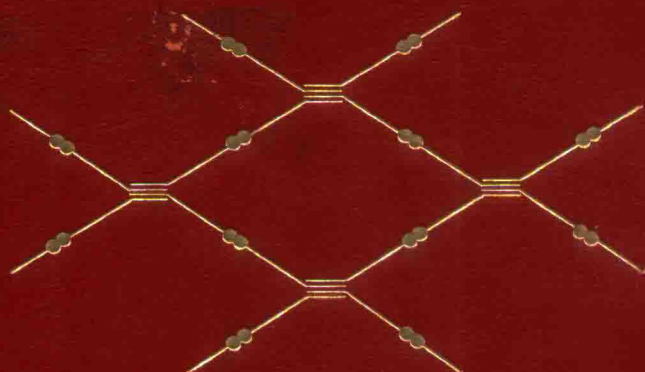


# Advances in Meat Research

Volume 4

Collagen as a Food



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Collagen as a Food

Edited by

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# Advances in **Meat Research**

Volume 4

Collagen as a Food

# **A. M. Pearson International Symposium**

## **Collagen as a Food**

November 11–13, 1985

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# Preface

The symposium "Collagen as a Food" was conceived in the spring of 1984 at a meeting of the New Product Research Committee of the National Live Stock and Meat Board, which was reviewing research proposals on factors influencing meat quality. Although a number of researchers submitting grant applications for funding recognized the importance of collagen in producing restructured meats or other new products, their grant applications addressed the problem of collagen only superficially by proposing either physical separation or measurement of total collagen. It was obvious that most U.S. meat researchers had little appreciation of recent developments in the identification and characterization of the 10 or more types of collagen, the mechanisms involved in crosslinking of collagen, or the structural changes that occur during denaturation and renaturation of the collagen molecule.

With these observations in mind, one of the members of the committee, Dr. Don Williams, suggested that a meeting be organized in which meat scientists and those involved in basic biochemical and biomedical research be brought together to focus their attention on collagen and how it could be modified to improve meat products. A number of people, including H. Kenneth Johnson and Burdette Breidenstein of the National Live Stock and Meat Board, members of the Department of Food Science and Human Nutrition at Michigan State University, and the administration of the AFRC Food Research Institute in Bristol, England, gave enthusiastic encouragement to the proposal. Its planning, funding, and organization were wholeheartedly supported, so that the symposium *Collagen as a Food* became a reality.

The symposium was held November 11–13, 1985, at Michigan State University. The meeting was marked by excellent papers, lively discussions in the Round Table sessions, and free exchange of information and useful interactions among all participants. Important and gratifying as these may be to the symposium organizers, the ultimate success of the meeting should be measured in terms of the subsequent application of the findings, concepts, and principles discussed in ways that will increase and improve the utilization of collagen as a food. The papers presented orally and the Round Table sessions are being pub-

lished as this volume of *Advances in Meat Research* to foster this long-term goal. Both the papers and the discussions have been edited somewhat for the sake of clarity and to conform to the accepted publication style.

*A. M. Pearson*

*T. R. Dutson*

*Allen J. Bailey*

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# The Biological Diversity of Collagen: A Family of Molecules

*Allen J. Bailey<sup>1</sup>*

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## INTRODUCTION

The biological diversity of collagen has until recently been difficult to account for, based as it had to be on a small number of side-chain modifications of a chemically very simple molecule. This diversity in structure and function is manifested in the forms in which collagen occurs: the strong ropelike fibers present in tendon, the flexible layers of interwoven fibers in skin, the transparent laminated sheets of fine fibers of cornea, the amorphous membrane structure of the lens capsule and glomeruli, the lubricated cartilage of the joints, the mineralized collagen of bone and dentine, and the fine filaments surrounding and supporting cells. Collagen is found in these various forms in the tissues of all types of multicellular organisms from the most primitive invertebrate, through sponges and coelenterates on up to man. Indeed the basis of the structural organization of the whole animal kingdom is dependent on the properties of the extracellular collagen fibers.

The identification of a whole family of genetically distinct collagens over the past few years has illuminated the variations of the basic structure that can account for this diversity. In addition, the properties of each collagen type can be varied by the more recently identified posttranslational modifications. These variations in properties allow a variety of

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