknowns in your labs or classes!

16. **Communicating with the Media Effectively – CANCELED**  
Barbara Hyde, American Society for Microbiology, Washington, DC

17. **Strategies for Meaningful Assessment of Student Learning**  
Judy Kandel, California State University - Fullerton, CA

The participants will assess a variety of formative and summative assessments linked to student learning outcomes in General Microbiology. Emphasis will be placed on critical thinking and problem-solving skills and will include the role of technology in assessment.

**Exhibitor Showcase, 5:00 – 7:00 PM:**

Exhibitors representing educational resource companies and organizations are available to discuss their products and services.

**Sunday, May 18th**

**Concurrent Sessions, 9:15 – 10:15 AM:**

Please see full listing on page 4.
Plenary Session, 10:30 – 11:30 AM:

1. Microtrends: New Directions for Microbiology Education
   Judith Kandel, California State University - Fullerton, CA

   What have we learned and accomplished since the first ASM Undergraduate Conference ten years ago? How has the changing face of both microbiology and undergraduate science education reshaped the challenges of the future? We will reflect briefly on the history of the Conference and explore ways to make our collective vision of the future of undergraduate microbiology education a reality.

Wrap-Up, Evaluations, and Adjournment, 11:30 AM