

Philosophical & Social Dimensions of Microbiology Workshop

The Philosophical and Social Dimensions of Microbiology Workshop was hosted by Egenis (ESRC Centre for Genomics in Society) at the University of Exeter, from July 13th–14th. We are grateful for the funding that made the workshop possible, and acknowledge support from the Wellcome Trust (Biomedical Ethics, Symposium grant, 07951/Z/06/Z), the AHRC (Philosophy of Biology, RG/APN/17361/AN5799) and NASA (for Professor Carol Cleland's travel).

25 people attended the Workshop, about half from the UK and the rest from North America, Australia and the rest of Europe.¹ Participants came from a variety of disciplines, including life sciences (e.g.: genetics, microbiology), humanities (e.g.: history, philosophy) and social sciences (e.g.: anthropology, sociology, social policy). Talks by invited presenters covered a similar range of disciplines, in order to ensure the interdisciplinary reach of the discussion. Four graduate students whose work was particularly pertinent to the Workshop theme were funded to attend. The presence of researchers at this career stage ensured that the Workshop insights would be disseminated across all academic levels.

The Workshop was structured into five sessions, each of which featured talks by a presenter and respondent (in brackets below), followed by a lengthy and detailed discussion of the issues raised by those presentations. Papers based on those talks are forthcoming in a special issue of *Studies in History and Philosophy of Biological and Biomedical Science* (see below).

1. Conceptual issues in the history of microbiology (Jan Sapp and Staffan Müller-Wille)
2. Microbial classification and the search for a species concept (John Wilkins and John Dupré)

3. Bacterial cognition and communication (James Shapiro and Lenny Moss)
4. Microbial biodiversity and the possibility of an alternative microbiosphere (Carol Cleland and Maureen O'Malley)
5. Summary session: bringing philosophical and social issues together (all participants)

Summary session

The concluding session of the workshop reviewed all the discussion generated so far, and gathered feedback from all participants about their impressions of the two days of presentations and discussion, as well as future issues to pursue and events to plan. All participants made comments about these being revolutionary times both within microbiology and outside it – the latter in relation to microbiology's potential impact on more general thinking (e.g.: neo-Darwinian evolutionary theory; understandings of cognition and communication; community-based analyses of life). Several issues were repeatedly identified as ones to pursue in post-Workshop activities and individual research.

- a. There is a need to formulate a general theory of living systems, and perhaps a more general philosophy of nature. Should macrobes and microbes be conceived of as qualitatively different (thereby necessitating two theories of living systems) or do we simply need to recognize important differences before reconciling the two in a common framework?
- b. Evolutionary theory and its assault by the Intelligent Design (and creationist) movement is a social arena to which the philosophy of microbiology was clearly perceived to be able to make very useful contributions, especially in terms of the challenges to neo-Darwinian thinking that such a philosophy would offer. The opposition to ID has generally been couched within a very conservative evolutionary framework, which has been articulated in a very dogmatic fashion. A more constructive response, argued several participants, would be to acknowledge the openness of scientific theory to revision and to

present a non-dogmatic theory of evolution – one which was able to incorporate the complex evolutionary phenomena found in the world of viruses, bacteria and archaea (e.g.: symbioses, cooperation, community selection). Individual participants will explore several avenues for making contributions to this long-standing and increasingly active debate.

- c. Ecological issues, such as global warming, are also prime areas to which microbiology and its philosophy can contribute a great deal by re-examining and reformulating the issues – especially those that related to biodiversity and conservation. Biological processes such as methane and oxygen production are crucially dependent on microbes, yet microbial life forms are barely considered in the wider public debate about how to preserve the biosphere. If the microbiosphere is taken into account, questions about what counts as biodiversity and what is worth conserving can be seen in a very different (and more biologically valid) perspective (e.g.: seed banks to preserve agricultural biodiversity are unlikely to be useful without the microbial partners plants need).
- d. Education curricula (high schools) currently focus on mammals and perhaps a few other animals. Even plants are marginalized, and microbes barely warrant a mention. Given their importance to the biosphere and all life, this is obviously a serious deficiency. Participants suggested two ways of remedying this problem: one, by writing a ‘gripping’ textbook that would introduce students and the wider public to the microbial world and a new understanding of life (in the same way *The Selfish Gene* did, but with a very different message); and two, by targeting various media outlets with stories about microbes and the problems of size-ism.
- e. The impact of the industrial-medical complex on academic science can be studied in great detail through more analysis of microbiology in its current and historical contexts.
- f. Microbiological insights need to be integrated more effectively into science policy discussions and formulation. An obvious example would be agricultural policy, which (as noted above) has tended to be formulated in a plant and human-centric way.

Future events and publications

- A special issue of *Studies in History and Philosophy of Biological and Biomedical Sciences*, based on the papers presented at the Workshop, will be published in 2007. Presenters will submit final versions of their papers by the end of October, 2006, and refereeing will be completed by the end of 2006. We plan to see the special issue in print by mid-2007.
- *A History and Philosophy of Microbiology Meeting* will be held at the University of Colorado in Boulder, in the first half of April, 2007. Jan Sapp and John Dupré will be keynote speakers at this event. Carol Cleland, a Workshop participant, is organizing the meeting and will send more information very soon to participants at the Exeter Workshop and other interested academics.
- The *Biennial Meeting of the International Society for the History, Philosophy and Social Study of Biology* will be held at Exeter in July, 2007. We plan to have a philosophy of microbiology theme included in the programme, and to organize two or three full sessions of microbiologically focused papers. Jim Shapiro is willing to contribute a paper once he has received a proposal for a session outline.
- Further discussion of other meetings and publications, including a collaborative book and other papers, will take place in July 2007 at Exeter.
- Finally, Egenis will continue to host a *Dimensions of Microbiology* webpage. It will cover philosophical, historical, scientific and sociological dimensions of microbiology, with a special focus on meetings and opportunities for collaboration between like-minded researchers.

¹ List of participants

Cleland, Carol (University of Colorado)

Dupré, John (University of Exeter, Egenis)
Elsdon-Baker, Fern (University of Brighton)
Frow, Emma (ESRC Genomics Policy and Research Forum)
Geertz, Marcel (University of Bremen)
Hauskeller, Christine (University of Exeter, Egenis)
Hughes, Steve (University of Exeter, Egenis)
Kendig, Catherine (Birkbeck College)
Koerner, Stephanie (University of Manchester)
Lyon, Pamela (The Australian National University)
Moss, Lenny (University of Exeter, Egenis)
Müller-Wille, Staffan (University of Exeter, Egenis)
Nicholson, Dan (University of Leeds)
O'Malley, Maureen (University of Exeter, Egenis)
Powell, Alex (University of Exeter, Egenis)
Roegel, Diane (University of Manchester)
Sapp, Jan (York University, Canada)
Schindler, Samuel (University of Leeds)
Shapiro, Jim (University of Chicago)
Turner, Sarah Lea (Centre for Ecology & Hydrology, Oxford)
Tyfield, David (University of Exeter, Egenis)
Van der Gast, Christopher (CEH, Oxford)
Wainwright, Milton (University of Sheffield)
Wilkins, John (University of Queensland, Australia)