

Report on the 2025 MiSAC Annual Competition

Human Fungal Disease and Antifungal Drug Resistance

Sponsored by the British Mycological Society

The aim of the 37th MiSAC Annual Competition was to increase understanding among teenagers of those fungi which cause a wide variety of diseases and the threat of antifungal drug resistance which impedes effective treatment. Each year, over 1 billion people experience a fungal infection but, with limited resources and under-funded health systems, around 2 million deaths occur.

The requirements of the 2025 competition 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. It was evident that students had enjoyed researching the topic and demonstrated their enthusiasm in producing an illustrated web-page report in a variety of imaginative ways to convey their findings. Overall, the judges were impressed by both the quantity and quality of the entries.

On the publicity flyer, the *Object of the competition* with its four bullet points provided the remit for the students' entries. **One** named human fungal pathogen had to be identified and described, with its associated disease and symptoms. Comments were required on how often the disease is encountered and its effects on different groups of patients, for example, those with a compromised immune system. In addition, students were required to discuss the antifungal drug treatments that are used, the factors that contribute to drug resistance and future ways of combatting the emergence of such resistance.

Around 20 different fungal diseases were selected by the students. These included common ailments such as athlete's foot, ringworm and thrush but students regularly researched other less-familiar diseases. Aspergillosis caused by *Aspergillus fumigatus*, sporotrichosis or rose handler's disease involving *Sporothrix schenckii*, cryptococcal meningitis and Valley fever (coccidioidomycosis) were among the examples chosen.

Whilst MiSAC is always pleased to welcome back entries from regular, established school participants, we were delighted by the very large number of newcomers to the competition, as well as schools returning to submit entries after an absence last year. As usual, there were two groups, KS3 and KS4 (S1/2 and S3/4 in Scotland). Entries were received from a total of **104** establishments; from England (92), Wales (4), Scotland (2) and Northern Ireland (1), together with 5 overseas schools in Azerbaijan, Cyprus, Switzerland, The Philippines and Indonesia.

30 schools submitted entries to both entry groups. In total, there were **454** separate entries consisting of 255 in the KS3 group and 199 at KS4. Many participants took the opportunity to work together in groups of up to 4, making a total of **744** students who entered the competition. The judging took place at the Chesham headquarters of CLEAPSS, one of MiSAC's sponsors, which hosted the event. The judging panel consisted of Mark Ramsdale, Associate Professor of Molecular Microbiology, University of Exeter, representing the British Mycological Society - sponsors of the competition and Emeritus Professor Anthony Whalley, Liverpool John Moores University, together with officers & members of MiSAC.

Entries from students in the KS3 group provided a strong field with some very detailed accounts of a wide range of medical mycology topics. The entry produced by the first-prize winner was considered exceptional, not only for a student at KS3, but for a student of any age. Professor Ramsdale thought the entry would not have looked out of place as an undergraduate student's submission; it provided detailed information in an accessible way and linked to supplementary content online via a QR code, which was cohesive, well-presented and engaging. The entries for KS4 were also very strong and led to prolonged discussion amongst the judges on potential prize winners. Around 20 entries closely met the remit and provided a great example of good scientific communication. Several contenders in this group, however, didn't quite address all the key areas required in the remit, in particular future ways of combatting the emergence of antifungal resistance. A number of entries in both age groups were commended not only for their artistic merit but also for their clarity of presentation. However, students should be discouraged from using dark background colours which make it difficult to read the information.

Entries covered a broad range of medical mycology topics, extending beyond those highlighted in the background information of the publicity flyer. Most (but not all) discussed named organisms, as required. Occasionally, there were factual errors in the text of the entries, but these were surprisingly rare, indicating a good sifting of reliable and robust information sources. Many students wrote correctly the genus and species names of the fungi they described, eg, *Aspergillus fumigatus* (which can be abbreviated to *A. fumigatus* after its first use). However, they had **not** learned to be consistent in their proper use of naming these organisms. (Teachers still need to emphasise the use of an upper-case initial letter for the genus name and a lower-case initial letter for the species. This should be in *italics* when printed and underlined when hand-written.)

Examples of symptoms and treatments were detailed in many cases. Insights into the causes of drug resistance were, however, missing from all but the best entries but some had summarised complex material to produce useful guidance for treatment options. Many did not bring together causes of resistance, mechanisms and suggestions for future developments required to manage effectively the local or global threats of antifungal drug resistance.

The judges continued to be impressed by the imagination and creativity of the students as they compiled their entries. Many students showed remarkable technical skills in using their computer to design their submission. In 2023, judges first commented on the skill of some students who created a *working* QR code for use with a smartphone to connect to URLs giving further information. This year, the number of entries that incorporated functioning QR codes showed a significant increase. Those who chose to work by hand could also achieve notable results.

We should also like to thank teachers for responding 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. A total of **£1240** was awarded to prize winners and their establishments. Winning and commended entries are displayed on the MiSAC web site www.misac.org.uk which includes a list of the prize-winning students and their schools. MiSAC thanks all the students for making the 2025 competition an outstanding success and their teachers for their support. We look forward to entries for the next MiSAC competition in 2026, which will explore the theme **How Microbes Make Milk**.

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