AMERICAN SOCIETY FOR MICROBIOLOGY

# Molecular Biology and Physiology (MBP) Retreat Summary

ASM Headquarters,
December 16-17, 2018

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Members of the Molecular Biology and Physiology (MBP) community met for a retreat on December 16-17, 2018 at ASM headquarters. The meeting was organized by COMS members Amy Camp, Sean Crosson, Tony Richardson, and Cari Vanderpool. Sixteen additional attendees included Judy Armitage, Vaughn Cooper (COMS Chair), Courtney Ellison (Graduate student), Neal Hammer, Chris Hayes, Linda Kenney, Michael Schmidt (COMS Vice Chair), Madeline Sherlock (postdoc), Tom Silhavy, Brian Stevenson, Dan Stoebel, Gigi Storz, Michele Swanson (ASM President), Boo Shan Tseng, Amy Cheng Vollmer (ASM Board), Stefano Bertuzzi (ASM CEO).

The purpose of the retreat was to:

- Define the mission of the MBP community
- Identify scientific horizons in MBP-related research
- Identify opportunities for ASM to support MBP research and member professional development
- Discuss strategies for enhancing member engagement with the Society, ASM Journals, and the ASM Microbe meeting

## 1. Mission

Scientists in the Molecular Biology and Physiology (MBP) community investigate fundamental processes and their molecular mechanisms in bacteria, archaea, eukaryotic microbes, and viruses, including the mechanisms by which microbes interact with each other and their environments.

The mission statement was drafted after small breakout discussions followed by a full group discussion. The consensus of the group was that research of the MBP community broadly extends and enhances research in all of the ASM tracks. The molecular underpinnings of processes studied by MBP scientists guide and aid translational research in medicine, manufacturing, agriculture and beyond. Moreover, the group agreed that the MBP community is dedicated to training scientists in established molecular approaches as well as developing new methods to accomplish our research goals. In short, MBP research provides a molecular foundation for our understanding of the microbial world.

It was suggested that we generate a graphical abstract for this MBP mission statement. This idea could be adopted by other tracks as well and could be a to-do item for the June 2019 COMS meeting.

## 2. MBP-related scientific horizons

· Multi-scale analyses of the structure and function of molecular machines. Advances in EM and fluorescence imaging and computational chemistry are enabling dynamic studies of the flagellum, pilus, and other molecular machines at high temporal and spatial resolution. Frontier imaging and image analysis approaches are also likely to yield new and interesting information on diverse microbial communities. This is an area where engineering, physics, synthetic biology, physiology, and genetics are converging.

· There have been significant advances in bacteriophage discovery and in the molecular biology of bacterial viruses. This work is informing new discoveries in bacterial molecular and cellular biology.

· Phase separation of intrinsically-disordered proteins and other polyelectrolyte materials in the cytoplasm can play a role in the regulation of cellular physiology. Research in this area is bringing together microbiologists with soft condensed matter physics and other areas in the physical and material sciences.

· There is growing interest in microbial nano-compartments (self-assembling protein “cages” that are involved in CO2 fixation, ethanolamine utilization, other processes). The fundamental physiology and cellular biology of these compartments is of interest to the MBP community. These nano-compartments are being developed as scaffolds for molecular engineering and synthetic biology purposes.

· CRISPR biology remains a frontier area of MBP research. Fundamental questions in this area remain, including how and why particular PAM sequences are selected.

· Advances in sequencing technology over the past decade now enable researchers to conduct classical genetic analyses of microbes that have typically been labeled as “genetically intractable”. These approaches will continue to advance our understanding of physiological and metabolic diversity in the microbial world.

· Single-cell sequencing and other single-cell analytical approaches are advancing our understanding of heterogeneity in cellular responses to environmental perturbation.

· Studies of metabolism have been reinvigorated in the MBP field due to new technologies (e.g. metabolomics) as well as a growing appreciation for its relevance to the microbiome and personal medicine.

A range of other MBP topics to be considered for future ASM Microbe meetings were provided to the COMS chair and vice-chair and the ASM Microbe planning committee.

## 3. Opportunities for ASM to support MBP Research and Member Professional Development.

· Development of a core facility/equipment sharing portal that identifies large equipment (e.g. sequencing, mass spectrometry, electron microscopy) that can be accessed by members at institutions without such equipment would be useful. Along these same lines, ASM could develop a board/portal with reviews of companies and core facilities that have been used by ASM members.

· Data sharing is critical for our research to advance. COMS encourages ASM to advocate for sharing of all large datasets (gene expression, Tn-seq, mass spectrometry and metabolomics, proteomics). In many cases, databases for sharing such large datasets do not exist, or are not user friendly.

· Portals with resources for educators at all levels should be made readily available on the ASM website.

· Career development resources could be enhanced on the ASM website. Profiles of successful senior scientists and microbiologists with non-traditional or “non-linear” paths would be of interest to the membership. Such a resource could facilitate direct connections between successful senior ASM members and interested trainees.

· ASM should update its “CMIIM List of Minority Microbiologists,” (https://www.asm.org/Articles/Policy/CMIIM-List-of-Minority-Microbiologists) and provide an easy way for people to add themselves to the list, and to search the list. Please see Diversify EEB (https://diversifyeeb.com/) for a model that works really well. This is an important resource to enhance diversity, equity and inclusion. The list can be used for ensuring diverse speaker line-ups at ASM Microbe, and is a resource for the entire community of microbiologists at all career stages.

· Research funding is, of course, very important for our community. The membership seeks ways to better advocate for research funding for microbial science. ASM can provide guidance on how to approach state and federal legislators regarding research funding.

· A portal for matching potential students and postdocs to PIs with funded research projects may be effective if used broadly. Along this line, we envision a forum where students could present 3-minute synopses of their PhD or undergraduate honors theses. This may allow PIs to identify students with the appropriate skill-sets for a given project. Similarly, 3-minute videos of PIs outlining their research program, or funded projects would allow potential students and postdocs to identify labs that meet their interests.

· Continue to support ASM-member new investigators. For example, the contacts of program officers at various funding agencies that are relevant to MBP research topics should be easily accessible on the ASM website. Continue to invite active program officers to ASM Microbe to give workshops for new investigators. Grant management workshops would also be useful to educate new investigators on funding sources, indirect costs and budgetary issues. Panels that outline how to navigate publication and peer review might also be of interest.

## 4. Member engagement with ASM, ASM Journals, and the ASM Microbe meeting

### *ASM*

· ASM has a team focused on social media, but many members are unaware of their efforts. How can ASM make students, postdocs, and PIs more aware of the scientific content that is delivered via social media? Conversely, how can we enable the membership to better engage the ASM social media to enhance the microbial science content that is delivered?

· COMS and ASM should find new ways to engage current grad students and postdocs. One possibility is a listening/meet-and-greet for MBP grad students/postdocs at Microbe 2019. It may be too late for this in 2019, but should be considered for 2020. Overall, it was clear from this retreat that COMS can do a better job of reaching out to students and postdocs for their input on ways ASM can better engage trainees.

· ASM provides many important resources and services to the community. However, many microbiologists are not aware of the benefits of ASM membership, or ways in which they can help advance microbial science by working through ASM. A “Why ASM?” campaign delivered through social media may be useful.

· Some branches are very active, while other regions do not have an active branch structure. How can we revitalize inactive branches? In many regions, the branch meetings are a very effective and affordable way to engage students and postdocs. Development of an approach to incentivize regional branch leadership in inactive areas will have long-term benefits for the society.

· The ASM/COMS small conference grant program is heavily oversubscribed. Increased funding for this conference “seed-funding” program is a good idea, and will engage more microbiologists. ASM membership should be a requirement for applying for this funding.

· Some members have expressed dissatisfaction with content delivered through Microcosm. Perhaps a monthly digital version via email, or content delivery through social media, may lead more consistent readership and better reinforce this benefit of ASM membership.

## *Microbe*

· More opportunity for members to propose and develop one-day pre-meetings before ASM Microbe would enable grass-roots engagement with the Society and could enhance ASM Microbe attendance. These “meetings within a meeting” could be on any topic in microbial sciences (some emerging area of research, women in science, etc.). Short proposals could be reviewed by a COMS subcommittee; such meetings would only require a small amount of money (perhaps $2-$3K) to help defray expenses.

· MBP members and COMS should be vocal in rethinking/restructuring ASM Microbe. Common complaints are that too many interesting symposia overlap and compete with one another and that more time needs to be dedicated to oral presentations for students, postdocs, and junior faculty. Increased engagement with the ASM Microbe planning committee and the ASM meeting planning office may help to optimize the ability of members to get the most out of ASM Microbe. Efforts to welcome new members, such as badge indicators and/or a new attendee reception, would offer a warmer welcome to new members/attendees. Posting an orientation video on the website, or a video that outlines how to use the ASM Microbe App more effectively would also serve to welcome new attendees.

· The role of COMS within ASM is unclear to many members. COMS should do a better job of branding itself to the membership. Additionally, a clear and informative organizational chart reflecting the new governance structure should be easily accessible on the ASM website.

· Microbe topics should be communicated to COMS members well before the COMS meeting at Microbe so that councilors have adequate time to probe the larger microbiology community for input.

· It should be possible for non-members to sign up for certain email communications so that they become more familiar with opportunities available through ASM. Efforts to identify and engage researchers who study microbes but do not identify themselves primarily as microbiologists has long-term advantages for the society.

· Time could be allotted at Microbe track hubs for brainstorming on subsequent Microbe content and format.

## *Journals*

· A mechanism by which ASM member postdocs can be recruited to review ASM journal article submissions directly without going through their PI would be helpful. COMS should obtain a list of postdocs interested in such a program.

· COMS should engage with ASM journals to develop strategies reinvigorate our flagship journals, and to discuss approaches to deal with new open access journal rules in certain regions. There are many benefits and advantages to publishing in ASM journals. ASM Journals should continue efforts to make these advantages clear to our membership.

***2019-2020 MBP major action item, to be considered:***

A joint SGM/ASM small meeting in an area that will engage microbiologists, and physicists, chemists, and engineers who are studying microbes. Two ideas discussed at the retreat include 1) development of a meeting focused of microbial nanocompartments, and 2) a meeting on frontier molecular and cellular imaging and analysis approaches, from the Angstrom to micron scale.