

## **BIOMECHANICS: BASIC AND APPLIED RESEARCH**

## **DEVELOPMENTS IN BIOMECHANICS**

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# **Biomechanics: Basic and Applied Research**

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*edited by*

**G. Bergmann**

Department of Orthopedics, Free University of Berlin,  
Berlin, F.R.G.

**R. Kölbel**

Department of Sports Science, University of Hamburg,  
Hamburg, F.R.G.

**A. Rohlmann**

Department of Orthopedics, Free University of Berlin,  
Berlin, F.R.G.

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## PREFACE

By definition Biomechanics is the application of engineering methods to study the mechanical aspects of living beings. Mostly the life scientists have the questions but lack of the specialized methods. The engineers on the other hand can handle very specialized equipment and methods, but lack in the biological thinking. If both sides are able to adapt to each other, Biomechanics is a classical field of interdisciplinary cooperation. In the beginning, most biomechanical research was done in the field of orthopaedics. But other areas like cardiovascular research, dentistry, sports and many others gain increasing importance.

This situation is clearly reflected in this book, which contains a selected number of papers which were presented at the Fifth Meeting of the European Society of Biomechanics, held in September 1986 in Berlin. Meanwhile these meetings have become a well accepted forum and a place of interdisciplinary discussion for scientists in Biomechanics on the one side and surgeons and other peoples interested in biomechanical solutions on the other. It is the third time that the proceedings are published as a book and the editors are sure that this volume will help to establish this series "Development in Biomechanics" as a valuable tool for all people involved in Biomechanics.

The Fifth Meeting of the ESB also marks the tenth anniversary in the short history of the European Society of Biomechanics. From the first conference 1976 in Bruxelles over the following meetings in Strasbourg, Nijmegen and Davos to the event in Berlin, an increasing number of society members and participants at the conferences shows the increasing importance of biomechanics research in human health.

Regarding the contributors to the meeting and also to this volume, as well as the membership of the ESB, certain streams have become apparent: There is a hard core of full time researchers who consistently work in this field and present their work. Then there are those temporarily involved in this interdisciplinary work as part of their career in either of the life- or engineering sciences. There is fluctuation among the latter. They seek the ESB only as a temporary forum but are a valuable enrichment because they bring with them a lot of new ideas and idealism.

During the last years, economical constraints allowed the establishment of only some new research groups. Although the financing of new teams became increasingly difficult, the scientific level of the existing ones became even higher, which is also reflected in the content of this book.

As in all growing disciplines, certain developments can be observed also in our society: In the beginning many problems wait for solution. Those are tackled first which can be solved with a limited expenditure of time and money and whose solutions can be applied most easily and on a broad basis. Success is quick and obvious. At this stage the scientific language of the researchers is still understood by people who are eager to apply the results. A common language is an important factor for the common progress. Examples for this starting phase are found in the development of fracture treatment and joint replacement. With time, however, methods become more sophisticated and expenditure greater. The danger arises that the scientific language becomes hard to understand for people expecting solutions to their problems. They are nonplussed and interdisciplinary exchange suffers.

Currently biomechanics seems to be in such a critical phase. Our society, however, will live and grow only if both sides understand each other. The language at our meetings must remain understandable for both sides, even at the risk that not all the details of the methods are presented orally. The scientists have the onus of presenting the results and their importance in a clear fashion rather than to describe theory and method in unintelligible detail. The Conference Committee of the Fifth ESB- Meeting has tried to keep this aspects in mind during the selection of papers, as have the editors of this book. It is hoped that this will add to the relevance of these proceedings.

Many people were involved in the preparation of the ESB-Meeting and this book. First of all the editors want to thank all authors for the work of preparing excellent talks, posters and manuscripts. The Conference Committee (P. Brinckmann, L. Claes, U. Rehder, U. Soltesz and A. Walter) had a lot of work in organizing the selection process for the Meeting, as had the reviewers of the abstracts for the Meeting. The chairmen of the sessions were not only involved in the excellent discussions during the Meeting, but also reviewed the manuscripts for this book.

Great financial support was obtained from the Deutsche Forschungsgemeinschaft and the City of Berlin. Many companies also contributed to the financial basis of the Meeting. The Free University was a generous host for this event and its Department of Orthopaedics (Oskar- Helene- Heim) supported the Conference in each possible way. Last but not least Ms. K. Meyer-Wendecker and the team of the Biomechanics Laboratory of the Oskar- Helene- Heim organized the event in the most enthusiastic and effective way.

It is a pleasure for the editors to thank all of them!

Febr. 1987

G. Bergmann, R. Kölbel, A. Rohlmann

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