

THE CHALLENGES FACED BY MICROBIOLOGISTS



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If one was to ask workers within the NHS to indicate the most pressing issues they face, one thing towards the top of their list will be controlling healthcare associated infections. In a similar vein, if one asks patients about to enter hospital what they fear most about their impending therapy, they will probably say contracting an infection such as MRSA or *Clostridium difficile*. With microbiological issues forming such a central focus in the clinical setting it is rather surprising to find that the amount of microbiology taught within the current curricula of both medical and pharmacy undergraduate degrees is pitifully small. Furthermore, teaching the important practical aspects of microbiology on any course is severely hampered by financial constraints.

The Society for Applied Microbiology is the oldest microbiology learned society in the UK. It was formed in 1931 originally as the *Society of Dairy Bacteriologists* which itself was established by the Ministry of Agriculture's appointed Advisory Dairy Bacteriologists. These were microbiologists whose role was to provide instruction on the hygienic production of milk, which in the period following World War I was woefully poor. Sometime after establishing the *Society of Dairy Bacteriologists* the remit of the society expanded and the name was changed to reflect this, firstly to the *Society for Applied Bacteriology* and finally to the *Society for Applied Microbiology*. Today the society has in excess of 1,500 members in over 80 different countries and its objectives are to advance for the benefit of the public the science of microbiology, in its application to the environment, human and animal health, agriculture and industry.

In this context the science of applied microbiology covers such areas as:

- Health
- Medicines production and quality
- Food safety
- Water quality
- Environmental protection

It is clear, therefore, that microbiologists are involved in a far wider agenda than just the challenges of antimicrobial resistance and healthcare associated infections outlined in the first paragraph. I will attempt below to give a flavour of the different issues facing microbiologists at the present time and try to indicate that these are not merely academic problems but issues which impact on all of us in a most profound manner.

CLIMATE CHANGE

Bacteria are the most abundant free-living organisms on earth and countless billions

of them live in our vast oceans. The role they play in biogeochemical cycles and their part in influencing carbon dioxide levels and hence climate change is not well understood. Even less well understood is what impact rising ocean temperatures and changing acidification will have on the functioning of this gigantic biome. There is a clear need for more work in trying to understand the complex interactions which lie at the heart of this problem so that we may be more able to deal with the issues arising from climate change.

INFLUENZA PANDEMICS

In the influenza pandemic of 1918/19 over 40 million people died worldwide; a staggering number which overshadows even the HIV tragedy. With this backdrop the concern over the recent swine flu pandemic is understandable as a new strain of H1N1 virus emerged. However, swift responses on the

part of politicians and microbiologists have put in place systems to limit its impact. We still do not know what awaits us over the coming months but the role of applied microbiologists in the areas of epidemiology, identification, vaccination and treatment will be paramount.

FOOD SAFETY

The Advisory Dairy Bacteriologists appointed by the Ministry of Agriculture just after the first world war were engaged in turning around the parlous state of the dairy industry at that time which impacted on both economic and health issues. Today, that industry is in great shape, at least from a food safety perspective, but that is not to say that problems do not exist elsewhere. The globalisation of the food market, increasing use of minimally processed foods, the desire for organic food production etc, all present microbiological challenges. Recent cases of *E coli O157* outbreaks in the UK have focused our attention on this issue and highlight the fact that we take our eye off the ball at our peril.

GLOBAL HEALTH ISSUES

Developing countries are facing a number of health issues including TB, HIV, malaria and cholera which are still major causes of mortality and morbidity in these areas of the world. These are often linked to infrastructural issues such as the supply of clean water and appropriate disposal of sewage waste, but health education issues are also relevant here. In attempting to address these problems the participation of scientists and technologists throughout the world is now recognised as being pivotal. However, in many developing countries it is necessary first to build up local scientific, particularly microbiological,

capacity to enable them to address their specific local issues and ultimately to develop sustainable economies.

THE ROLE OF LEARNED SOCIETIES

Learned societies bring together like-minded specialists to enable them to share their expertise. The *Society for Applied Microbiology*, for example, publishes five microbiology journals reporting on research in all aspects of applied microbiology. These journals are available free to members and allow them to keep abreast of developments in their field. The society also organises three major meetings and awards over £150,000 of grants each year.

It is important for such organisations also to act as a voice for their subject discipline, particularly attempting to influence policy makers on matters of importance. This might include putting the case for more microbiology to be introduced into clinically related undergraduate courses or more money to be made available for the effective teaching of microbiology laboratory skills. In our case one vital function is to communicate effectively the science of applied microbiology to the general public and the media. In this context we work with representative bodies like the *Society of Biology* (recently formed by the amalgamation of the *Institute of Biology* with the *Biosciences Federation*) and organisations such as the *Science Media Centre* and advocate one policy voice for the Life Sciences or Biological Sciences (to include microbiology).

Our society, like other learned societies, has members engaged in day-to-day work within microbiology laboratories in academia, the NHS, other government-funded

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organisations and industry. These people are at the cutting edge in dealing with issues such as those described above. It is vital that there are continuous professional development schemes appropriately funded for such scientists working in the microbiology arena.

INTERNATIONAL CAPACITY BUILDING

At the UN Millennium Development Summit in 2000 the Heads of State from Governments across the world agreed to work together to achieve a more prosperous international community. From this summit a number of Millennium Development Goals were drawn up leading to multi-million pound capacity-building initiatives co-ordinated by, among others, the World Bank and, in the UK, by the Department for International Development (DFID).

There is no doubt that large initiatives such as these do play a major role in delivering the global development agenda. However, they are often very inflexible and in many cases the most significant impact can be made by individuals carrying out small scale interactions on a personal level. This suggests that learned societies can embark on capacity building projects in developing countries on a smaller scale but make a real difference to individuals on the ground. Societies such as the *Society for Applied Microbiology* are ideally suited to contribute to this agenda since our members are specialist scientists covering

an extended network of over 80 countries and with strong links at grass roots level.

Examples of potential interactions include:

- Setting up collaborative research projects
- Donation of equipment, journals or textbooks
- Laboratory training in UK for overseas young scientists
- Lecturer/student exchange
- Organising meetings/training workshops in developing countries
- Assisting schools/universities with accreditation or curriculum design
- Expert advice on local problems
- Assistance with grant or paper writing
- Help with forming "sister" learned societies

In conclusion, applied microbiologists are engaged at every level in dealing with some of the most important issues facing us at the current time. Learned societies are there to support them in their endeavours and to push these issues further up the political agenda. In particular they are there to highlight the vital role played by this often-overlooked group of specialists. It is essential for the long term prosperity of the UK that sufficient resources are available to support applied microbiology so that the challenges we face can be adequately addressed.

