



Microbes made my lunch

Aim of the 34th MiSAC Annual Competition

To develop an understanding among teenagers of the beneficial role of microbes in food production.

Background

In general, microbes don't have a good reputation. While some *do* cause disease, the vast majority are not harmful to us. Some are incredibly useful in making acids, alcohol and other substances that add flavour, texture and nutritional value to foods. Microbes make many staples of our diet: bread, cheese, yoghurt and beer spring to mind.

Some microbes ferment starch and sugars in the absence of oxygen to produce lactic acid or alcohol whereas some aerobic microbes produce citric and acetic acids, depending on the food sources and microorganisms involved. Carbon dioxide may be released as a by-product of fermentation by yeasts and causes bread to rise. Lactic acid bacteria produce a sour flavour in foods such as yogurt, sauerkraut (fermented cabbage)

and kimchi (fermented vegetables) and are a feature of fermented meat products such as salami. The fungus *Aspergillus niger* is used to produce citric acid which adds flavour to soft drinks.

The use of yeast to make bread was recorded in ancient Egypt 5000 years ago and, 2000 years ago in China, soya beans were fermented to produce soy sauce. Microbial fermentation is used to release cacao and coffee beans from the fruits of their plants in making chocolate and coffee. It also improves the flavour and aroma of the finished products. *Marmite* is prepared from yeast cells left after fermentation in the production of beer and the fungus *Fusarium venenatum* is grown in a fermenter to produce the mycoprotein *Quorn*.

Object of the competition

You are required to produce a poster for teenage students on a catering or food microbiology course at a local college. This should present a clear understanding of the ways in which microbes are involved in the production of food.

Your poster should:

- provide an illustrated account of how microbes are involved in the production of **three** different examples of food and **one** example of a drink.

Include information on:

- the characteristics of the microbes you choose,
- the main features of the production process,
- the role of microbes' metabolism in contributing to the food created.

Format of entries

- Your entry must be produced on paper as hard copy on one A3 sheet (or two A4 sheets secured side by side with adhesive tape) using only one side of the paper.
- You may produce your entry either by hand or computer.
- The entry may be submitted by an individual or a group of not more than four students.

Prizes

Schools	1st £250	2nd £125	3rd £70
Students	1st £100	2nd £50	3rd £25

A certificate will be awarded to each student submitting an entry of scientific merit. The results, winning entries and a report of the competition will be published on the MiSAC web site competition pages at www.misac.org.uk.

Sponsor of the 2022 competition



Important

Remember that part of the competition judging will be on the scientific merit of an entry. Always use your own words because plagiarism will be penalised. For data and other materials used to illustrate your entry, provide information of their sources. Use the full scientific name of any microbe you identify, remembering that the first name (genus) begins with an upper-case letter and the second name (species) has a lower-case initial letter (e.g. *Saccharomyces cerevisiae*). Use an italic font for the scientific name - or underline it if your entry is hand-written.

What makes a good poster?

Effective posters are informative and attractive, lively, well-designed (which includes making it readable from a distance and choosing distinguishable colours) and often amusing in order to make an immediate and visual impact. Make the presentation of your entry entertaining for its intended audience, i.e. teenagers. This can be achieved by using photographs, diagrams, drawings, in addition to data and sources of further information.

Web sites

- http://www.misac.org.uk/PDFs/MiSAC_Briefings_1.pdf
- http://www.misac.org.uk/PDFs/MiSAC_Activities_1.pdf
- <http://www.misac.org.uk/article-downloads/5.Moore-Superfungi-2019.pdf>
- <http://www.misac.org.uk/article-downloads/7.Adams-Vinegar-2019.pdf>
- <http://www.misac.org.uk/article-downloads/22.Moore-Quorn-2019.pdf>
- <https://www.cheesescience.org/microbes.html>
- <https://en.wikipedia.org/wiki/Sauerkraut>
- <https://en.wikipedia.org/wiki/Chocolate>
- https://en.wikipedia.org/wiki/Fermentation_in_food_processing
- <https://sarahs-world.blog/microbes-make-foods/>
- <https://eatcultured.com/blogs/our-awesome-blog/fermented-foods-science>
- <https://happybellyfish.com/2020/02/01/best-fermented-foods-from-around-the-world/>

Closing date: 4th April 2022



Bread

Image Shutterstock



Marmite - a by-product of fermentation

Shutterstock



Wine and cheese

Image J Schollar



Chocolate

Image Shutterstock



Kimchi fermented vegetables

Image Shutterstock



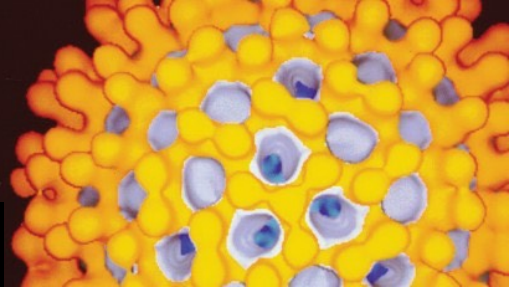
Mycoprotein Quorn

Image Shutterstock



Products of fermentation

Image J Schollar



Promoting microbiology in schools and colleges since 1969

Rules

- Judging will be based on two entry groups: Key Stage 3 (S1/2) and Key Stage 4 (S3/4).
- Each entry must be submitted on paper, on **one A3 sheet** (or two A4 sheets taped together) using one side of the paper only, and may be produced either by hand or by computer.
- Entries may be created either by individuals or groups of no more than 4 students.
- A maximum of 10 entries per school in each entry group is permitted.
- Account will be taken of originality, presentation and effectiveness in communicating with the intended audience.
- Only entries that conform to the competition rules and show scientific merit will be considered; note the requirements and consider the suggestions given on the front page.
- Evidence of plagiarism, such as downloading text directly from web sites without modification and interpretation, will result in disqualification. (MiSAC recommends only reputable sites for research; see www.open.ac.uk/webguide for tips on using the internet.)
- Each entry must be clearly labelled on the back with the name and address of the school, the teacher's name, the full name of each contributing student and the entry group, i.e. Key Stage 3 or S1/2 and Key Stage 4 or S3/4.
- Entries cannot be returned and may be used for promotional purposes by MiSAC.

Closing date: 4th April 2022

Check list for teachers

Please tick before submitting entries

- Students' name/s on entry? []
- School name on entry? []
- School address on entry? []
- Teacher's name on entry? []
- Key stage on entry? []
- Entry form completed? []

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Entry form *

Name of teacher:

Tel no:

Email:.....

KS3, S1/2 entry group

Name(s) of student(s)

1

2

3

4

5

6

7

8

9

10

Name and address of school

.....

.....

.....

KS4, S3/4 entry group

Name(s) of student(s)

1

2

3

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10

How did you learn of the competition? **Please tick**

[] MiSAC web site [] Post to school [] Emailing [] Social media [] Other

Don't forget to keep a copy of the rules and entry form!

** Personal data for use only by MiSAC in connection with the MiSAC Annual Competition*

Address for entries: MiSAC Competition, c/o NCBE, University of Reading, 2 Earley Gate, Whiteknights Road, Reading RG6 6AU