

Newsletter

May 2007

This edition of the IGIS Newsletter explores the continuing research into taste and how our growing appreciation of the fifth taste of umami is finding new directions. We also focus on the recent review of glutamate, carried out by a group of experts at the University of Hohenheim in Germany. The participants discussed a series of questions regarding the physiology and safety of glutamate. In addition, this edition of the newsletter features some interesting new products, and reviews two new books about umami and Japanese cooking.

The evolution of taste

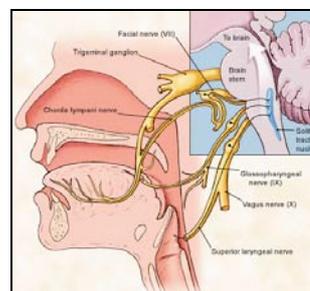
Scientific research continues to reveal more and more about what, how and why we taste. In December last year, Thomas E. Finger published a review of the world of taste from an evolutionary perspective¹. In this review, Dr. Finger looks at what 'taste' means in both human and non-human organisms. He examines chemosensory organs that serve taste-like functions, in both invertebrates and vertebrates, and how taste buds have evolved in the latter.

A study carried out last year by Jayaram Chandrashekar² and his team focused on identifying the unique receptor cells that are able to detect each of the five basic tastes in mammals: sweet, sour, bitter,

¹ Thomas E. Finger; Evolution of Taste: From Single Cells to Taste Buds; ChemoSense, Vol.9 No.1 (December 2006)

² Jayaram Chandrashekar, Mark A. Hoon, Nicholas J. P. Ryba and Charles S. Zuker; The receptors and cells for mammalian taste; Nature 444, 288-294 (16 November 2006)

salty and umami. They discovered that, contrary to previous beliefs, these distinct cell types function as dedicated sensors that elicit stereotypic responses. The savory sensation of umami is evoked when the T1R1 and T1R3 receptors detect amino acids such as glutamate. Future research should now be able to trace 'lines of information' from the tongue to sensory centers in the brain, and therefore allow us to understand where and how they combine to form part of the fuller 'picture' of taste and flavor.



Understanding umami

Further research into taste will surely yield new and exciting findings. Professor Tim Jacob at the University of Cardiff in the United Kingdom points out that umami taste and perception is complex and that there is still more to be discovered. He comments on the discovery that the tongue is not neatly mapped out with different areas for different basic tastes, but rather that certain regions are sensitive to one or two tastes. Sensors are also located on the palate, the esophagus and throughout the oral cavity. And what is particularly interesting is that there is a high density of umami receptors

on the palate that are connected to the brain by the facial nerve, not via the nerves of the tongue – so umami has its own direct link to the brain.

Of course, our perception and enjoyment of taste is also influenced by other factors such as aroma, appearance, mouthfeel, hunger and satiety.³ When it comes to satisfaction and 'comfort foods', the importance of the savory umami sensation produced by glutamate is gaining increasing recognition amongst menu developers and consumers alike. A poll by the US restaurant chain Denny's amongst late-night diners showed that 67% wanted savory food for dinner above anything else. As a recent article on the website of restaurant industry magazine QSR comments, ('The Fifth Sense', 17 January), dinner is a time when we crave a satisfying and comforting close to the day. The rich meaty umami sensation can provide this.

Tapping into this need for 'savoriness', parents can work umami into dishes that children may not otherwise eat. A blog entitled 'Gastrokid' encourages parents to harness the umami flavor into healthy dishes, and so entice children to eat good food without adding large amounts of fat, sugar or carbohydrates. (See <http://customcom.typepad.com/gastrokid>)

With our increasingly sophisticated palates, and rising recognition of umami, food scientists are searching for glutamates in new types of foods and chefs are starting to experiment with different food textures and aromas to heighten the umami experience. The future looks exciting for the fifth taste!



³ See Rolls, E.T., *The Brain and Emotion* (Oxford Univ. Press, USA, 2000)

Safety of monosodium glutamate upheld by Hohenheim Consensus

In 2006, experts from a range of scientific disciplines met at the University of Hohenheim, Stuttgart, Germany to review and evaluate recent work on the physiology and safety of monosodium glutamate. The objective was to update the Hohenheim consensus of 1997 which dealt with metabolic and safety aspects of monosodium glutamate. The group took into account newly available information, including findings from the "International Symposium on Glutamate" in 2000 (Fernstrom and Garattini, 2000). The conclusions reached by the experts have been published in the *European Journal of Clinical Nutrition*.⁴



Amongst the points agreed by the group were the fact that glutamate from all sources is mainly broken down and used as energy by the cells of the intestinal lining; that even in very high doses glutamate causes no ill effect and will not trespass into fetal circulation; that for those with a decreased appetite, the palatability of food can be improved by using a small amount of monosodium glutamate; and that the general use of glutamate salts as a food seasoning can be regarded as safe for everyone. The paper dispels a number of common misconceptions about monosodium glutamate and supports its use as a safe and effective flavor enhancer.

⁴ K Beyreuther et al.; Consensus meeting: monosodium glutamate – an update; *European Journal of Clinical Nutrition* (2007), 61, 304-313

Myths dispelled by the Hohenheim Consensus, 2006

MYTH 1:

Monosodium glutamate is an allergen, causing a range of reactions including headache, muscle tightness, numbness, weakness and flushing.

The group concluded that a multicenter placebo-controlled study did not find any side-effects when monosodium glutamate was given with food. They also highlighted the Geha study⁵ which shows that individuals who claim to be sensitive to glutamate can not reproduce their symptoms when under test conditions.

MYTH 2:

Monosodium glutamate causes 'Chinese Restaurant Syndrome' (CRS) and asthma attacks.

Consensus was reached that monosodium glutamate used as a food seasoning has no adverse effects on the lungs. Previous studies from 1981 suggesting such effects were shown to be poorly designed. Further studies in 1998 and 1999 showed no effect on lung function and concluded that monosodium glutamate does not cause 'bronchospasm' (difficulty in breathing caused by a sudden constriction of the muscles in the walls of the bronchioles).



A further three studies looking at the reported effects of oriental food showed that out of a total of 109 asthmatics tested, none showed

reactions to it and none reacted to orally-administered glutamate. The research shows that people who claim to suffer from CRS simply cannot isolate glutamate as the cause and often find that it is a well-known allergen such as peanuts, shellfish or certain herbs, which is causing this reaction.

⁵ Geha et al., 2000

MYTH 3:

Monosodium glutamate is harmful for unborn and newborn children.

Both of these allegations were refuted. Firstly, the group agreed that the transfer of glutamate to the baby is controlled by the placenta barrier, even when there is a high level of glutamate in the mother's blood stream. This is because the placenta metabolizes glutamate.

Secondly, a study looking at exposure to monosodium glutamate, in animals of all ages, showed no developmental, reproductive or brain abnormalities. The group agreed that orally administered



glutamate does not influence the development of newborn children.

Furthermore, the paper also

makes reference to the fact that since breast-milk contains free glutamate, breast-fed babies consume a higher amount of free glutamate per kg body weight than during any of their later life.

MYTH 4:

Glutamate can cause neurological degenerative diseases.

The group asked if there is any data that might link added glutamate to the development of neurological disease.

They concluded that there are no scientific data available to support this.

MYTH 5:

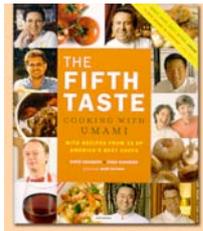
Monosodium glutamate causes obesity.

The review mentions that there is literature showing that glutamate can be administered in very large doses to humans on a long-term basis with no ill effects. The intestinal metabolism of glutamate is no different whether the glutamate is derived from natural sources or from monosodium glutamate. The group agreed with three studies showing that all glutamate taken up is used inside cells as energy.



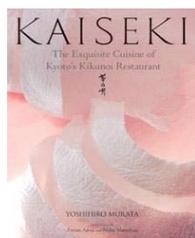
BOOK REVIEW

A new book entitled **'The Fifth Taste – Cooking with Umami'** by David and Anna Kasabian contains umami-rich recipes from 25 of America's best chefs.



Published by Universe Publishing, this cookbook not only contains over sixty umami recipes but also an informative front section explaining what umami is and how to detect it - with a range of taste test instructions. This section also gives details of the history of monosodium glutamate and information on all types of umami-rich foods. There are two recipe sections, one for everyday dishes and one showcasing the featured chefs' umami recipes. Showing how simple it is to select and combine umami-rich ingredients, the recipes range from sauces and soups, to braised fish, marinated steak, dumplings and salads.

Another interesting cookbook, recently featured in the Japan Times, is **'KAISEKI: The Exquisite Cuisine of Kyoto's Kikunoi Restaurant'**, by Yoshihiro Murata - who chaired the Molecular Gastronomy Masterclass with Heston Blumenthal in Japan in 2004.



Murata, the owner-chef of Kyoto's famed Kikunoi restaurant, presents a culinary

journey through the four seasons of celebrated 'Kaiseki' cuisine, with recipes using the changing seasonal produce available. In this beautifully illustrated book, he shares his thoughts on the philosophy behind Kaiseki and his tips and methods for making these delicious light 'tasting-menu' dishes. He explains how each dish is put together and, in the description of Sea Eel with Rice he mentions the importance of umami in Japanese cuisine, saying that with its "qualities of natural deliciousness...it allows us to create depth of flavor without using heavy oils or cream". He describes the dish: "The tender sea eel is almost bursting with umami as it disintegrates in your mouth and the rice is sticky and warm. Eating doesn't get much better than this".

PRODUCT WATCH

We have spotted some interesting umami-rich products on the shelves!



1) Colatura di Alici, Delfino Battista, (Italy)

This is a fermented 'essence of anchovy' sauce, typical of Cetara on the Amalfi Coast in

Southern Italy – and similar to 'Garum' fish sauce produced by the Ancient Romans. It is a by-product from the process of curing anchovies in layers of sea salt. The salty red liquid drips from the anchovies and is used as a glutamate-rich seasoning in pasta dishes or on vegetables. It is also used as a tasty alternative to salt.

2) Marmite Guinness (UK)

In March this year Unilever UK launched a limited edition version of Marmite, containing a strain of yeast used to make the Irish stout Guinness. Seeing as Marmite is already packed with umami from a blend of different brewer's yeasts, the addition of Guinness yeast will add an extra rich umami-kick!

