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## Foreword

Biofunctional textiles present a novel disciplinary and scientific field. It evolved through the need to create very specific, biologically functional materials which would have a targeted efficacy on human skin.

At first, the experts were very skeptical as to whether it could be possible to change the structure of a textile, especially the surface of the fibers, to a point where it would be able to take over the biological functions of the skin. However, thanks to the research foundations on the mechanisms of surface kinetics and of the forming of depot structures, it took a relatively short time to reach a promising approach for the task. With the founding of the Competence Center for Textiles and Skin in 2002, research data were gathered from the Clinic for Dermatology and Dermatological Allergology at the Clinic of the Friedrich Schiller University at Jena, the German Textile Research Center North-West, Krefeld, and the Hohensteiner Institute at Boennigheim, and a new scientific field was introduced, namely ‘biofunctional textiles’.

Experts in textiles and medicine acknowledged which new possibilities lay in producing biofunctional textiles, especially their functional properties. Research in dermatology and clinical practice were already at a very advanced stage and the time had come for the vast knowledge accumulated by the individual researchers and research groups to be brought together. This has been achieved in this book. Thanks go to the initiators, Prof. Dr. med. Peter Elsner and Dr. rer. nat. Uta-Christina Hipler, for making this state-of-the-art expertise



available to the public. Leading experts in the fields of textiles and medicine are highly appreciative of this achievement.

The current state of knowledge forms a good basis for research into functionally useful products. We hope that the scientific knowledge published herein will encourage a more objective discussion on biofunctional textiles and the weighing up of emotional objections against scientific argumentation.

With biofunctional textiles, the textile industry and medicine have taken a step forward together along the path to enriching the use of textile materials for the good of mankind.

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## Preface

According to the archaeologists and anthropologists, the earliest clothing probably consisted of fur, leather, leaves or grass, draped, wrapped or tied about the body for protection from the elements. Knowledge of such clothing remains inferential, since clothing materials deteriorate quickly compared to stone, bone, shell and metal artifacts. Anthropologists at the Max Planck Institute for Evolutionary Anthropology have conducted a genetic analysis of human body lice that indicates that they originated not more than about  $72,000 \pm 42,000$  years ago. Since most humans have very sparse body hair, body lice require clothing to survive, so this suggests a surprisingly recent date for the invention of clothing. Its invention may have coincided with the spread of modern *Homo sapiens* from the warm climate of Africa, thought to have begun between 50,000 and 100,000 years ago.

The significance of clothing is extensive, including clothing as a social message. Social messages sent by clothing can involve e.g. social status, occupation, ethnic and religious affiliation, marital status or sexual availability. Anyway, the practical functionality of clothing is the most important feature.

Practical functions of clothing include providing the human body protection against the weather – strong sunlight, extreme heat or cold, and rain or snow – also protection against insects, noxious chemicals, weapons and contact with abrasive substances. In sum, clothing protects against anything that might injure the naked human body. Humans have shown extreme inventiveness in devising clothing solutions to practical problems.

Especially in recent years, new technologies have been permitting the production of ‘functional textiles’ and ‘smart textiles’, i.e. textiles capable of sensing changes in environmental conditions or body functions and responding to

these changes. The examples of special fabrics cover underwear with integrated cardio-online system up to textiles with carrier molecules. Such fabrics are able to absorb substances from the skin or can release therapeutic or cosmetic compounds to the skin.

The current interest in biofunctional textiles is mainly focussed on the use of such textiles supporting therapy and prevention in dermatology.

Textiles interact with the skin in a very intensive manner. Therefore, the microorganisms of the skin can influence the skin itself, the textiles as well as the interaction between skin and textiles. During the last few years, the materials for manufacturing textiles show positive tendencies towards a higher functionality. The market has been enriched with innovative antimicrobial products, especially with silver fibers or materials with enclosed silver ions. These textiles could not only find a domain in the wellness sector, but the goal is to use textile fabrics with antimicrobial finishing sufficient for prophylaxis and therapy.

On the other hand wearing these new textiles can generate problems, unknown till now. Potential health risks can occur. To minimize such risks, careful and reliable in vitro as well as in vivo test systems should be established, which is, by the way, one of the most important requirements of the European Conference on Textiles and Skin. Standards are necessary for the effectiveness of antimicrobial textiles as well as for the evaluation of their undesirable side effects, like cytotoxicity, allergenic and irritative potentials.

Because of the fact that this subject is of current interest, many papers have been published in the last few years about the interaction between textiles and skin. Also, a previous volume in this series, *Textiles and Skin*, was well accepted by researchers, dermatologists and others interested in learning about this important subject.

Therefore, the editors decided to continue this successful project. This volume in the series *Current Problems in Dermatology* collects information about the new trends in the interaction of textiles and skin and especially the development of antimicrobial-finished textiles. We apologize that not all aspects of this topic could be taken into consideration and trust that all readers will accept the choice we made. Hopefully, this issue will contribute to the further consolidation of the dialogue between dermatologists and textile engineers.

The editors thank all the authors for their effort contributing to this volume with articles of excellent quality. Finally, we would like to thank the staff of S. Karger AG, Basel, for the productive co-operation and their kind help with this project.

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