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SYMPOSIUM ON MICROBIAL AND ENZYMATIC MODIFICATION OF PROTEINS

Introduction

The utilization of protein foods has always involved some modifications of their native state. These included such minor physical or chemical alterations as cooking or fine comminution and also major treatments like fermentation. In the latter, the proteins underwent both physical modifications and severe molecular rearrangements that affected their intrinsic structure and organoleptic properties. Man has early discovered that biological agents, such as microorganisms or the extracts of living tissues, are very effective in promoting the desired changes in his protein foods. Recently, with the increased emphasis on providing adequate protein nutrition to growing world populations, many investigations have been designed to discover the actual molecular transformations involved in these modifications, with the intent of their optimization and direction toward beneficial end products. The present symposium—hopefully, a first in a series—is devoted to introducing some of these investigations.

The wide spectrum of protein modifications for food utilization may be classified as follows: (1) nutrition—introduction of deficient nutritional components into the protein or improvement in its digestibility by the biological agents; (2) functionality—alterations in the nonnutritional, but still useful, properties of the proteins (solubility, water or fat uptake, viscosity, gellation, general texture, etc.); (3) organoleptic properties—modifications in the taste and flavor of the protein material for improved palatability.

All three classes of modification have been involved in man's quest for adequate protein foods. In this symposium each class is represented by two investigations.

Ideally, one would prefer the modification system and a biological agent that will perform specifically the alterations desired. Thus, in fermentation, an optimum condition would be one in which the reaction proceeds until the texture, flavor, nutrition, and other properties have reached optimum stages. In practice this is very difficult, since the multiplicity of the reactive agents present inevitably introduces by-products, not always beneficial to man. Even when single enzymes are used as modifying agents, as will be seen in one of the presentations of this symposium, some detrimental by-products may be produced. Therefore, the reactions have to be studied on a basic level, sometimes far removed from practical conditions, so as to isolate the unwelcome reactions involved. This field of study, in spite of the long history of the modifications, is therefore only at the beginning of exact scientific investigation. All the studies, practical or not, have to be carefully followed for the ultimate utility to mankind.

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