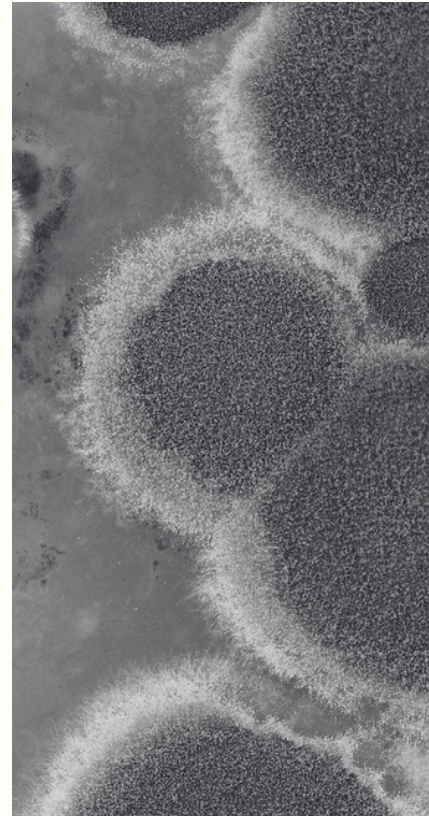
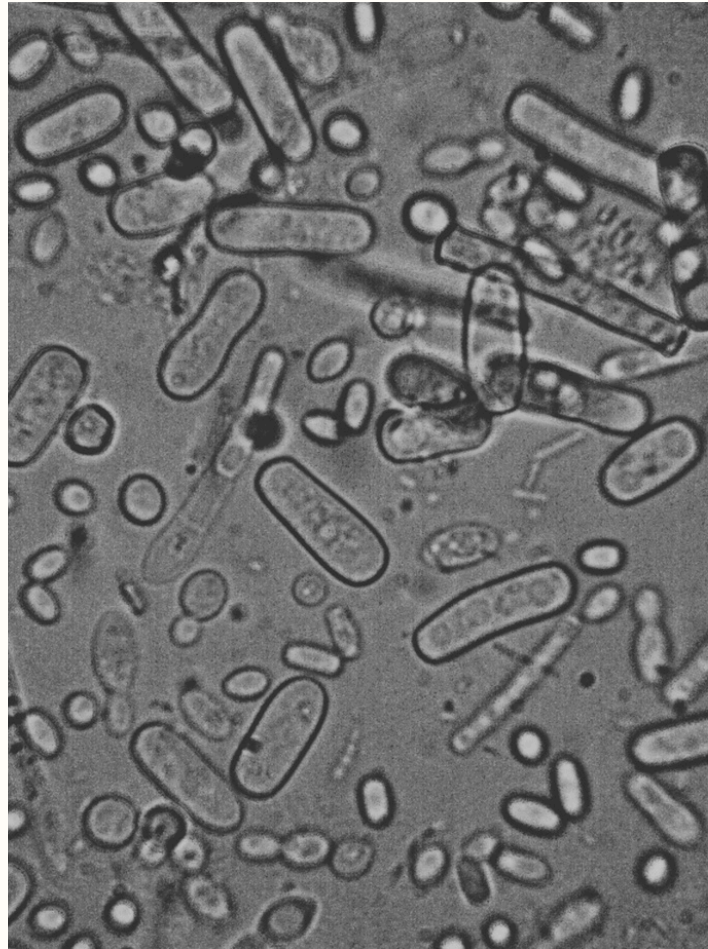




# SIMPLE

# *organisms*

# SIMPLE *organisms*



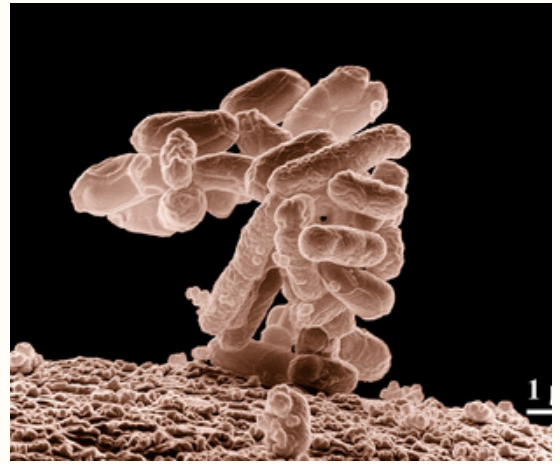
## ABOUT US

The bilingual group of 1º ESO has prepared a magazine composed of articles about various simple organisms and their interesting applications.

This project is part of Cosmezuela, Proyecto Almazuela 2.0.

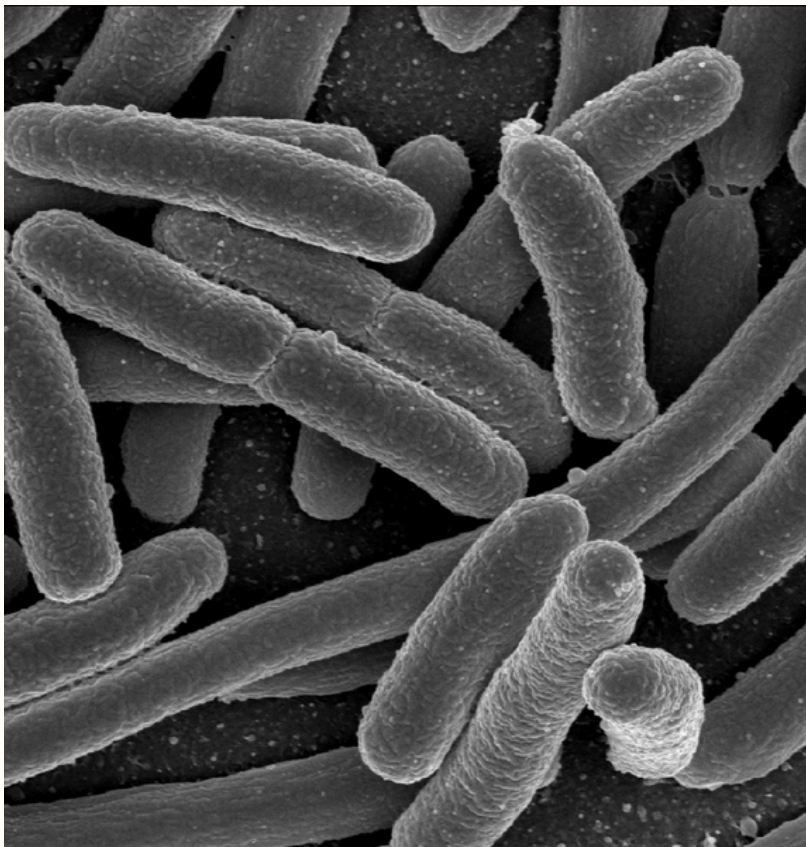
# *Escherichia coli*

## Is it an ally or a threat?



A group of *Escherichia coli*.

Is *Escherichia coli* good or bad for us? Well, it depends on the strain of *E. coli* that you have. For example, the *E. coli* in our intestines helps us, but when you get infected by another strain of *E. coli*, the consequences can be fatal. But don't be afraid, if you learn how to minimize your exposure to the "bad *E. coli*" you shouldn't be worried.



*Escherichia coli* under the microscope.

Source: LEFT - Wikipedia, RIGHT - Microbiologiaparahunanos.wordpress

Let's start at the beginning. Theodor Escherich, a German microbiologist, discovered the *E. coli* in 1884, when he was researching about bacteria in our intestines. Then he realized that the *E. coli* was a fast-growing bacteria.

The *E. coli* makes up part of our microbiome and helps us with digestion, in fact, this bacteria is present in our bodies since birth. In the intestine of living beings, the *E. coli* helps digest and absorb some nutrients that homeotherms themselves lack the capacity to do.

The *E. coli* has a rod-shape, and develops without oxygen. It helps us because produces some vitamins we can't. Also, in biotechnology, its structure has been modified in order to make vaccines.

On the other hand, the *E. coli* causes typical symptoms of intestinal diseases, like vomiting and nausea. To prevent us from getting infected by *E. coli*, we have to be careful and have good hygiene.

In conclusion, this bacteria can be as harmful as helpful in our organisms, it just depends on the situation and the variant of *E. coli*.

## *Taxonomy*

**Domain:** Bacteria  
**Kingdom:** Bacteria  
**Phylum:** Proteobacteria  
**Class:** Gammaproteobacteria

**Order:** Enterobacteriales  
**Family:** *Enterobacteriaceae*  
**Genus:** *Escherichia*  
**Species:** *Escherichia coli*

# Bacteria that makes delicious yoghurt?

The bacteria *Lactobacillus casei* or *Lacticaseibacillus casei* (how it is actually called) is a very important bacteria for our nutrition because it transforms milk into yoghurt.



*Lactocaseibacillus casei* bacteria.

Source: LEFT - Yakult

Source: TOP RIGHT - Canva

Source: BOTTOM RIGHT - <https://www.bioprofyl.de/es/magazin/intestino/lactobacillus-casei-microorganismo-fascinante>



Probiotic supplements.

*Lacticaseibacillus casei* is a bacteria that produces lactic acid, which is the responsible of making probiotic food.

This bacteria lives in our stomach and intestine. It helps with the digestion and maintaining a healthy microbiota. However, it is important not to consume it in excess, because it can cause bloating, gas, diarrhea or constipation.

On the other hand, it gives the kefir, yoghurt and cheese its scent and texture since *L. casei* is a fermentative bacteria.

*Lacticaseibacillus casei* has many benefits and it is a very important to be included in our nutrition.



*Lactocaseibacillus casei* fermentation.

**Domain:** Bacteria  
**Kingdom:** Bacillati  
**Phylum:** Bacillota  
**Class:** Bacilli

**Order:** Lactobacillales  
**Family:** *Lactobacillaceae*  
**Genus:** *Lacticaseibacillus*  
**Species:** *Lacticaseibacillus casei*

## Taxonomy

# The bacteria behind vinegar fermentation



Vinegar and apples.

*Acetobacter aceti* is responsible for fermentation of food, like vinegar or alcohol. It can resist high levels of acidity, because of its metabolism. This important bacteria was discovered in 1864 by the famous French scientist Louis Pasteur.



Microscopic image of *Acetobacter Aceti*.

Source: LEFT - [Naturalhistory.fandom.com](https://www.naturalhistory.fandom.com)

Source: RIGHT - <https://www.bbcgoodfood.com/health/nutrition/health-benefits-apple-cider-vinegar>

## Taxonomy

**Domain:** Bacteria

**Kingdom:** Bacteria

**Phylum:** Proteobacteria

**Class:** Alphaproteobacteria

**Order:** Rhodospirillales

**Family:** *Acetobacteraceae*

**Genus:** *Acetobacter*

**Species:** *Acetobacter Aceti*

*Acetobacter aceti* is a gram-negative bacteria that moves using a flagella. Louis Pasteur proved it to be the cause of converting ethanol to acetic acid in 1864.

This bacteria is a benign microorganism which is present everywhere in the environment, existing in alcoholic ecological niches which include flowers, bees, water and soil.

It lives wherever sugar fermentation occurs. It grows better at high temperatures (25 to 30 °C).

Did you know that this bacteria was used for many years in alcohol and vinegar industries? So this bacteria is very important for the economy because if this bacteria does not exist there would not exist these products.

This bacteria converts the ethanol in wine and cider into acetic acid to create vinegar. Also it can survive in high acidity levels.

It is believed that this bacteria can cause detrimental effects on pineapples turning them pink and then rot. Studies are still being conducted on other species on the genus *Acetobacter* to check if there are more causes.

# *Porphyra yezoensis*: the alga that conquers the world in the form of sushi



Nori seaweed sheets.

Alga nori has been used since XVII in Japan, Korea and China, but Dr. Kathleen Drew-Baker discovered how to improve the farming methods. This red alga is normally used to make sushi and its scientific name is *Phorphyra yezoensis*.



Alga nori in sushi.

Source: LEFT - <https://www.pexels.com/es-es/foto/comida-delicioso-arroz-fotografia-de-comida-13233519/>

Source: RIGHT - <https://mimasaiifigen.com/es/algas-japonesas/162-nori-origen-japon-25g.html>

The alga nori is a really famous algae that a lot of people like. *Porphyra yezoensis* started to be used in XVII in Japan, Korea and China. However, Dr. Kathleen Drew-Baker discovered how to improve alga nori farming methods. The scientific name of this alga is *Porphyra yezoensis*.

*Porphyra yezoensis* is a red alga that lives in the sea and its filaments are attached to oyster shells or rocks.

The preparation of nori involves harvesting, cleaning, mincing, and spreading the seaweed into thin sheets, which are then dried and roasted. While traditional methods used sun-drying, modern industrial processes use machines for drying and large ovens for roasting the final sheets to a crisp texture.

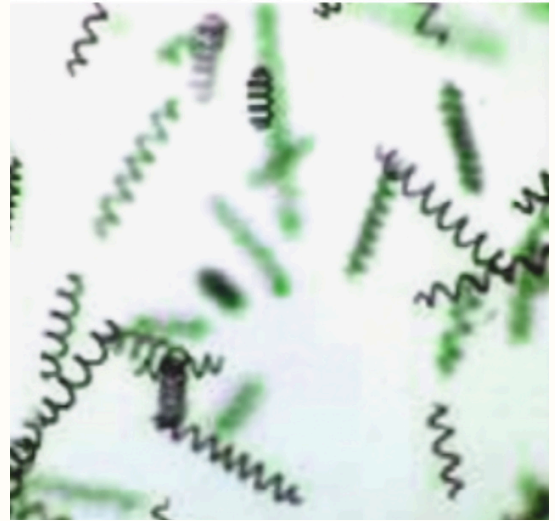
The alga is highly valued in gastronomy, because it is used to make sushi.

**Domain:** Eukarya  
**Kingdom:** Plantae / Rhodobionta  
**Phylum:** Rhodophyta  
**Class:** Bangiophycidae

**Order:** Bangiales  
**Family:** Bangiaceae  
**Genus:** *Porphyra*  
**Species:** *Porphyra yezoensis*

## Taxonomy

# SPIRULINA: THE "SUPERFOOD" YOU NEED IN YOUR LIFE



Microscope image of microalgae spirulina.

The *Arthrospira maxima* is a cyanobacteria that grows on lakes and its color is blue (cyano). This cyanobacteria is used as a supplement called spirulina that provide some nutrients like proteins or vitamins. It can be added to salads, pasta, etc. and it helps to have a healthy live or when you have exams or in a diet.



Spirulina powder.

Source: LEFT - Túa Saúde (spirulina)

Source: RIGHT - <https://www.ecospirulina.com/que-es-la-espirulina.php>

*Arthrospira maxima* is a type of a cyanobacteria that appeared on Earth 3,000 million years ago in Central America. Actually, it continues growing on lakes.

This organisms has a pigment called phycocyanin that provides its characteristic blue color (cyano).

Cyanobacteria was the first living being that was capable to do the photosynthesis for producing polysaccharides and proteins.

In fact, *Arthrospira Maxima* is used for producing spirulina, a very healthy supplement. It provides us many nutrients, mineral salts and proteins. Some people eat spirulina before exams or to be healthy and they put it on salads, ice creams, cookies, etc.

The phycocyanin pigments serve as antioxidants and anti-inflammatories so spirulina is good for our health.

The spirulina was discover by Jean Baptiste Turpin in 1827, but the Aztecs in Mexico and the Kanembu tribes in Chad, was the first ones using it to put it on cookies.

## Taxonomy

**Domain:** Bacteria  
**Kingdom:** Bacteria  
**Phylum:** Cyanobacteria  
**Class:** Cyanophyceae

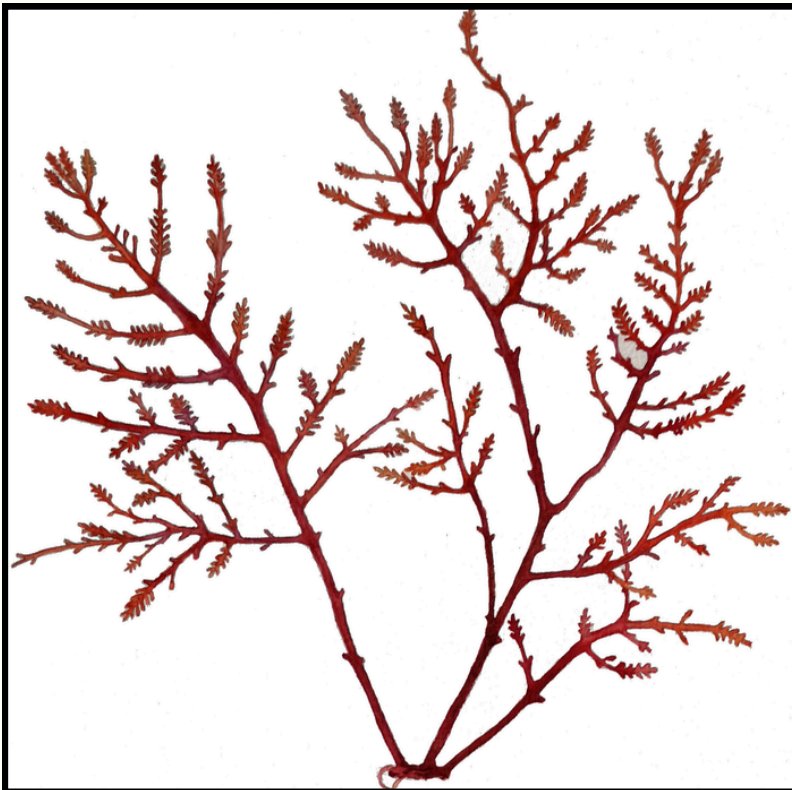
**Order:** Oscillatorial  
**Family:** *Phormidiaceae*  
**Genus:** *Arthrospira*  
**Species:** *Arthrospira maxima*

# Everything you didn't know about *Gelidium*



*Gelidium* algae in the sea.

***Gelidium* is a genus of red algae. It can reach up to 30 cm in height and it can be found in the north of the Iberian Peninsula and in some parts of the Mediterranean sea. *Gelidium* is used for the production of agar, used as a food thickener and culture medium for microorganisms.**



*Gelidium* branches.

Source: LEFT - <https://www.ecologistasenaccion.org/122020/las-algas-gelidium-los-bosques-submarinos-de-la-costa-cantabrica-en-estado-vulnerable/>  
Source: RIGHT - Wikipedia

*Gelidium* is a genus of red algae which can reach up to 30 cm in height. It can be found in the north of the Iberian Peninsula and in some parts of the Mediterranean sea.

Algae are photosynthetic organisms, meaning that they produce the food they need to live and complete their life cycle using sunlight and inorganic substances.

The structure of *Gelidium* is cartilaginous and branched, and one of its curiosities is that in winter it loses its aerial part and in spring this part "blooms" again.

At first, scientists had no particular interest in this red algae since not much was known about the extraction and collection of agar agar, but nowadays, it is widely used. This algae is extracted to be used as a food thickener (it is a source of agar agar) and as a culture medium for microorganisms.

In Spain, the extraction of *Gelidium* has a long tradition in Galicia, Asturias, Cantabria and Euskadi.

## Taxonomy

**Domain:** Eukarya

**Kingdom:** Plantae / Rhodobionta

**Phylum:** Rhodophyta

**Class:** Florideophyceae

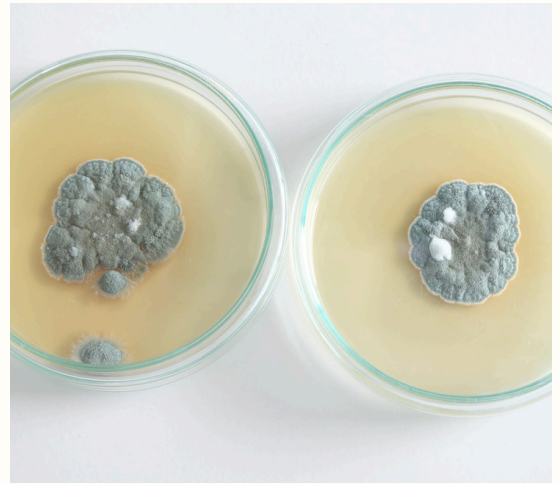
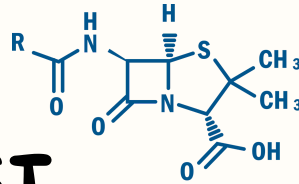
**Order:** Gelidiales

**Family:** *Gelidiaceae*

**Genus:** *Gelidium*

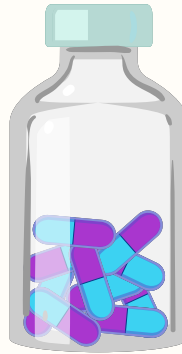
**Species:** *Gelidium canadiense*, *Gelidium corneum*, etc.

# PENICILLIUM NOTATUM: FLEMING'S BEST DISCOVERY OF ALL TIME



*Penicillium* growing in Petri dishes.

*Penicillium notatum* is a type of fungi that produces the first antibiotic ever discovered, the penicillin. Alexander Fleming discovered the penicillin and it saved millions of lives.



*Penicillium notatum* is a type of Fungi. It is famous for being the fungi that helped Alexander Fleming discover penicillin. Penicillin was the first antibiotic and it was discovered in 1928.

*Penicillium notatum* has for colour a nice teal and some yellow pigment. It's primarily formed by the cellular structures of a filamentous fungus, including hyphae, conidiophores (branched, brush-like structures), phialides, and conidia (spores). It is commonly found in nature, in temperate and subtropical regions, and it is a frequent mould in indoor environments, especially in damp or water-damaged buildings, as well as in salted food products.

Penicillin is an antibiotic secreted by this mould. This discovery changed the modern medicine. Apart from all this, it is a known allergen and, in rare cases, can cause opportunistic infections (penicilliosis) in people with severely weakened immune systems. This invention by Alexander Fleming saves the lives of millions of people from infections; without it, there would have been devastating consequences in the history of health because approximately 200 million people would have died.

#### A LITTLE ANECDOTE:

*Penicillium notatum* produces penicillin and if the penicillin would have been created before, people like Mozart have lived more.



Alexander Fleming in the laboratory.

Source: LEFT - Wikipedia.  
Source: RIGHT: Canva.

**Domain:** Eukarya  
**Kingdom:** Fungi  
**Phylum:** Ascomycot  
**Class:** Eurotiomycetes

**Order:** Eurotiales  
**Family:** *Aspergillaceae*  
**Genus:** *Penicillium*  
**Species:** *Penicillium notatum*

## Taxonomy

# THE FUNGUS THAT SAVES LIVES



Cefalexina pills.

*Acremonium chrysogenum* is a filament fungus. It can produce many antibiotics like peniciline and cephalosporine. An antibiotic is a very important medicine that kills bacteria and saves lives. It can live in the ground, in plants roots or in lakes. It was discovered by Guiseppe Brotzu.



*Acremonium chrysogenum* in a laboratory.

Source: LEFT - [https://cs.wikipedia.org/wiki/Acremonium\\_chrysogenum](https://cs.wikipedia.org/wiki/Acremonium_chrysogenum)  
 Source: TOP RIGHT - <https://sanatpharma.com/tag/cefalosporina/>  
 Source: BOTTOM RIGHT - <http://www.iam-europa.com/schimmelpilze-a-bis-z/acremonium/>

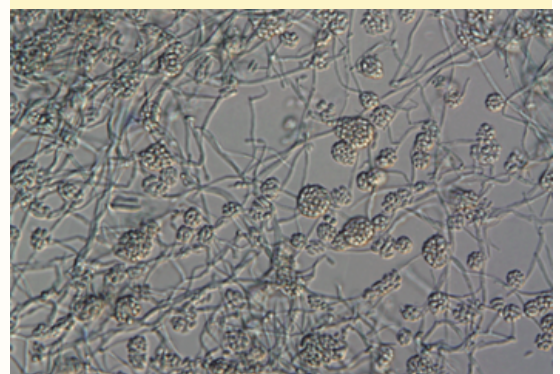
*Acremonium chrysogenum* is a filament fungus. It is morphologically simple. They usually live in the floor, diverse plant roots in wich it can be harmful. we can also find it in rests of vegetal matter or even in lakes.

Some species can cause infections in humans and other diseases.

The first sample was found in 1948 by the scientist called Guiseppe Brotzu, in the sea of Cerdeña.

This fungus produces antibiotics, the most famous are: cephalosporine P, N and cephalosporine C.

The use of cephalosporine C can cure many diseases. Some applications of cephalosporins are: Penicillin-resistant gonorrhea, sinusitis, meningitis or septicemia.



*Acremonium* sp. under the microscope.

## Taxonomy

**Domain:** Eukarya  
**Kingdom:** Fungi  
**Phylum:** Ascomycot  
**Class:** Sordariomycets

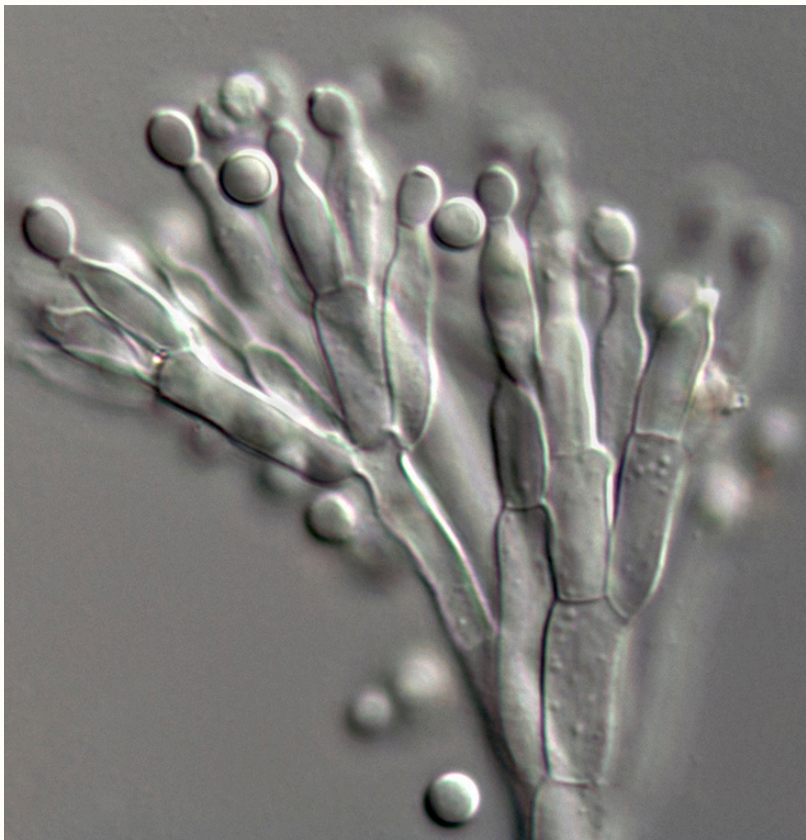
**Order:** Hypocreales  
**Family:** *Hypocreomycetidae*  
**Genus:** *Acremonium*  
**Species:** *Acremonium chrysogenum*

# IF YOU LIKE BLUE CHEESE, YOU ALSO LIKE EATING THIS FUNGUS



*Penicillium roqueforti* in a Petri dish.

***Penicillium roqueforti* is a fungus that is used for producing blue cheese. It is added to cheese and grows inside it, creating blue veins and giving the cheese its flavor and aroma.**



*Penicillium roqueforti* hyphae.

Source: LEFT - Canva  
Source: RIGHT - Canva

*Penicillium roqueforti* is the scientific name of a saprophytic, eukaryotic fungus that is used in the production of cheese like blue cheese and roquefort.

This fungus doesn't have tissues and it's multicellular. It is naturally found in soil and decaying organic matter.

The application of this fungus is the production of classic blue cheeses. Its use for making cheese is ancient, tied to the caves of Roquefort, France.

The early methods consisted on placing bread inoculated with the mold in caves, the mold grew on the bread, which was then used to inoculate cheese. Nowadays, fungi are cultured commercially, add like a starter. Cheesemakers pierce wheels to create air channels, allowing the mold to grow and form veins

The use of this mold produces cheese ripening, flavor and aroma.

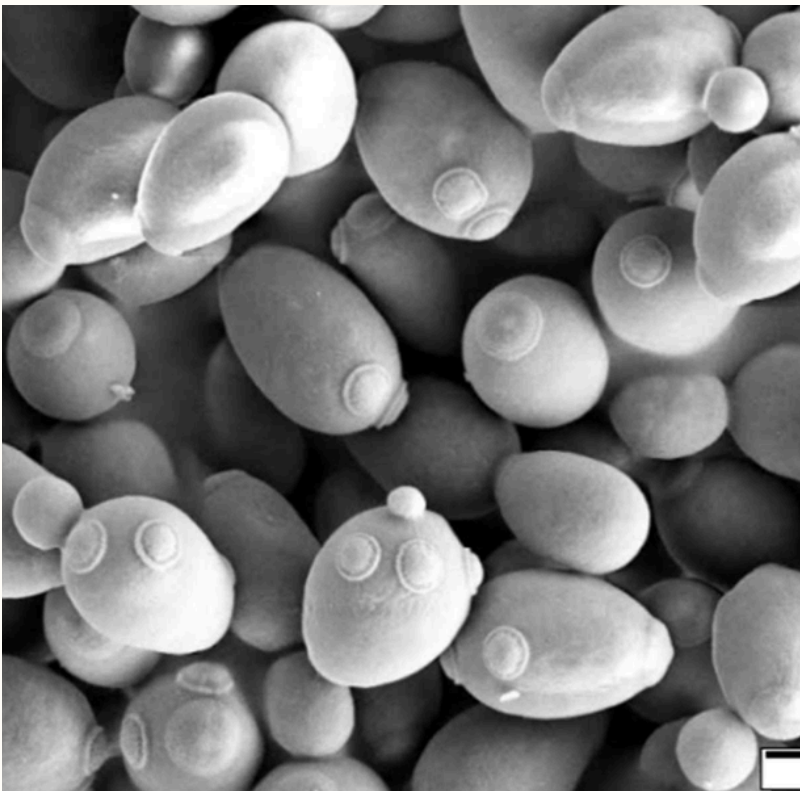
## Taxonomy

**Domain:** Eukarya  
**Kingdom:** Fungi  
**Phylum:** Ascomycot  
**Class:** Eurotiomycetes

**Order:** Eurotiales  
**Family:** *Aspergillaceae*  
**Genus:** *Penicillium*  
**Species:** *Penicillium roqueforti*

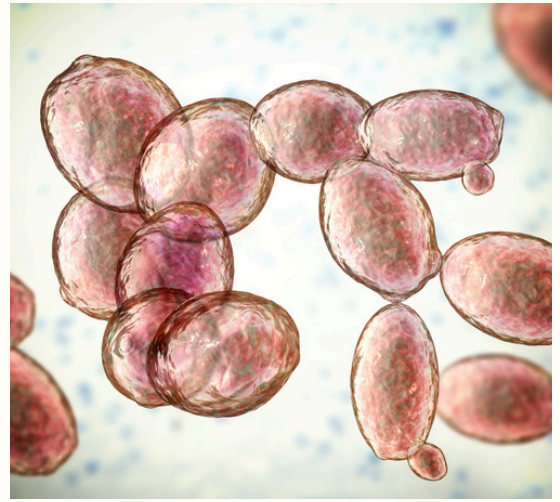
# *Saccharomyces cerevisiae*: the microorganism that ferments the world

It was not found it was domesticated by humans for fermentation and likely it was use in 9000 years ago in China to wine making, it is a yeast created in fungus, it works performing fermentation and other cellular processes. Louis Pasteur accredited the role of *Saccharomyces cerevisiae* in fermentation and the first human who saw that was Anton Van Leeuwenhoek but he didn't consider they like living beings. However spanish people had been starting to use it when roman peple arrived.



*Saccharomyces cerevisiae* under the microscope.

Source: LEFT - <https://microbiologiaparahumanos.wordpress.com/2019/03/13/saccharomyces-cerevisiae/>  
Source: TOP RIGHT - Canva  
Source: BOTTOM RIGHT - Canva



Cells of *Saccharomyces cerevisiae*.

*S. cerevisiae* is a fungi yeast who was used during more than 9 thousand years in China, they use that to the wine making, so it is the first use registered, the *S. cerevisiae* is a yeast created by fungus, you can find that in some fungus, the first person who saw the *S. cerevisiae*(registered) was Anton Van Leeuwenhoek, however he doesn't saw they as living beings, the first person who saw the fermentation potential was Louis Pasteur.

The *S. cerevisiae* is used right now to ferment the food and alcoholic drinks(like wine, beer, meat...).

*S. cerevisiae* has got a phylum called Ascomycota, for the decomposition of organic matter, the fermentation of foods like bread and beer, the production of antibiotics like penicillin.



Yeast powder.

**Domain:** Eukarya  
**Kingdom:** Fungi  
**Phylum:** Ascomycot  
**Class:** Saccharomycetes

**Order:** Sacharomycetals  
**Family:** *Saccharomycetaceae*  
**Genus:** *Saccharomyces*  
**Species:** *Saccharomyces cerevisiae*

## Taxonomy