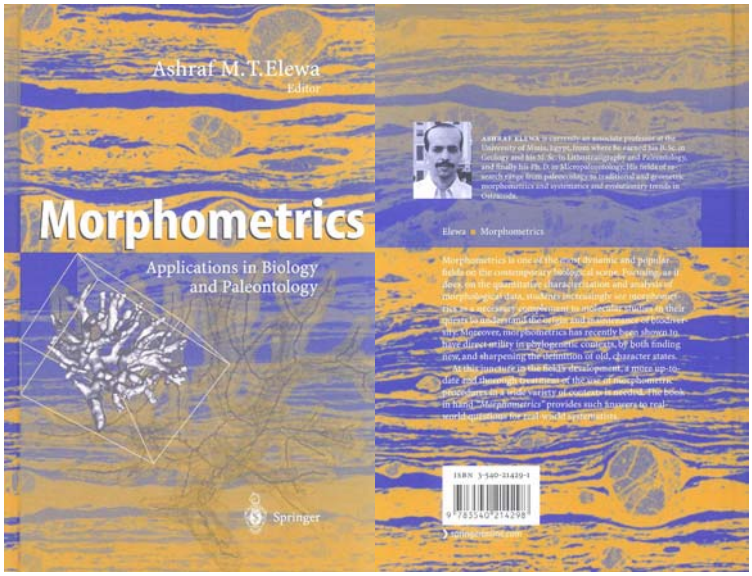
Elewa, A.M.T. Ed. 2004. Morphometrics. Applications in biology and paleontology. – Heidelberg, Springer Verlag

Book review by M. Signore



I found 'Morphometrics' an intriguing yet very specialised book, about an intriguing yet very specialised field of morphology. The title is somewhat deceiving, as one is led to assume that the book is either a manual of morphometric techniques, or (as it turns out) a collection of papers in which morphometrics is successfully applied.

The book contains 16 contributions about the use of morphometric analyses in biological and palaeontological studies, and the arrangement of papers is presented in some sort of 'phylogenetic' order. We start with ostracods, move through five other papers dealing mostly with arthropods but including a brief modelling of ammonites and an interesting work on the analysis of branching sponges and corals, after which we conclude with vertebrates, with a strong bias towards dinosaurs (including birds) and mammals. The two final contributions are about humans.

I like to emphasize the fact that all papers are written by leading morphometricians, and are well-organised and well-written. My major criticism concerns the scope of the book. It seems that this work is not for the beginner or the scientist who is casually interested in morphometrics. You need a strong and deep background in this subject in order to understand most of the papers in the book.

Another problem I have encountered (but this can be due to my lack of knowledge of the subject) is the fact that most of the papers have no conclusions, but appear to be just a 'showcase' of methods with little significant contribution to knowledge of the relevant taxonomic group. This may be, allow me to reiterate it, due to some well established trends in morphometric studies of which I am not aware, but it is, nonetheless, a point that the reader should be made aware of.

While a detailed discussion of each of the 16 papers included in the book is beyond the scope of this brief review, some general remarks can be made, using the various papers as examples. The invertebrate section is, in my opinion, the most significant as the morphometric studies give some definite conclusions. For instance, it is now possible to understand the reasons behind the polymorphism exhibited by some ostracods or by the blue lobster and relate them to some environmental conditions. An interesting new method of acquiring and creating a 3-D model of branching colonies of sponges and corals is explained.

In the longer vertebrate section, only dinosaurs and mammals are considered, with two important exceptions: the shape of the head of *Sphyrna* (in which the authors try to devise a method to better understand the evolution of the hammerhead sharks), and the possible existence of a stock structure in the Pacific sardine. Both of these papers contains a plethora of new geometric data as well as the results of geometric and statistical analyses, but the conclusions are vague, and there are very few hints regarding directions for future research. For instance, no pattern has been found in the various species of *Sphyrna* that can help to identify the evolution of the strange heads in these sharks.

In the dinosaur section, an interesting application of morphometrics to palaeoichnology explores the shapes of different 'sauropodomorph' trackways. The results are controversial and demonstrate that certain classical features of some ichnites should be reconsidered or that the morphometric method has some problems.

Also, the analysis of the skull shape in extant bird related to some non-avian theropods is not able to give convincing data on anything. The only good approach in the dinosaur/bird section is a nice paper about the possibility to predict habitat and walking abilities of passerine birds from the morphometric analysis of their foot soles. After a failed attempt at using maximum likelihood to identify *Marmota* skulls, a good practical application of all these theoretical approaches is found in the study of the geometric patterns of molars in the Soricidae. This method give results that are in agreement with the 'classical' systematics of this rodent family. Finally, two papers on geometric morphology applied to the various subspecies of *Homo* give uncertain results.

All in all I have found this book disappointing. I think that the main reason is that almost all papers give no conclusion of any sort, but seem to represent merely an exercise in morphometrics. Sometimes, it looks as if the authors hoped to obtain good results but none has shown up in the end, therefore they resorted to showing how accurate their study was in mathematical terms. No practical uses can be found in the methods described in this volume (except, as I have remarked, for two or three papers). Also, for 'practical' scientists this book may appear like a collection of 'ideas' with no real result, as most of the papers end with the casual remarks that "more data are needed in order to have conclusions" or "the method proved inconclusive" or in the best cases (saving the two or three papers mentioned above) suggesting more or less plausible and vague environmental explanations for the differences in morphology or for the inability to recognise precise patterns.

But from a theoretical point of view, this book looks quite good. A plethora of statistical methods and analyses have been pushed to their limits, and a lot of numbers and formulae have been used and thoroughly tested.

As a conclusion, I recommend this book if you are a theoretician or a great fan of statistical modelling (sometimes only in the hope that sooner or later you will find something useful in the numeric patterns). But to those who want to approach morphometrics for the first time… well, this book is not for them. There is too much theoretical background that you should know before being able to completely appreciate the numerical ideas so accurately built in most of the case studies presented. You should however take a look at this book if you are in the middle between these two ends: theoretician or fresh starter.

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