Summary of Discussions on Session H

Vegetable Proteins in Fermented Foods and Other Products

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The panel chaired by Tallent consisted of all Plenary Session H speakers plus Michio Kozaki of Tokyo University of Agriculture, and Bengt von Hofsten, Food Laboratory, Swedish National Food Administration.

Since fermented and related traditional foods represent the oldest usage of vegetable products as high protein dietary components, such foods provide rich sources of experience and information concerning nutritional quality and popular acceptance. It is, therefore, appropriate for these foods to receive attention in the program of this World Conference on Vegetable Food Proteins. Plenary Session H provided this attention, and Round Table Session H-1 afforded an opportunity to explore in further depth some of the points raised in the Plenary talks. Opening statements by five of the panelists are reproduced in these Proceedings.

In his Summarizing Remarks for Plenary Session H (q.v.), Bouvy listed several attributes shared by all of the processing methods described. Of these attributes, achieving preservation must have been a key driving force bringing about evolution of the processes described as being used in the Orient and in developing nations. For those covered for the Western World, on the other hand, improving flavor undoubtedly was paramount. This latter group, hydrolyzed and autolyzed vegetable and yeast proteins, generated a considerable amount of discourse in the Round Table Discussion. Someone asked about the contribution of glutamyl peptides to the flavor-enhancing properties of these products. The answer was that in acid hydrolysates the quantitites of such peptides are negligible, and in enzymatic hydrolysates they amount to 3-4% (db) as compared to 4-5% free glutamic acid.

Another question pertained to the susceptibility of soy proteins to bitter flavor development during hydrolysis. The bitter principles are believed to be peptides smaller than m.w. 3000, whereas those left by enzymatic hydrolysis in the manufacture of hydrolyzed vegetable protein (HVP) are larger than this. Research has shown that carboxypeptidase, an enzyme abundant in yeast and citrus fruit, is uniquely effective in hydrolyzing these bitter peptides.

It is important to note that the products described in Dr. Olsman's Plenary lecture develop a bouillon type flavor. Cooked meat flavor is much more complex. Over 500 flavor compounds have been reported in volatile fractions of roast beef, and of course many of these compounds have not been detected in HVP. Discussion of this point brought out that to produce real meat flavor, small molecular weight products from Maillard type reactions are needed. During roasting of meat, these reactions take place not in the aqueous phase but in the fat.

In discussions of traditional fermented foods, several of the attributes listed by Bouvy were illustrated in further detail. Miso, soy sauce, and tempeh are all known to be free of stachyose and raffinose (the flatus factors in nonfermented soy products) and trypsin inhibitors. While no specific values were quoted, there seemed to be general agreement that PERs of traditional fermented foods are relatively high. Protein content was identified as a critical quality parameter for selecting soybeans to be used in making good soy sauce. In the case of miso, uniformity of seed coat color is essential to produce a paste without unesthetic dark spots. Since traces of phospho-pesticides have been found to disappear during seed germination, an interesting question was raised (but not answered) as to the fate and effect of pesticide residues in fermentations.

The only negative note concerning fermented foods was with regard to bongkrek poison described by Winarno. Bongkrek is so strongly entrenched as a traditional food in certain parts of Indonesia that it is hard to effectively ban it. Efforts to replace it with tempeh might succeed, or consistent use of 1.5 to 2.0% sodium chloride to suppress the toxin formation might be successfully promoted. It should be emphasized that the toxins are produced only when shredded coconut residue is the substrate; they are not formed when soybeans are used.

Finally, the audience was made aware of a source of funding for basic and applied research in the area under discussion. The International Foundation for Science headquartered in Stockholm supports such research in developing countries on fermented foods, among other things. Grants awarded last year amounted to almost $2 million. A recently published brochure describes many of the projects.