

TEXTBOOK OF WOOD TECHNOLOGY

Volume I

Structure, Identification, Defects, and Uses of the
Commercial Woods of the United States

Formerly published under the title

COMMERCIAL TIMBERS OF THE UNITED STATES

by H. P. BROWN, PH.D.

PROFESSOR OF WOOD TECHNOLOGY, THE NEW YORK STATE COLLEGE OF FORESTRY

A. J. PANSHIN, PH.D.

PROFESSOR OF FORESTRY, MICHIGAN STATE COLLEGE

and C. C. FORSAITH, PH.D.

PROFESSOR OF WOOD TECHNOLOGY, THE NEW YORK STATE COLLEGE OF FORESTRY

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THE AMERICAN FORESTRY SERIES

The American Forestry Series is intended for the college student, the practicing forester, and men in the forest industries. It is designed to provide text and reference books under a unified or coordinated plan. There will be many authors; each volume will be complete in itself, standing or falling on its own merits; but the subject matter of the series as a whole will be carefully planned so that wherever possible one volume will carry forward at the point where another has stopped, enabling the student or reader to develop his knowledge in logical sequence. There must be some overlapping, but every effort will be made to minimize unnecessary duplication. This policy will not be allowed to interfere with the inclusion in the Series of more than one book covering the same subject whenever circumstances arise making it desirable to add the new volumes. The plan is to build through many years a series which it is hoped will ultimately cover the entire field of forestry as completely as is feasible. In a sense, the Series should gradually become a manual of forestry. This should remain true even when the Series ultimately offers the choice of alternative volumes in each of several fields.

It may not be inappropriate to state in detail the viewpoint which has determined the plans and policies for the Series:

Forestry is a profession. It involves the application of biological science, engineering or physical science, and economics. It involves further the wise use of the experience of decades or centuries gained by the foresters of many lands. It involves to an unusual degree sound judgment and plain common sense. Judgment and common sense are indispensable because conditions in the forest are complex and extremely variable; because economic handicaps are of fundamental importance; and because the maturing of the forest crop is so long a process that mistakes and virtues in forest-management decisions may be decades in disclosing themselves.

Forestry is not an exact profession. A forest is the most complex biological society, in both plant and animal life, with which man works in any phase of his land-utilization enterprises. The forest yields to man a wider range of services than is provided by any other form of land utilization. The growing crop is exposed to many vicissitudes—enemies and profound economic changes—for perhaps eighty or a hundred years between seed time and harvest. Forestry applies many factors to the many-sided affairs of the forest and its products. The profession is therefore based on the ability to perceive, analyze, and wisely balance many seriously conflicting elements. These factors arise in each of

several widely separated fields of human knowledge. A plan of handling a given forest may be sound from the standpoint of biology and in the light of known experience from other regions, yet most unwise because of the economic conditions in the locality concerned. Economics may indicate a certain forest policy as being the most advantageous, yet this policy may be impracticable because of handicaps in tree species, tree competitors, soil, or climate.

Forestry is not a science. In America, forestry has not yet attained even a strong foundation of underlying science on which to build. In his profession, the engineer can base most of his important planning on precise data and on known laws of physics and mathematics. The American forester must work without the precise data, and without much knowledge of the complex reactions of forest soil, climate, animal, tree, and competing plant. Forestry should be scientific at every point at which a scientific basis is available. The scientific basis should be strengthened through research as rapidly as possible. But it will be long before American forestry can become truly scientific; and even then it will probably be, like agriculture, a meeting ground of sciences rather than a science in itself.

True forestry is statesmanship of the finest type. With the forester lies the responsibility for directing land-use policies with wisdom as to the century-long future. The area over which he has the stewardship is almost or quite as great as that devoted to cultivated farm crops.

In Europe, progress in forestry consists of further refinements in an already going system. In all the Americas, forestry is a project in pioneering. In Canada and the United States, our foresters have entered the second era in their progress. Pioneering effort to establish public appreciations begins to make way for pioneer work in the woods. From Mexico on through the central and southern Americas, the first effort has started. In these nations of Central and South America, with their vast forests, there will come to pass in due time one of the world's great forestry developments.

The American Forestry Series is to be professional in character, with as much sound science as it is possible to include. Books as well as men must be pioneers. It is the hope of the publishers, the editor, and the authors that the Series may do its part in helping a pioneering profession on two continents gradually to become more exact, more scientific, and wiser in judgment. In some of the volumes, the aim will be to present the best exact factual data available at the time. In other fields, the method will be to recount the results of experience, to give such scientific facts as are at hand, and to suggest viewpoints and methods which may help the practicing forester to evaluate the conditions under which he is work-

ing. In the volumes of the latter class, the student need not expect to find precise formulas that will do his thinking for him, automatically solving his problems without mental effort on his own part. Rather, the aim will be to provide essential backgrounds for the development of individual professional judgment.

What is the field of forestry? For the purposes of this Series, we are assuming that the field open to us includes true forest, brush, and range lands—all lands of the open country that are potential producers of useful non-cultivated plant crops. We are concerned with the management of these lands and with their products and services to man. It may well be that not all of this is forestry. But certain it is that in due time someone is to manage for man's use the various classes of productive untilled lands in the open country. Who better than the forester and his close allies, skilled in the ways of the outdoors? Our interest centers, not primarily in the definition or exact scope of forestry, but in the work to be done for man's welfare.

June, 1934

The above statement of the aims and policies of the American Forestry Series appeared in 1934 in the first volume of the Series, "Identification of the Commercial Timbers of the United States," by H. P. Brown and A. J. Panshin. In 1940, it was reprinted in the successor to that text, "Commercial Timbers of the United States," by the same authors.

FOURTEEN YEARS LATER

On September 22, 1898, at Cornell University, the first classes in technical forestry in America began, with Dr. B. E. Fernow lecturing to about half a dozen students, of whom the writer had the rare good fortune to be one.

A busy half-century! In American forestry education, as in the profession itself, it has been the pioneer half-century. Now things are changing. There is not the slightest doubt that forestry in America is rapidly emerging as a true profession. It will grow through the years: in extent, in soundness, in the stature of its service. We are entering the first professional half-century. From pioneer to professional is a profound change. The American Forestry Series, in company with other groups of technical forestry books, should contribute its share to the developments of the coming decades.

WALTER MULFORD
Consulting Editor

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PREFACE

The text "Commercial Timbers of the United States" appeared as a one-volume work in 1940 and dealt with structure, identification, properties, and uses. It has now been in use in many forest schools for nearly a decade and is well known to some generations of students. This Volume I of a "Textbook of Wood Technology" is a revision of the earlier text, with such changes, additions, and deletions as seem to be in order.

The justification of a new book is twofold. During the Second World War, wood technology received a tremendous impetus because of the imperative need for further and more accurate information on the properties of wood to permit its efficient use in tremendous quantities in national defense. How well wood technologists throughout the country rose to this responsibility is now a matter of record; this is evidenced by a backlog of factual data hitherto unavailable. The text, "Commercial Timbers of the United States," required revision for this, if for no other reason. But there was a second and fully as cogent a reason for the revision. It has become increasingly evident to the authors through the years that the book as originally written was not sufficiently comprehensive in subject matter to place it in the category of a textbook of wood technology. The need for such a text requires no defense; in it, the whole field of wood technology should be covered; within its covers, the gamut of information on wood should be so set down in logical sequence that a student is not forced to acquire factual information piecemeal but rather finds it all within one text.

Once the authors were committed to the plan of preparing a book dealing with the entire field of wood technology, it became evident that the inclusion in one volume of the information required for such a text would make it unwieldy for student use. Two volumes were necessary, and this plan has been followed in the present edition. Volume I deals with the structure, identification, defects, and uses of wood; Volume II is concerned with physical properties, mechanical properties, and the chemistry of wood in so far as its chemistry should be known to forestry students and to wood utilists other than chemists.

Fortunately the original text, as written, permitted the incorporation of its subject matter into the larger work without great change. By cer-

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