

A New Taste Sensation

Parmesan cheese has it. So does ketchup. It's umami, and it's changing the way everyone from top chefs to Frito-Lay executives thinks about food.

By Katy McLaughlin, *Wall Street Journal*, Dec. 8, 2007

Americans are taught from an early age that there are four basic tastes -- sweet, salty, sour and bitter. But what describes the taste of chicken soup?

To an increasing number of chefs and food-industry insiders, the answer is "umami," dubbed "the fifth taste." First identified by a Japanese scientist a century ago, umami has long been an obscure culinary concept. Hard to describe, it is usually defined as a meaty, savory, satisfying taste.

San Francisco chef Gary Danko whips up a tomato soup that will tempt and tantalize with that little-known fifth taste: umami. Stacey Delo gets a demo at Mr. Danko's home kitchen.

But now, in the wake of breakthroughs in food science -- and amid a burst of competition between ingredient makers to create new food flavorings -- umami is going mainstream. Chefs including Jean-Georges Vongerichten are offering what they call "umami bombs," dishes that pile on ingredients naturally rich in umami for an explosive taste. Packaged-food companies such as Nestlé, Frito-Lay and Campbell's Soup are trying to ramp up the umami taste in foods like low-sodium soup to make them taste better, while the nation's mushroom farmers are advertising their produce to chefs as an ideal way to get the umami taste.

The food industry is embracing umami as part of an effort to deliver highly flavored foods to consumers while also cutting back on fat, salt, sugar and artificial ingredients. At the same time, more consumers are scrutinizing food labels for chemical-sounding words and unhealthy ingredients.

To understand the taste of umami, imagine a perfectly dressed Caesar salad, redolent of Parmesan cheese, minced anchovies and Worcestershire sauce; or slurping chicken soup; or biting into a slice of pepperoni-and-mushroom pizza. The savory taste of these foods, and the full, tongue-coating sensation they provide, is umami.

While umami is a relatively new concept in this country, it has been well known in parts of Asia for nearly 100 years. It was identified in the early 20th century by Kikunae Ikeda, a Japanese scientist who coined the name umami (pronounced "oo-MA-mee") using the Japanese term for "deliciousness." He found that foods with the umami taste have a high level of glutamate, an amino acid and a building block of protein. Mr. Ikeda developed and patented a method of making monosodium glutamate, or MSG, a processed additive that adds umami taste to food, much as sugar makes things taste sweet.

MSG, which was first manufactured by the company Ajinomoto in 1909, is made through a complex process that involves fermenting corn glucose and other raw materials. Today, an estimated 95,000 metric tons of MSG are sold in North America each year, according to Ajinomoto. It appears in everything from some McDonald's sausage and chicken meals to supermarket items like Campbell's soup, Doritos chips and Kraft macaroni and cheese.

What MSG has going for it is that it is a readily available, inexpensive, intensely umami ingredient with no off-flavors -- just as sugar is a classic expression of sweet and salt is perfectly salty. (Other ingredients also add umami, including yeast extracts, but these can add flavors some product developers don't want.) In many parts of Asia, it is as common to add a dash of MSG to dishes as it is for cooks here to toss in a little salt or sugar. But in the U.S., MSG has developed a bad reputation as a suspicious additive that many consumers believe gives them allergies or headaches.

In fact, many studies have found that MSG doesn't cause ill effects. "I don't see normal amounts of MSG as posing a risk to the vast majority of people," says Michael Jacobson, executive director of the Center for Science in the Public Interest, a Washington food-safety advocacy group.

For years, Western chefs and food scientists debated whether umami was a true taste, as fundamental to the sensory system as sweet or sour. That changed in 2000 when scientists at the University of Miami published a study -- partly funded by Ajinomoto -- identifying receptors on the tongue with no purpose other than to recognize the presence of glutamate. Subsequent studies, some funded by the ingredient industry and others without industry funding, identified other umami receptors.

While there is debate about which study is correct, scientists now widely believe that the body was designed to recognize glutamate, says Gary Beauchamp, director of the Monell Chemical Senses Center in Philadelphia, a sensory research institute that also receives some Ajinomoto funding. Just as we crave sweets as a spur to seek out carbohydrates, we are also geared to enjoy glutamate so that we will eat proteins, he says.

A Monell study found that babies will eat more soup if it has small doses of glutamate. (When my 17-month-old son had a recent bout of pneumonia and lost his appetite, a grating of Parmesan, one of the foods highest in glutamate in the Western diet, helped entice him to eat noodles, rice and lentils.)

Umami's acceptance as the fifth taste has spurred everyone from high-end chefs to packaged-food makers to find ways of delivering the taste to foods. Because MSG's negative connotation has persisted in the West, that often means finding MSG substitutes. Mr. Vongerichten creates intense umami-tasting dishes, which he dubs umami "bombs," at his various restaurants. "The ultimate umami dish is expensive," he says, citing a \$185 Parmesan custard with white truffles at his New York restaurant Jean Georges. His less pricey umami bombs include a \$12 lunch dish of black bread with sea urchin.

Hiro Sone, chef and co-owner of Ame, a new-American restaurant in San Francisco, touts his "umami soy sauce," enhanced with kombu, a type of seaweed, and bonito flakes, which are pieces of dried fish. When added to cuttlefish and

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sea urchin, the umami sauce is "like an MSG bomb," Mr. Sone says, but without any MSG.

Interest in umami is driving new research and development among companies that create and manufacture flavorings for the processed-food industry. These can range from natural ingredients to artificial flavors that essentially are to MSG what saccharine and aspartame are to sugar. Senomyx, an ingredient-making company in San Diego that went public in 2004, has developed an artificial taste bud, complete with umami receptors, in its lab. The company uses it to test reactions to thousands of ingredients.

So far, Senomyx has identified four new umami ingredients that can often be used in small enough amounts to be listed on a food label simply as "artificial flavors." This is a boon to food companies because it eliminates the need to add an unfamiliar, chemical-sounding word to an ingredient list.

Nestlé is using one of the Senomyx umami ingredients in bouillon cubes in the Caribbean, instant noodle dishes in Brazil and powdered seasoning in parts of Central America, all under the company's Maggi brand.

When Campbell's recently reformulated its soups to lower the sodium content, part of the focus was on "including ingredients that would provide umami-type characteristics," says George Dowdie, Campbell's senior vice president of global research and development and quality. Mr. Dowdie wouldn't reveal which ingredients did the trick but says it was a combination of natural foods -- things like cheese, mushrooms and tomatoes -- and proprietary flavorings from flavor companies. He adds that the company is hoping to learn more about umami through a research deal it has made with Senomyx.

In mid-July, Frito-Lay, a unit of PepsiCo, hired its first executive chef, Stephen Kalil. Mr. Kalil says he is experimenting with umami ingredients from Latin and Asian cultures -- like cheese powder, anchovy powder, fermented soybean products and mushroom powder -- to create new flavors for brands including Lay's and Flat Earth vegetable and fruit crisps. The company has no plans to replace the MSG in certain products, however. "If we were to change the flavor of Doritos, for our 18-to-24-year-old male consumer there would probably be a riot," says Mike Zbuchalski, vice president of culinary innovation for Frito-Lay North America.

Dairy Management Inc., a trade group for the dairy industry, recently funded research into what compounds cause the umami taste in Swiss and cheddar cheese, in the hope of learning how to give cheese umami taste more consistently and quickly.

The Mushroom Council, a trade group for the mushroom industry, has distributed a report to restaurants about how mushrooms contribute to umami. Titled "Umami: If You've Got It, Flaunt It," it offers instructions in "building the U-bomb," by sautéing mushrooms and adding them to grilled steak.

Some of the biggest promoters of the idea that there are umami-rich alternatives to MSG in many foods we eat are MSG makers themselves. A consortium of MSG manufacturers, led by Ajinomoto, sponsors the Tokyo-based Umami Manufacturers Association. The group hosts conferences about umami and publishes a Web site in English featuring MSG-free umami recipes.

"We are hoping that eventually people will become familiar with why this flavor enhancer is in our food -- well, because it's giving my food the taste that I like," says Kitty Broihier, a consultant for Ajinomoto Food Ingredients, a Chicago-based subsidiary of Ajinomoto. By emphasizing that the glutamate in food is the same as the glutamate in MSG, makers hope to make people think of MSG as a more natural ingredient.

For home cooks, umami can open up an entire pantry of ingredients. Just as a few shakes of salt can improve a dish, a correctly applied dash of cheese, wine or even ketchup can pump up the umami, without overwhelming the dish with the flavor of the added ingredient. Cooks skilled in umami can reduce the fat and salt content of foods without sacrificing flavor. There are several ways to boost the umami taste in a meal (see the accompanying graphic for umami tricks used by top chefs). One is to add ingredients rich in glutamate, such as Parmesan (even a rind tossed into the soup pot deepens flavor) or other types of aged cheese; soy sauce; tomato products such as juice, paste or ketchup; and fish-based sauces (like Worcestershire and Thai fish sauce). Another is to use foods high in certain nucleotides, another compound that contributes to the umami taste. These include many kinds of seafood, mushrooms and meat, especially veal and stocks made from bones.

For a more powerful effect, cooks can combine foods from those two categories. For reasons scientists don't entirely understand, when glutamate is combined with certain nucleotides, the umami effect is magnified.

Finally, cooks can build umami flavor through technique. In general, any process that breaks down protein, including drying, aging, curing and slow cooking, increases umami. This is because glutamate, normally bound up in proteins, is released into a form the tongue can perceive as umami when proteins are broken down, says Chris Loss, a senior culinary scientist at the Culinary Institute of America in St. Helena, Calif.

10 UMAMI BOOSTERS

<ul style="list-style-type: none">• Parmesan cheese• Dried mushrooms• Wine• Seaweed• Soy sauce	<ul style="list-style-type: none">• Marmite, Vegemite (yeast extracts, popular in the UK and Australia)• Ketchup• Fermentation
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