

Promoting microbiology in schools and colleges since 1969

CHAIRMAN'S ANNUAL REPORT 2018-2019

Summary

The MiSAC Chairman, John Grainger, was awarded an MBE in the Queen's birthday honours list. The 31st MiSAC Annual Competition 2019, *Metabolism, medicines & muck: how microbes help farming*, was this year generously sponsored by the National Farmers Union. To celebrate MiSAC's 50th anniversary in 2019, a collection of articles on aspects of microbiology has been published on the MiSAC web site, which is now managed by Indent Design Ltd. MiSAC has continued to offer authoritative advice to schools, colleges and other organisations. Members contributed to a range of meetings, courses and exhibitions in various parts of the UK and abroad. The Committee held four meetings, one of which involved judging the competition entries.

Order of the British Empire award for the Chairman of MiSAC

MiSAC is delighted to announce that its Chairman, John Grainger, has been awarded an MBE in the Queen's birthday honours list.

News of the award appeared on June 6th 2019 in the London Gazette: "The Queen has been graciously pleased, on the occasion of the Celebration of Her Majesty's Birthday, to give orders for the following promotions in, and appointments to, the Most Excellent Order of the British Empire: M.B.E. *To be an Ordinary Member of the Civil Division of the said Most Excellent Order: Dr. John Michael GRAINGER*, Chair, Microbiology in Schools Advisory Committee; For services to Microbiology."

This award is most fitting in that it occurs 50 years after the founding of the Microbiology in Schools Advisory Committee and is a most appropriate celebration of the many years of service by its Chairman.

MiSAC 31st Annual Competition 2019, *Metabolism, medicines & muck: how microbes help farming*

The aim of the 31st MiSAC Annual Competition, generously sponsored by the National Farmers Union (NFU), was to increase an understanding among teenagers of the benefits of microbial activities in agriculture. The requirements maintained the well-established approach of basing the competition on a topic that is associated with school curricula but with specifications that require students to explore material beyond the curriculum.

In addition to receiving entries from regular participants, we were again pleased to note the continuing growth in interest from newcomers to the competition. As usual, there were two entry groups, KS3 and KS4 (Secondary 1/2 and 3/4 in Scotland). Fifty group entries were received from 44 establishments throughout the UK; 6 submitted entries to both entry groups. In total, there were 232 separate entries consisting of 154 in the KS3 (S1/2) group and 78 at KS4 (S3/4). The strong level of support

from the KS4 (S3/4) group was particularly encouraging. Many participants took the opportunity to work together in groups of up to 4, making a total of 361 students having had the experience of contributing to the competition. Judging took place at the National Agriculture Centre, Stoneleigh at the headquarters of the NFU. Representatives of the MiSAC committee were joined on the judging panel by members of the NFU education team. The judging panel consisted of NFU representatives Josh Payne, Education Manager, and Jennie Devine, together with members of MiSAC.

The overall requirement was to produce a poster, aimed at teenagers, that would provide a better understanding of the ways in which microbes are of benefit to agriculture. The material to be considered was chosen from any of three specified aspects of agriculture, i.e., (1) soil fertility & plant health and growth, (2) animal health and growth, and (3) waste management. An overview of the ways in which microbes are involved was required by illustrating at least three processes of relevance to the three areas. Examples of these were provided for guidance but choice was not limited to those examples. Students were required to include the scientific basis of the chosen processes, the formal names (genus and species) of at least one of the microbes involved and other relevant and interesting information, e.g., the importance of the contribution of the process. The competition entry had to be printed on one A3 sheet (or two A4 pages attached side-by-side) and could be prepared either by computer or by hand. Guidance on making an effective poster was also provided.

As the judging procedure always includes attention to the requirements of the competition, it is important that entrants take careful note of the specifications. The judges were pleased that the entry requirements were generally well observed, with many hand- and computer-produced entries that achieved high standards of presentation and with some demonstrating innovative approaches. Entries revealed strong interest in all three of the

specified areas (i.e. soil fertility, plant health and growth; animal health and growth; waste management) and in a range of processes within those areas. Some entrants chose to focus on 3 processes, the minimum number allowed, whilst others dealt with up to all of the 11 processes suggested for guidance. Processes of entrants' choice included decomposition/biodegradation, probiotics and plant growth products.

Credit was given for illustrating a good factual account with photographs, diagrams or data and for presenting a design which is appropriate for a poster and is both informative for, and attractive to, the intended interest group, i.e., teenagers.

Although advised to choose colours carefully, the combinations used by a small number of entrants made the text difficult to read. More attention needs to be given to the naming of an organism by using upper case for the genus and lower case for the species, and to the correct use of the singular and plural cases, e.g., fungus, mycelium (singular); fungi, mycelia (plural).

It was encouraging to receive appreciative comments from teachers (and on one occasion directly from a student) regarding the benefits of taking part in the competition and the interest and the enjoyment that was generated. We also thank teachers for their attention to the request to record full identification details on the back of each entry which eases the administration of several hundred entries, many involving more than one student.

Money awards totalling £1,275 were made to prize winners and their establishments, and some entries were awarded a commendation. Winning entries will be made available on the MiSAC web site. All students who did not receive an award have had their work acknowledged by a certificate of entry and each participating establishment was sent a flyer describing the new microbiology teaching resources specially prepared to mark the 50th anniversary of the foundation of MiSAC. Those which gave permission will also receive resources from the NFU.

MiSAC warmly thanks the NFU for generously sponsoring the competition, the students for making the competition a success and their teachers for their support. We look forward to responses to the next MiSAC competition in 2020 on vaccination.

Prizes and commendations were awarded to students from the following schools.

Key Stage 3 Group: First Prize - Josh Kamalarajan, Ewan McClelland and Sam Mayes, The Wallace High School, Lisburn, County Antrim; **Second Prize** - Zak Leek and Moroti Olomo, Eltham College, Mottingham, London; **Third Prize** - Jenny Hu and Jessica Lin, Durham High School for Girls; **High Commendation for Creativity**: Madeline McDonald-Maier and Aliza Matthew, Colchester County High School for Girls, Essex; James Gooding, King Edward's School, Edgbaston, Birmingham; Sahaj Mandair, King Henry VIII

School, Coventry; **Commendation**: Rebecca Stanton, The Grange School, Hartford, Cheshire.

Key Stage 4 Group: First Prize (Joint) - Ella Dai, King's College, Taunton, Somerset and Eleanor MacGillivray, King's Ely, Cambridgeshire; **Third Prize** - Otilia Salgado, King's Ely, Cambridgeshire; **High Commendation for Creativity**: Jiri Illovy, William Morris and Ollie Yelland, Ryde School with Upper Chine, Isle of Wight; **Commendation**: Andria Bernot, Phu Minh Duong and Sabrina Panza, CATS College, Canterbury, Kent.

Finance and sponsorship

MiSAC finances remain relatively healthy, thanks to prudence in expenditure and the much-appreciated support from its sponsors:

- *British Mycological Society (BMS)*,
- *CLEAPSS*,
- *Microbiology Society (MS)*,
- *NCBE*,
- *The Quekett Microscopical Club*,
- *SSERC*.

Their generosity provides an annual financial contribution &/or meeting rooms and laboratory facilities.

MiSAC continues to limit its expenditure by reducing commitments at exhibitions and conferences which would not be cost effective. For example, we have chosen not to have a stand in the main exhibition area at the annual meetings of the Association for Science Education (ASE).

The annual return was made to the Charity Commissioners.

MiSAC web site

Because of the ill health experienced by our previous web-site consultant, MiSAC has now made arrangements for the site to be managed by Indent Design Ltd, the company that originally created the web site. A major undertaking was the publication of the *MiSAC matters 50th Anniversary Articles* collection. This required the web site's structure to be redesigned to allow access to the 33 articles written by a team of leading microbiologists, together with the foreword written by Sir Paul Nurse. The resource has been organised so that the articles can be accessed individually or browsed via thematic groups, such as 'Biotechnology', 'Environment', 'Microscopy' and 'Food'. Each article can be downloaded from the web site. For details of the articles in the collection, see 'MiSAC publications' below.

Priority was given to this substantial reworking of the site, as well as general updating. More recently, the annual competition page has been revised to provide a report and details of the winning entries of the 2019 competition.

Work is in progress to update the information on previous UK competitions and those held in Thailand and China.

MiSAC publications

MiSACmatters Anniversary Articles

To celebrate the 50th anniversary of the founding of MiSAC, it was decided to ask celebrated scientists to write short articles on a wide range of microorganisms and their activities. The aim was to provide secondary teachers and students with an insight into the important roles of microbes in everyday life. This unique and informative collection would highlight some important questions addressed by current and cutting-edge research.

More and more offers were submitted from authors who wanted to be part of this initiative, until the collection of material had grown to a total of 33 articles, listed below. In total, 38 microbiologists contributed to the enterprise. In addition, MiSAC was honoured when Sir Paul Nurse FRS, Nobel Laureate, agreed to write a foreword to the articles.

1. *Biorecovery of valuable elements by fungi*
2. *An ancient difference between a chicken and an ostrich uncovers a new way to fight influenza*
3. *Pathogenic bacteria: wolves in sheep's clothing*
4. *New drugs from an old desert*

5. *Superstore - super fungi! How much do you owe the fungi for your shopping basket?*
6. *Hidden Depths - Secondary metabolites of deep sea fungi are a promising source of novel antimicrobials*
7. *The story of vinegar*
8. *A positive view on health and safety in school microbiology*
9. *Tree pathogens and our changing landscapes - a tale of human carelessness?*
10. *Time for the plastic-eating fungus?*
11. *What happens to poo?*
12. *Candida: a fungus of the healthy human microbiome - but one that can bite the hand that feeds it*
13. *The acetone:butanol:ethanol fermentation process*
14. *Herpes viruses - hidden viruses*
15. *Nitrification and ammonia oxidising microbes in soil*
16. *'What - no bananas today?'*
17. *Overcoming addiction in bacteria: how to disable a deadly E. coli outbreak*
18. *Watch out for the fungus - It's behind you and coming up fast! Another reason to fear Climate Change?*
19. *The fundamentals of science: What can we learn from Beatrix Potter?*
20. *Gut microbes; we are not alone*
21. *Oops! Why mistakes make 'flu dangerous*
22. *Life in the old Quorn yet! Why a bright future for mycoprotein™ is good news for the world*
23. *Using mighty microscopes to look at microbial machinery*
24. *A random walk through life*
25. *The African trypanosome and human trypanosomiasis*
26. *'I'm pickin' up good vibrations': how nanoscale vibrations and advances in microscopy are helping us in the fight against bacteria*
27. *Lichens, key environmental bioindicators*
28. *Pasteur and Lister through the microscope*
29. *Bacterial endospores: their roles in resolving the spontaneous generation controversy and understanding cell development*
30. *Landfill disposal of domestic refuse: what a load of rubbish!*
31. *DIY smartphone microscope*
32. *Arbuscular Mycorrhizal Fungi - how plants managed to colonise land*
33. *How can algae infect farmed fish?*

Since the initial collection of anniversary articles was published, two further contributions have been promised: on malaria and the mode of action of parasites. These will be a valuable addition

because teachers have expressed a need for further information on these topics.

With the substantial amount of work involved in producing the anniversary articles, progress on completing a number of further new publications, described below, has been delayed.

MiSACmethods 1: Looking at microbes

This provides information on preparing material for practical studies, such as hay infusions and pond & vase water, together with guidance on microscopy, the recording of observations and health & safety.

MiSACmethods 2: Sourcing, maintaining and using microbes It will provide valuable guidance on the routine tasks involved in preparing for, and conducting, microbiology practical work.

MiSACactivities 5: Spoilage of oranges

This practical guide will explore factors which encourage the growth of the mould *Penicillium digitatum* on the surface of oranges.

Microbe Bite-size practicals provides outlines of some simple practical activities which illustrate the ubiquity and importance of microbes in everyday life.

Advisory work

The Treasurer has been invited to work with the South East Asia Ministries of Education Organisation (SEAMO), at its STEM Education Regional Centre in Bangkok, to develop projects in Thailand and SEAMO Regional Countries, linked to the MiSAC-based activities that she has already carried out.

Future activities

The 32nd Annual MiSAC Competition in 2020 will explore the issue of vaccination. The focus will be on protecting children up to 15 years old against infectious diseases. Students will be asked to prepare pages of information for a web site aimed at teenagers.

The microscopy workshop for teachers and technicians at Reading University, which MiSAC and the Quekett Microscopical Club had planned for the summer, has been postponed until an evening session in the spring term, 2020.

Acknowledgements

MiSAC is most grateful to its sponsors for their continued support. The generous amount of voluntary time, willingly given by the MiSAC Officers and the other Committee members, is also gratefully acknowledged. In addition, we greatly appreciate the work of the Honorary Auditor.

Committee membership 2018-2019 (with affiliations)

Chairman:	John Grainger, MBE (University of Reading)
Vice-Chairman:	John Schollar (NCBE)
Secretary:	John Tranter (ASE)
Treasurer:	Margaret Whalley (BMS)

Assistant

Secretary: Phil Bunyan (ASE)

Lay members: Nathan Smith (BMS)
Jason Harding /
Ai-Linh Tran (CLEAPSS)
Rachel Exley (MS)
Kit Brownlee (QMC)
Kate Andrews (SSERC)