

# DISGUSTING!

Our disgust response evolved to protect us

While rotting meat, such as this dead field mouse, is ideal for maggots and other carrion-consuming animals, the smells emitted are a universal warning to humans that it is not safe to eat. Martin Hughes-Jones/Alamy Stock Photo

**OVER MILLENNIA**, indigenous people in the Arctic have developed ways of preserving protein and essential nutritional elements to get them through the long and hard winters, including various ways of fermenting meat. One practice that Europeans travelers treated with reactions ranging from suspicion to revulsion is the dish kiviaq. The Inughuit (Inuit-related) people of Greenland eat kiviaq as a special winter dish. Making it involves netting a few hundred dovekies (*Alle alle*)—easy to catch and fat little relatives of puffins orawks the size of a small pigeon—and stuffing them, feathers, guts, bones, and all, into a seal carcass. These are all sealed in with blubber and sewn up into the raw body. The seal is buried beneath rocks for several months while the birds ferment in a controlled environment. When ready, deep in the winter, the gooey, fermented birds are peeled out of their feathers and eaten whole, one by one. They are said to have a flavor related to blue cheese or sour

salami, and are quite tender. British culinary adventurer Mike Keen calls it “a smash in the mouth, but a good smash in the mouth.”

While kiviaq does not sound appealing to most Western palates, some European foods are found equally disgusting elsewhere. When the Italian Jesuit missionary Matteo Ricci (1552–1610) established a Catholic mission in China in the early 1600s, he described the revulsion Chinese people felt when smelling European cheeses. The indigenous people of Mexico had a similar reaction when first experiencing cheeses imported from Spain. A stinky, ripe, blue cheese would have been odd enough in China, which had its own traditions of making fermented milk products, but in the Americas, where milk itself was unknown and indigestible, fermented cheeses were at first seen as utterly revolting.

Disgust is a powerful and universal human response to smells, tastes, and substances we find repugnant. Many reactions of disgust are genetically

encoded and inborn in our species. And for good reason: Many things that we as an omnivorous species *could* eat would make us sick or kill us. We are universally inclined to keep clear of feces, blood, vomit, and dead bodies. Disgust surrounds our interaction with other people’s saliva, nasal mucus, pus, and other discharges. Regarding potential food, our noses detect a wide range of chemical compounds that warn us to stay away from potential pathogens, including putrescine emitted by rotting meat, cadaverine from decaying bodies, and hydrogen sulfide, the rotten-egg smell. Decomposing fish gives off trimethylamine and histamines that lets even a novice fish buyer know which fish is fresh and which is not. Various aldehydes and amino acids warn us of sour milk, rancid fats, and food contaminated with feces.

But some reactions of disgust are learned responses. We absorb these norms as children, growing up in a society. They have nothing to do with



When the people of China and the indigenous people of Mexico were introduced in the 1600s to smelly European cheeses, such as this Danish blue cheese, they found them revolting. © Derek Phillips/Dreamstime.com



Many non-Swedes find Swedish fermented herring, called Surströmming, redolent of sewage and rotten eggs. Niklas Emmoth/Alamy Stock Photo

the chemical characteristics of dangerous foods, but elicit a very similar visceral response. In the United States, some people eat cattle, but almost none knowingly eat horses or dogs. Some people eat pigs, but most do not eat cats. Guinea pigs are pets in the U.S., but food in the Andes, just as cows are not consumed by Hindus in India. A Belgian friend served horse meat, a Belgian delicacy, to Americans. It caused only positive reactions until the guests learned what it was, after which one person ran to the bathroom to be violently sick. During the Spanish Inquisition (1478–1834), suspected Jews and Muslims were

forced to eat pork. Many were not physically able to, revealing their religious antipathy to certain foods. Most cultures view the flesh of humans as an extreme example of something that is culturally defined as non-edible, even though it has none of the chemical clues that it is “bad.” These are culturally conditioned responses, in which our learned reaction is—to our brain and stomach—substantially the same as our biological one.

Just as our cultures teach us that some things are not for eating, our acculturation as children can override inherent aversions. Inuit children dig right into kiviak and other fermented

meat dishes. Nearly every human culture uses fermentation to process and preserve foods. Fermentation uses microorganisms to chemically alter the molecules in food. We use it to convert various sugars and carbohydrates to ethanol for wine and beer, and to use healthy bacteria to repel other bacteria and fungi in cheeses and pickled products. Living yeast cells give off carbon dioxide to make the voids or bubbles in bread before the yeasts are killed in the oven. The anaerobic fermentation that takes place in making kiviak makes the birds more tender, digestible, and richer in flavor, while protecting the meat from harmful species of bacteria. In Sweden herring is preserved by fermenting it to become surströmming, a dish that non-Swedes find redolent of sewage and rotten eggs. Fermentation is also the reason the most expensive beef steaks are “aged”: The enzymes active during aging break down muscle fibers, proteins, and fats in the meat to make it more tender and flavorful.

**WHY ARE WE DISGUSTED** by some things and not others? Researchers in the last fifty years have explored the function of the emotion of disgust and found it to be, for the most part, an adaptive evolutionary trait. Charles Darwin (1809–1882) was fascinated by the question, positing that disgust had evolved to help us stay away from “tainted” meat and other foods. Darwin wrote, “Disgust is a sensation rather more distinct in its nature and refers to something revolting, primarily in relation to the sense of taste, as actually perceived or vividly imagined; and secondarily to anything which causes a similar feeling, through the sense of smell, touch, and even of eyesight.” But the reaction involves a cost-benefit analysis because if we avoided foods with any blemish or hint of pathology, we might starve to death, and clearly under conditions of food stress people will eat things they might otherwise avoid. The acids, enzymes, and antimicrobial proteins in our

digestive tracts can kill off many food-borne pathogens. Still, Darwin wrote about disgust explicitly: “It is curious how readily this feeling is excited by anything unusual in the appearance, odour, or nature of our food.”

Researchers since Darwin have also been interested in many aspects of the complex emotion of disgust. They have found that within a society, some individuals are more sensitive to, and more inclined to avoid, food that is “bad” (whether biologically or culturally) than other food. On the other hand, some are more inclined to try exotic food. Researchers quantify this variation along a scale of Pathogen Disgust Sensitivity or PDS, and find that it varies by age, gender, degree of healthiness, and the extent to which the respondent is hungry. Overall, individuals with high PDS are more cautious about foods and indeed some studies have shown that higher PDS correlates with better health indicators, such as fewer intestinal parasites. In every society that has been studied there is a variability of PDS, from high to low. Children undergo developmental change regarding food sensitivity and “neophobia”—the fear of new food tastes, smells, and textures. In general, they are more willing to try new foods between ages one and two, and then become more averse to new foods between ages three and six. There is some support for the idea that the phase in which toddlers seem willing to stuff anything into their mouths helps in avoiding later allergies or other sensitivities.

Charles Darwin’s interest in emotions like disgust may seem strange, given his focus on evolution and natural selection. However, what drew Darwin to study emotions was his growing understanding that, in the case of humans, there was more than hard-wired biology guiding human evolution. Human evolution is driven by a combination of biological and cultural factors. From his *On the Origin of Species* (1859), here is his succinct explanation of evolution:



The Inughuit people of Greenland eat kiviaq, a special winter dish comprised of whole dovekies, or little auk, that have fermented for several months in a buried seal carcass. Kris Grabiec/Shutterstock

As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, *it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be naturally selected.* From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form.

For Darwin, emotions such as disgust, contempt, or pride all evolved through the same processes that gave rise to binocular vision or opposable thumbs.

Within the broad genetic variability among people, some were better adapted for certain kinds of behavior. Take the question of drinking milk or eating fermented milk products. Our early human ancestors could digest milk as babies—they were raised on their mother’s milk—but lost the ability to digest it later. Nearly all adults were what we would today call “lactose intolerant.” But in northern Europe, east Africa, and other places where cattle and sheep were domesticated, milk was available and could serve as an important supplemental source of nutrition. A few people did have the gene that would allow them to produce

the enzyme lactase, simply by virtue of the genetic variability of the human population. These individuals had a slight advantage, and thus had a slightly better chance of living to an age to pass these special genes on to their offspring. The ability to digest milk became increasingly prevalent until nearly everyone could do it. The smell of sour milk and fermented cheese may still have warned our olfactory senses that this stuff was “not food,” but that response was overridden by the learned cultural lesson that milk was food.

In his famous poem, “On the Nature of Things,” the classical Roman philosopher Lucretius (ca. 99–55 bce) wrote, “What is food for one person may be bitter poison to others.” Similar expressions can be found in almost every human language and culture. Throughout human history, we have reshaped our biological instincts and invented the means to turn things that might otherwise be seen as dreadful and stomach-churning into culinary delicacies. Please pass the kiviaq!

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