

Preface

The need for the present book became increasingly apparent as I worked on the integument and its structures over the past 14–15 years, first in fossil groups and later in extant vertebrates. Even among living vertebrates, in particular marine groups, it was only in the last quarter of the twentieth century that we were beginning to understand the structure of the dermis and its enormous biomechanical contribution to locomotion. Coming right up to 2013 my colleagues and I were able to demonstrate how little the biomechanical microstructure of the feather was known given that such knowledge would have important implications for bird flight. Yet we need to go back over 450 million years to the very beginning of vertebrate evolution to put our understanding of the vertebrate integument today in proper context. I was fortunate that my undergraduate lecturer and later Ph.D. supervisor, Beverly Halstead, at the University of Reading in the UK, was one of the key workers involved in research on vertebrate origins and that his seminal contributions on the extinct jawless vertebrates, on the origin of bone and on the origin of teeth formed a major part of his zoology lectures. This background characterises the direction and function of the book, which is aimed at both undergraduate and postgraduate students. The topic of the book at times may appear complex but the profusely illustrated text with diagrams, photos and some of my own artwork may help make the book easy to use and understand. While many of the illustrations are original I owe a debt to many authors cited whose illustrations have been used to a greater or lesser extent, unmodified or modified (if there are errors, they are mine).

Fossilised integument and integumental structures although scarce have been preserved in vertebrate fossils, perhaps nowhere more so than in the famous Liaoning region in China. Although much of the integumental material on dinosaurs from China have, in recent years, been concerned with possible feather origins or feather-like structures, I hope the book will encourage investigations on a broader level because there is, I am sure, much material that may be neglected with respect to knowledge on the integument in general (i.e. not connected with feather origins). For instance, I have demonstrated this in the dermis of the dinosaur *Psittacosaurus* from Liaoning and with a colleague, Prof. Gerhard Plowdowski, on colour in the epidermis of another specimen, also from Liaoning. Feather origins are important, hence there is no suggestion that the search needs to be downplayed.

It seems safe to say that despite the importance of the integument in the lives of vertebrates and its changing morphological and functional role over time there is no other book that deals with the topic specifically, in particular its mechano-structural properties. Volume 2 will discuss the biomechanics of the integument in much greater detail.

The Vertebrate Integument Volume 1

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