SYMPOSIUM ON NATURAL FOOD TOXICANTS

Introduction

This decade has witnessed an increasing and timely concern on the part of the public and their representatives over the possible harmful effects of chemical pollutants in our environment. Although it has not been popular to think in such terms, everyday food, too, is just a mixture of chemicals. In fact, eating represents the greatest direct exposure to exotic compounds that most of us ever received.

For centuries, people have been aware that certain plants and animals simply could not be used as food due to toxicity; in addition, some foods spoiled and became inedible, while others must be avoided at appropriate seasons. Only in recent years, however, have a number of more subtle diseases of men and domestic animals become associated with specific chemical constituents of food or forage.

Even the incidence of acute poisoning has been significant in terms of both public health and economics. Between 1956 and 1958, for example, nearly 500 persons lost their lives in Japan alone due to eating a type of poisonous fish; food and feed contaminated with ergot alkaloids altered the course of European history and later were responsible in considerable part for the establishment of the U.S. Department of Agriculture; and as much as 25% of newborn lambs in some flocks still may suffer abnormalities because of poisonous plants eaten once by their mothers during pregnancy. What, then, might we expect from longterm exposure to less spectacular toxicants in our common foods?

Several recent symposia and monographs have dealt with this subject primarily from the toxicological viewpoint. The present symposium for the Division of Agricultural and Food Chemistry was directed intentionally at the chemical aspects of these natural toxicants. The subject was divided arbitrarily into three parts to cover toxicants of animal, microbial, and higher plant origin, and I wish to thank my co-organizers F. E. Russell (University of Southern California) and Leo Goldblatt (U.S. Department of Agriculture, New Orleans) for their splendid cooperation in arranging the first two sections, respectively. Certainly, this has been the most extensive symposium ever held on the subject, and its publication, too, will represent a form of experiment. Through the cooperation of the American Chemical Society, the articles presented here will be reproduced by the Society in book form in order to reach the largest possible readership.

To my mind, the principal purpose of the symposium has been to introduce this fascinating subject to those who were not fully aware of its significance and, hopefully, to transmit to our audience some part of the enthusiasm of our panel of experts. If only a single advance in this field were to result from an interest generated here, the effort will have been more than justified.

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Studies on Shellfish Poisons

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Shellfish constitute an important part of the human diet. On occasion, shellfish have become poisonous and have caused paralysis and death. The poison originates in a marine dinoflagellate that occasionally grows in the water where the shellfish feed. It has been isolated from the hepatopancreas and siphon of shellfish, and is a heat-stable derivative of a purine base ($C_{10}H_{17}O_4N_7 \cdot 2HCl$). It is one of nature's most potent low molecular weight poisons. The poison also has been isolated from the dinoflagellate, *Gonyaulax catenella*, in axenic cultures and found identical to the poison isolated from the shellfish. Paralysis and death occur quickly, through inhibition of the sodium influx associated with a nerve impulse. No antidote is known.

Shellfish constitute one of the important seafoods for human consumption. Occasionally, in local areas, shellfish become extremely poisonous and have caused many outbreaks of food poisoning in humans resulting in sickness and death. The regions of the world where paralytic shellfish poisoning, sometimes called mussel poisoning, has occurred most often are around the North Sea, the north Atlantic coast of America, the north Pacific coast of America from central California to the Aleutian Islands, the coastal areas of Japan, and of South Africa. In general, these areas are 30° or more north or south latitude. The most recent outbreak of shellfish poisoning occurred during the latter part of this past June along the northeast coast of England. Because the shellfish poisons are not readily destroyed by heat processing or removed by washing of the shellfish, they present a unique public health problem for the commercial packers of shellfish. The peculiarity of the shellfish poison problem during the past 200 years was that the shellfish, which may have been

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