

Microorganisms used in biotechnology

Some of the organisms more commonly used in biotechnology include:

Aspergillus. A type of filamentous fungus that has been used for genetic engineering in a few cases and which is also used to produce citric acid by fermentation.

Bacillus subtilis. This Gram-positive bacterium is widely used as a cloning host, especially for the expression of secreted proteins.

Candida utilis. A yeast used in fermentations to produce chemicals.

Clostridium acetobutylicum. A bacterium used as a source of enzymes.

Corynebacterium glutamicum. This is widely used in fermentation processes producing amino acids for food supplements.

Escherichia coli. This very versatile Gram-negative bacterium is used in many biotechnological processes. It is by far the most common host cell for recombinant DNA work. It is also used in fermentations to make many amino acids and other products since it grows on many very cheap fermentation substrates, grows fast, and can be

manipulated genetically to accumulate many different chemicals. It is also very chemically versatile and quite non-pathogenic (with the exception of a few strains which, obviously, are not used for biotechnology).

Penicillium. A group of filamentous fungi used primarily to produce penicillin antibiotics.

Pseudomonas. A group of soil bacteria that contain some extremely diverse chemical abilities, which biotechnology has harnessed in bioremediation.

Saccharomyces. *Saccharomyces cerevisiae* is brewers' and bakers' yeast, and as such is probably the most widely exploited microorganism. *Saccharomyces* are also used in recombinant DNA work because they are eukaryotes and hence have the same sort of genetic structure as the humans, secrete proteins in a similar way, and so on, but are almost as easy to ferment as bacteria.

Streptomyces. These Gram-positive bacteria are used to produce a range of chemicals, especially antibiotics. They have also been used as the host for genetic engineering.

(from: *Biotechnology from A to Z* – Oxford)

1

Copy the table in your exercise book and then complete it with the missing information about these microorganisms commonly used in biotechnology.

MICROORGANISM	TYPE	USE
<i>Aspergillus</i>	fungus	for genetic engineering and to produce citric acid
<i>Bacillus subtilis</i>		
<i>Candida utilis</i>		
<i>Clostridium acetobutylicum</i>		
<i>Corynebacterium glutamicum</i>		
<i>Escherichia coli</i>		
<i>Penicillium</i>		
<i>Pseudomonas</i>		
<i>Saccharomyces</i>		
<i>Streptomyces</i>		

2 Find words matching the definitions below choosing from those underlined in Microorganisms used in biotechnology. *Tip: copy the definitions in your indexed book.*

- a. are organisms whose cells possess a nucleus.
- b. are polymers of amino acids linked via peptide bonds.
- c. are proteins that control the various steps of all chemical reactions.
- d. are substances which kill microorganisms or stop their growth.
- e. are the basic building blocks of proteins.
- f. is a series of procedures that are used to join together DNA segments.
- g. is an adjective meaning 'which does not cause disease'.
- h. is the manipulation of the genes in an organism with the aim of improving its characteristics.
- i. is the use of microorganism metabolism to remove pollutants from the environment.
- j. A is an organism containing another one.