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Fourth Edition

FABRIC REFERENCE

MARY HUMPHRIES



Fabric Reference

FOURTH EDITION

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Fellow, Institute of Textile Science

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Preface

Innovation is bringing what were once “far-forward” developments in textiles involving highly complex technology, into mainstream consumer goods. This fourth edition of *Fabric Reference* emphasizes, to students as well as instructors, the relevance of this innovation to their fields. I shall return to this theme shortly in “Focus on Today’s Exciting Fabrics.” But first, a general indication of what this book is about.

Fabric Reference is a guide for anyone who needs accessible information on today’s fabrics—how they behave and why. The study of textiles represents a highly technical, complex, and rapidly developing field, yet one that attracts and interests most students with its direct impact on all our lives. What is learned about fabrics in an introductory course will usually be applied in careers involving many other skills as well, such as those offered in programs of textile, fashion, or interior design; apparel and furnishings merchandising; costuming; or communication in various media.

The student more often than not comes to textiles without a background in the disciplines that underlie the information offered (particularly organic chemistry and physics). This book is aimed to serve the needs of such students, for whom textile science is a significant component of their programs but not the entire focus. This is accomplished by following the most up-to-date technical information, but condensing the essentials—distilling the main points without “watering them down.”

Study of the *Fabric Reference* is greatly assisted by the material in its companion book, *Fabric Glossary*, which describes by name and characteristics most of the fabrics we deal with in apparel, interiors, and other consumer goods. In this way, while studying a certain weave structure, for example, the student can also absorb details of major fabrics made that way, see closeup photos or scans of the materials, and even handle many of them through a swatch set of fabric samples designed to be mounted in this fabric dictionary. Use of the two books together is

facilitated by tables in the *Fabric Reference* that provide links with the names in the *Fabric Glossary*. In addition, the comprehensive index of the *Fabric Reference* also lists the pages in the *Fabric Glossary* that contribute to that subject and indicates where an item is illustrated in either book.

Presentation and Organization

Fabric Reference first discusses all the elements that go together to make a fabric, with sections on textile fibers; all kinds of yarns; fabric constructions, including weaving, knitting, lace, tufting, nonwovens, leather, and furs; and finishing, including coloration. This basic information is presented in a condensed format; data are summarized, and elements that are often confused one with another—such as raw silk and wild silk—are clarified. The book offers full coverage of the rapidly increasing special modifications of manufactured fibers, high-performance materials, specialized finishes, and leading-edge printing methods. All of this is laid out clearly, with many excellent illustrations including specially executed graphics.

Following the sections just outlined, much fuller treatment is given of many areas of applied textile knowledge that are dealt with only sparsely in other textbooks, plus some aspects that are virtually ignored. I believe these areas of knowledge to be among the most useful in many fabric-related fields.

Fabric Reference includes an expansive section on the care of fabrics, a subject that other texts treat more briefly. Home care instructions according to the approved symbols used in the United States are compared with those of other countries. I also discuss the far-reaching changes in commercial cleaning, which include wet cleaning as well as dry cleaning solvent use. I have included insights gained from my work with textiles testing, quality control, and extensive experience in dyeing. Anyone buying fabric will do so

with more confidence if the basic colorfastness to be expected has been clarified, as it is here.

Because students should understand the importance of standard tests, I have included a brief section on fabric assessment. For those in interior design, the special tests routinely used for upholstery fabric, carpets, and other materials have been added, along with the significance of the rating scores (suitable for light use, contract use, etc.) in selecting fabrics. Students, retail buyers, designers, fabric buyers for garment houses, or home sewers and dressmakers can apply nontechnical assessments to get valuable information about a fabric's likely performance, or provide practical and revealing investigations of fabric properties. There is also a unique Fabric Case History record sheet to encourage those actively working with fabrics to develop a routine of keeping samples of and full data on materials used. This has proven to be a vital asset to many designers—an "archive" with a record of fabrics used, not only during makeup of the article, but also behavior in use. This applies to designers of anything from theater costumes, to high-performance sportswear, or interiors.

As befits a fabric reference, this text includes a full section on use of the metric system in textiles, recording almost every aspect imaginable—the result of my work as the "textiles person" on a metric committee of the Canadian Home Economics Association. When we deal with most of the world, we encounter metric units, and people in laboratory work use them all the time.

The extensive section on fabrics and ecology is unique among current texts. It addresses such issues as how we can keep warm in cold weather with the least impact on the environment; how we can keep cool in hot, sunny conditions, and relatively safe from ultraviolet radiation at any time; what is happening to combat pollution or promote recycling; and finally, where some of the most forward and exciting developments are leading.

Online Supplements

An online Instructor's Manual is available to instructors. To access the online Instructor's Manual, go to **www.prenhall.com**. Instructors can search for a text by author, title, ISBN, or by selecting the appropriate discipline from the pull down menu at the top of the catalog home page. To access supplementary

materials online, instructors need to request an instructor access code. Go to **www.prenhall.com**, click the **Instructor Resource Center** link, and then click **Register Today** for an instructor access code. Within 48 hours of registering you will receive a confirming e-mail including an instructor access code. Once you have received your code, go to the site and log on for full instructions on downloading the materials that you wish to use.

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Focus on Today's Exciting Fabrics

The extent of change and development in textiles available to the public has been so great since the third edition of *Fabric Reference* that I rewrote most of my introduction. I tried to describe some of the profoundly different materials we are using or are close to being able to use for consumer products that were "ivory tower" research destinations not long ago. I think it is important that today's students get exposure to this in even an introductory course in textiles, or they will neither understand the choices that are possible nor recognize when a product is radically different from a seemingly similar traditional one.

An open mind is needed to explore the unfolding opportunities, and also to keep delight in and respect for ages-old fabric favorites as well, often enhanced by ultra-modern yarn styles, machine construction, or possibly new printing or surface embellishment methods.

There is very little looking back in this edition of *Fabric Reference*;^{*} instead I have emphasized today's and tomorrow's fabrics—the products of leading-edge technology that produces more and more astounding results. In previous editions I paid tribute to microfibers much finer than the wispy filaments from the spinnerets of a caterpillar (silk). We are already becoming blasé about these fibers, but they are wonders nonetheless. Now we are using *nanotechnology*, on a thousand times smaller scale, and in digital printing, electronic control is creating patterns with drops of ink on a scale a thousand times smaller again (*picoliter*). We are seeing more “smart” textile products engineered to play an active part under specific conditions.

Fabric Reference is the result of a distillation of my nearly sixty years' experience in the textiles, communications, and education fields, and a desire to present the information gleaned from this experience as succinctly and clearly as possible. It is a culmination of wide-ranging research into the field's fast-moving technology to record the latest developments in an accessible format. I hope this text offers a lifeline to (a) students of textiles who are trying to grasp the essentials of this demanding subject and hoping to work in one of the areas where knowledge of fabrics is crucial; (b) those who are already involved in a textiles or clothing field but have no formal training; and (c) educators dedicated to leading students through this complicated, rapidly developing, but deeply rewarding and satisfying subject.

Fields of Application

The information in this text applies to many fields:

- Design and manufacture of fibers, yarns, or fabrics and various aspects of finishing, including dyeing and printing
- Design and production of garments or accessories, whether in business and industry or by an

individual in couture, commercial dressmaking, or home sewing

- Design and furnishing of interiors
- Quality control of fabrics, garments, or other consumer textiles products
- Any phase of merchandising of fabrics, garments, accessories, or home furnishings, including wholesale, retail, and display, plus staff training
- Fabric care—laundering, commercial cleaning (dry or wet), repair, storage, or conservation
- Design and production of costumes, whether for theater in its many guises or for “living museums” where authentic reproduction costumes are desired
- Preservation and display of historic costumes
- The myriad forms of textile crafts, including spinning, weaving, dyeing, surface embellishment, and needlework
- Communications in all media concerning any of these areas

To guide you into and through the exciting, fascinating, colorful world of textiles, I offer the *Fabric Reference*. May it prove a good companion.

Acknowledgments

Revising a book like *Fabric Reference* involves gathering information on developments that are highly technical, yet move ever more rapidly beyond applications such as industrial or aerospace textiles to become part of the consumer market, often carrying trademark names to single out the result of a great deal of research. I prefer to get my information from those who deal in the terminology of physics, organic chemistry, or whatever the basis is of a particular product, and to do this I often contact professionals who might not be expected to give their time helping me make a link between the underlying scientific discipline and those who will use this textbook. It is a process I delight in: “translating” data to make it clear while keeping it accurate.

Particular thanks go again this edition to Rose E. Dee (International) Ltd., for providing their newest registered designs to grace the covers of both *Fabric Reference* and *Fabric Glossary*, as well as others for

^{*} The history of textiles has been my extracurricular passion for many years, taking me as an amateur member into spinning and weaving guilds and as a very active member into costume societies. However, it is modern fabrics I have dealt with all my working life, first in the textiles industry—running a small research, development, and testing laboratory while at the same time presenting information to consumers through print, radio, and television—and later teaching college fashion students.

the title and section heading pages, all sent by their Head of Design, Michelle Miller. My daughter, Nina Scott-Stoddart, revised four key graphics, and piloted me through the process of receiving and organizing images.

The reviewers of the third edition were particularly helpful for this revision, and I sincerely appreciate their contribution. On a very few points I went my own way, but almost all of the critiques zeroed in on areas that I had missed, or they reinforced my belief that certain areas were much more important this time around. Thanks to those reviewers: Brian George, Philadelphia University; Marguerite Reed-Brooke, Philadelphia University; and Robyne Carol Williams, North Dakota State University.

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The outstanding skill and precision of my copy-editor, Rebecca M. Bobb, was deeply appreciated—indeed, enjoyed deeply. There has been considerable effort in this edition to lay out and separate the condensed information so that it can be “taken in” more easily.

In sifting through the masses of information in this very fast-moving field, I have had delightful and fascinating exchanges with many busy experts who so generously gave their time to provide me with technical information, wonderful new images, and the essential letters of permission to publish. I thank them all, listed here alphabetically by company or organization:

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Of individuals directly connected to production of this book, I wish to thank Paul Beacock, my computer graphics wizard (who had not been familiar with textiles before!), and the stalwart "home team" of my daughter Nina Scott-Stoddart, my sister Lucy Noble, and my good friend Rosemary Webber for endless hours of effort. Support came also from Bev Newburg of Seneca College, Cathy Bell of St. Lawrence College, and Alistair Stewart, expert and patient photographer. Claire Becker shared her expertise over the years in Seneca textiles classes. My reference on silk production was obtained for me by Debbie Boedefeld Cowan, a former student now living in Japan, and the essential translations from the Japanese were by Hiroshi Yamamoto. Critical appraisal of the jacquard loom diagram was made by Marceline Szpakowski:

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Mary Humphries

About the Author

Mary Humphries has nearly 60 years of experience in the textiles field, from the basis of an Honor B.A. (Household Economics), then an M.A. in textiles research, both at the University of Toronto. Two of her papers (then Mary Murdison) were published on her M.A. work in the *Journal of the Textile Institute*, Manchester, U.K. She is a Charter Member and Fellow of the Institute of Textile Science. Mary worked in textiles testing, in research and development, as head of a small laboratory for more than 10 of her 13 years

there. Some work involved referee reports on dry cleaning. During that time, she was National Textiles Chair for the Consumers' Association of Canada, and she did extensive radio and television broadcasting, as well as speaking to consumer and industry groups. She was a Professor of Textile Science at Seneca College in Toronto for 23 years and at Ryerson Polytechnic University for 1½ years. She is a past Chair of the Costume Society of Ontario, and for nearly 10 years was Editor of their thrice-yearly *Costume Journal*.

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