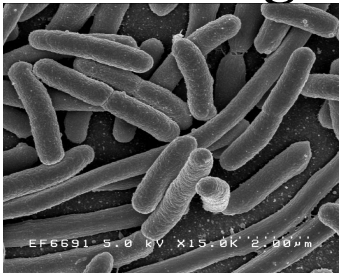


The image shows the interior of a restaurant named 'Chez Microbe'. The space is characterized by warm, ambient lighting from various pendant lamps, including long cylindrical ones and smaller, round ones. A long bar with a dark countertop is visible on the left, with several high-top stools. In the foreground and middle ground, there are dining tables with dark wood frames and chairs with patterned upholstery. Large windows on the right side offer a view of the exterior, which appears to be a modern building at night. The overall atmosphere is sophisticated and contemporary.

Chez Microbe

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Microbiology of Food
12/1/15

Salad {Romaine, cucumbers, peppers, carrots, tarragon olive oil, balsamic, raisins, sunflower seeds }



It is well known that lettuce has been the harbinger of multiple foodborne disease outbreaks, often caused by *Salmonella* and *E.coli*. Though it has been suggested that pathogenic bacteria within the lettuce leaves cause a higher incidence of these pathogens, this is most likely more a result of the growing conditions that cultivate its phyllospheric microbiome rather than its internal microbiome, as the highest occurring bacteria that is remotely related to *E.coli* and *Salmonella* is Enterobacter, though this bacterium is not necessarily internally occurring in romaine lettuce ³. This puts pressure on food producers to carefully monitor external conditions to prevent food contamination.



^Image: Lisa [Flickr](#)



Cucumbers, like the ones in this salad, can suffer from *Cucumber Mosaic Virus* (CMV), which is in the *cucumovirus* genus, during their production that turns them pale and bitter . It is usually vectored by aphids and is known to be one of the most widely hosted viruses across agricultural crops, becoming a production challenge for food producers.² (CMV pictured above)

The salad dressing used is made with balsamic vinegar, which is produced by acetic acid bacteria (AAB). This phyla of bacteria, in the proteobacteria family, must also be able to withstand the elevated glucose level in the production of the vinegar, which is caused by the cooked grape must that imparts its particular flavor. In this case, microbes are at work to ferment the vinegar in its processing and create its distinctive flavor for its consumption¹.



Image: https://www.flickr.com/photos/tyger_lyllie/3350276971

Mustard Salmon, Brown Rice, and Broccoli

Image: [Wikipedia Commons](#)



Image:
*Lactobacillus
fermentum*²



Brown rice is favored by many health conscious consumers, mostly as a result of its higher protein and fiber content and lower glycemic load. There is proof, however, that there is a much higher incidence of Lactic Acid Bacteria (LAB) and overall higher microbial diversity in the bran of brown rice, which could contribute to its higher nutritional content and benefits.¹



Image: <http://www.tastespotting.com/features/mustard-crust-salmon-recipe>
The mustard coating on the salmon not only gives the salmon a delicious flavor, but growing mustard as a cover crop can also enhance the Arbuscular Mycorrhizal Fungi (AMF) communities in the soil where its cultivated. While mustard cover crop is not necessarily the same as the mustard that comes in a jar, this nitrogen-fixing plant can greatly improve the productivity of agricultural fields by promoting a diverse and abundant array of AMF species and it would most likely aid many food producers in maintaining top soil quality as a part of a crop rotation⁴.

Image: Steffen Zahn, Flickr



Broccoli's health benefits could potentially be improved during its production through the application of the beneficial biocontrol agent (and fungus!) *Trichoderma harzianum*. This is an example of the ways microbes can be used in food production to increase nutritional value through mutualistic microbial relationships.³

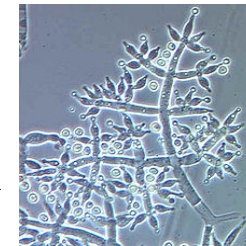


Image:
https://en.wikipedia.org/wiki/Trichoderma_harzianum

Mint chocolate chip ice cream



Image: <http://josephkim15.tumblr.com>

While the mint extract in mint chocolate chip ice cream imparts it with its distinctly minty flavor, mint's essential oils and alcohol extracts could also act as inhibitors to pathogenic bacteria like *Salmonella typhimurium*, *Staphylococcus aureus*, and *Vibrio parahaemolyticus*⁵, as they are known for having antiseptic properties.



Image: *Bifidobacterium lactis*²

Scientists are discussing the ways in which ice cream could potentially become a delivery agent for probiotics, like yogurt and other fermented dairy products, due to its widespread popularity (arguably more so than yogurt). The viability of a probiotic ice cream, however, depends on the incorporation of the probiotic bacteria – most likely *Bifidobacterium lactis* – at the correct stage in the ice cream's processing and at the correct pH level. That being said, if enough probiotic bacteria can survive the freezing stage of ice cream preparation as well the consumer's digestive system, it could be a delicious vehicle for probiotics¹.

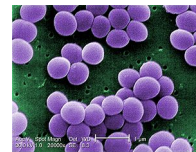


Image: http://www.wikiwand.com/es/Staphylococcus_aureus

The chocolate chips in mint chocolate chip ice cream could become a food safety issue during the processing of the ice cream, particularly if they are added after the pasteurization of the ice cream's dairy base³ due to the molds and yeasts that congregate on their surfaces if left unpasteurized. There has already been much investigation about the incidence of *Staphylococcus aureus* ice cream⁴ after a particularly bad outbreak in Germany in 2013, so the skittishness around the contamination of ice cream, with its multi-step and multi-temperature production process, is not entirely unfounded.