

BONE AND TOOTH

*Proceedings of the First European Symposium
held at
Somerville College, Oxford, April 1963*

SPONSORED BY
THE BONE AND TOOTH SOCIETY

Edited by

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PREFACE

ALL the papers published in this volume were presented at the First European Bone and Tooth Symposium held in Oxford, England, from 16 to 20 April 1963 under the sponsorship of the Bone and Tooth Society of Great Britain.

The Bone and Tooth Society of Great Britain was founded in 1950 and its main purpose was to bring together all workers engaged upon fundamental studies of bones and teeth.

Membership of the Society has increased steadily and much interest has been shown by workers in Europe and in other countries overseas. This growing interest prompted the Society to consider means whereby a closer liaison could be produced not only between its members but between all workers concerned with the study and investigation of the mineralized tissues of the body. In this field the Society has long been aware of the important role played by the Annual Gordon Conferences in the United States of America and it was felt that a meeting for European workers, modelled broadly on the lines of those Conferences, could serve a valuable purpose. It was recognized that a residential symposium provided the best opportunities for a free interchange of ideas between individual participants as well as providing an occasion for more formal presentation of new information.

The First European Bone and Tooth Symposium was therefore planned to take place in Oxford from 16 to 20 April 1963 under the direction of a small Organizing Committee. Dame Janet Vaughan kindly offered the facilities of Somerville College, Oxford, for residence for 100 participants and the meetings were held in the Department of Physiology, Oxford University, by kind permission of Sir George Lindor Brown. As interest in the Symposium proved to be much greater than originally anticipated, a further 60 non-resident participants joined in the meetings and discussion groups. The names and addresses of all the participants have been listed on pp. xi-xvii.

The daily programme of the Symposium consisted of 10 short communications presented during the morning session and a review lecture in the late afternoon given by an invited speaker. Thanks are due to Professor A. I. Darling, Dr. Honor B. Fell, Dr. I. MacIntyre and Dr. L. B. H. Tarlo for presenting these review lectures and also to Dr. P. Bordier, Professor P. J. Gaillard, Dr. G. Gustafson and Professor J. Trueta for opening the discussions. During the Symposium the afternoons and

evenings were left free for the organization of small and informal discussion groups between individual participants.

The arrangements for the Symposium were made possible by the generous financial help of the Wellcome Trust.

At a special meeting of the participants it was agreed unanimously that a European Bone and Tooth Symposium be held annually in whichever European country was willing to act as host. Professor M. J. Dallemagne extended an invitation to hold the Symposium at the University of Liège in 1964 and this invitation was received with enthusiastic assent.

To all the authorities mentioned and to all those who individually contributed to the success of the Symposium, the Organizing Committee would like to convey its most sincere thanks. Thanks are also due to the Pergamon Press for their generous co-operation in the publication of this volume and it is hoped that the Proceedings of future Symposia will continue to be published.

Oxford, 1963

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SESSION I

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OPENING LECTURE

THE ORIGIN OF BONE

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WHEN considering the origin of bone, it is necessary not only to examine the type of connective tissue cells which are capable of being transformed into osteoblasts, but also to investigate the fossil calcified tissue from which bone could have been derived, and the possible reason for its appearance in the first place. Bone is normally recognized as the main tissue in the higher vertebrates forming the internal skeleton, which acts as a supporting framework for the body, and this bony endoskeleton is frequently contrasted with the chitinous exoskeleton of the arthropods. It is often suggested that the possession of such an internal support has given the vertebrates a considerable advantage as far as their evolutionary potential is concerned, but although this may be true of the higher vertebrates, it is not so in the case of the earliest vertebrates—the heterostracan ostracoderms (Tarlo, 1962b). As can be seen from Fig. 1, a notable feature of these animals, which lived some 350–500 million years ago, was their possession of a bony exoskeleton composed of numerous plates forming a carapace. They had no bony internal skeleton at all, although during the course of evolution there was in later groups a gradual reduction of such an exoskeleton with the concomitant development of a bony internal skeleton to replace a cartilaginous one. Thus it seems reasonable to infer that the first vertebrates also possessed an endoskeleton composed of cartilage. In fact Ham (1953) suggests that bone was evolved in order to replace calcified cartilage, but, as will be shown, the evidence points to bone having originated quite separately from cartilage, and not as a supporting tissue. It seems to have taken on the function of support as a secondary feature when it came to replace endoskeletal cartilage.

Although it has long been known that so-called membrane bones are homologous to the plates of the carapace in early vertebrates, it has not been generally accepted that all endoskeletal and exoskeletal elements have the same basic origin. However, Jarvik (1959), following the work of Goodrich (1904) and Holmgren (1940), has demonstrated that successive