

The first group, in which growth-ring production begins between November and January, i.e. at the beginning of the wet winter, and in which cambium is active during that period and dormant during the dry summer season, appears to be the type indigenous and best suited to this region.

Literature

BERNSTEIN, Z. and A. Fahn : The effect of annual and bi-annual pruning on the seasonal changes in xylem formation in the grapevine. *Ann. Bot.* 24: 159-171, 1960

FAHN, A.: Annual wood ring development in maquis trees of Israel. *Palest. J. Bot. Jerusalem Series* 6: 1-26, 1953

FAHN, A.: The development of the growth ring in wood of Quercus infectoria and Pistacia lentiscus in the hill region of Israel. *Tropical Woods* 101: 52-59, 1 plate, 1955

FAHN, A.: Xylem structure and annual rhythm of development in trees and shrubs of the desert. I. Tamarix aphylla T. jordanis var. negevensis, T. gallica var. maris-mortui. *Trop. Woods* 109: 81-94, 2 plates, 1958

FAHN, A.: Xylem structure and annual rhythm of development in trees and shrubs of the desert. II. Acacia tortilis and A. raddiana. *Bull. Res. Council. Israel, Section D. Bot.* 7: 23-28, 1959

FAHN, A.: Xylem structure and annual rhythm of development in trees and shrubs of the desert. III. Eucalyptus camaldulensis and Acacia cyanophylla. *Bull. Res. Council. Israel, Sect. D. Bot.* 1959

FAHN, A. and N. Arnon: The living xylem fibres of Tamarix aphylla Karst. MS. 1961

FAHN, A. and B. Leshem: Xylem fibres of woody species of the desert and the Mediterranean regions of Israel. MS. 1961

FAHN, A. and C. Sarnat: Xylem structure and annual rhythm of development in trees and shrubs of the desert. IV. *Shrubs*. MS. 1960

GINZBURG, H., A. Fahn and M. Zohary: Anatomical and ecological studies on splitting of desert shrubs MS. 1961

MOSS, E.H.: Interxylary cork in Artemisia with a reference to its taxonomic significance. *Amer. Jour. Bot.* 27: 762-768, 1940

WAREING, P.F.: Growth studies in woody species. IV. The initiation of cambial activity in ring-porous species. *Physiol. Plant.* 4: 546-562, 1951

WAREING, P.F.: Interaction between IAA and G.A. in cambial activity. *Nature* 181: 1744-1745, 1958

WAREING, P.F. and D.L. Roberts: Photoperiodic control of cambial activity in Robinia pseudacacia. *New Phytol.* 55: 356-366, 1956.

Zurich, February 1962

Edition 200 copies

Edited by the Secretary Treasurer

Zurich, Switzerland

Office: Laboratorium für Holzforschung E.T.H.

Universitätstrasse 2

EDITORIAL

Since the appearance of our last News Bulletin 1962/1, the French translation of the "International Glossary of Terms used in Wood Anatomy" has been completed by Mr. Didier Normand, Centre Technique Forestier Tropical, 45bis, avenue de la Belle Gabrielle, Nogent-sur-Marne, (Seine), France. We propose to mimeograph this French edition free of charge for all Members who are interested. In order to know the number of copies necessary, we would ask you to contact the Secretary-Treasurer, Universitätstrasse 2, Zürich 6, Switzerland, not later than December 31st, 1962. Additional copies for teaching purposes can be ordered as well at a price of S.Fr. 5.-- each, which is our net cost.

As expected, only a few copies of the German version have been ordered; there are still copies available for Members who have not placed their order yet. The Spanish translation has been undertaken by Prof. Dr. H. Lamprecht, Escuela de Ingenieria Forestal, Universidad de Los Andes, Mérida, Venezuela (in collaboration with Prof. Harry Corothie, Mérida). As soon as it is completed, publication of a multilingual Glossary will be considered.

Concerning the Xth International Botanical Congress in Edinburgh (Scotland), 1964, we have not yet received any suggestion from our Members.

The forthcoming Bulletin 1962/2 is devoted to two recent publications dealing with wood identification. Since this branch of our science concerns one of our main activities, we found it necessary to publish extensive reviews

of those books. The Oxford system of proceeding with punched cards, which allows of starting with the most conspicuous feature of a given wood specimen, facilitates identification enormously. Such a key, with multiple entry, is far superior to any traditional dichotomous key. As far as can be judged at the moment, it is the only way of conceiving a universal key including all wood species of the world.

A. Frey-Wyssling  
Secretary-Treasurer

#### MODERN METHODS OF WOOD IDENTIFICATION

One of the most important aims of wood anatomy beyond the studies of phylogenetic evidence is the identification of unknown wood specimens by means of structural details. Identification is more than a mere application of morphological descriptions of wood - it is a dynamic and most active handling of the more static knowledge in wood anatomy.

Both description and identification belong to the first subjects of our I.A.W.A. We are therefore glad to further the discussions of these problems with the publication of an article by our member Professor Yatsenko-Khmelevsky and add a review of the new Bulletin No. 46 of the Forest Products Research Laboratory in Princes Risborough on Identification of Hardwoods.

#### SOME PROBLEMS OF THE STUDY OF WOODS OF SOUTH-EAST ASIA

by Andrew A. Yatsenko-Khmelevsky, Professor at the  
Department of Plant Anatomy, Kirov order Lenin Forest  
Academy, Leningrad, U.S.S.R.

1. Even in the recent past the utilization of the wood obtained from the forests of South-East Asia (Indonesia, Burma, Viet-Nam, Thailand etc.) was restricted to the exploitation of relatively few tree species, yielding the especially valuable wood either with respect to its mechanical properties, its merits as a decorative material, its fragrance or from the standpoint of the traditional concepts associated with those woods.

2. In our days, the rapidly progressing national economy of these countries has raised before their forest institutions and their wood-working industry the problem of finding the ways for a wider usage of most of their indigenous species of forest trees in the different fields of their national economy. The number of tree species involved in the wood-working industry increases from dozens to hundreds and even thousands. In the Democratic Republic of Viet-Nam the list of species of wood utilized by the wood-working industry of the Republic comprises 400 entries and exhibits a trend to increase with time steadily and incessantly.

3. This increase to hundreds and thousands of tree species involved in the wood-working industry raises new claims on the science of wood. The utilization of wood itself becomes more and more diverse; besides the utilization of the unprocessed wood as a material for buildings, furniture etc., there originate and develop in these countries the industries associated with the chemical processing of wood for the production of various plastics, artificial fibers etc. The requirement to xylologists to give the identifications of wood based on its anatomical character still retains prime importance.

4. Modern wood anatomy has already accumulated very ample evidence. At the first stage of its development associated with the activity of the German, partly French universities in the second half of the XIXth century the herbarium samples provided the staple material for the anatomical studies. These data, summarized by Solereder in his well-known book, gave us the first idea of the anatomical structure of the wood of seed plants. At the second stage of development of wood anatomy the leading rôle passed over to the American investigators, mainly to the schools of Irving W. Bailey and Samuel J. Record that have led to the formation of those main concepts of the taxonomic and evolutionary significance of the structural characters of wood that are now adopted by xylologists and botanists all over the world. All these data, however, have proved to be insufficiently concrete from the standpoint of the tasks with which wood anatomists are confronted today.

5. In the literature on the anatomy of wood there are some examples of descriptions very successfully extending to the level of species, such as the famous work of Moll and Janssonius on the wood of Java, D. Normand's splendid atlas and descriptions of the wood of the Ivory Coast and the voluminous work of the prominent Indian wood anatomists A. Chowdhury and G. Gosh. But it is exactly these examples of such publications (which have taken their authors years and years of hard work) that emphasize the necessity of the elaboration of new methods of the description of wood.

6. The description by itself of hundreds and even thousands of species is not an unrealizable task. The interpretation of such descriptions, however, and their use for the identification of wood has proved to be very difficult or, even, virtually impossible. Anyone who has had to use such descriptions for the identification of wood knows how unreliable the conclusions thus arrived at are.

7. It is our firm conviction that the only practically possible method of utilization of the immense bulk of the data supplied by all the existing descriptions of woods is the use of the modern automatic computers. This problem that has already been the object of our studies in Leningrad for some time is by no means too complex from the technical standpoint. The main

task here is the elaboration of the internationally approved scheme for the full description of wood that is uniform for all the woods of Dicotyledons in order that the data of all the investigators in this field could be made use of for the programming of the automatic computer.

8. The idea of using the principle of perforated cards for the identification of wood is by no means new; in fact it is already about two decades old. However the schemes of description proposed by Clarke, Normand and some other authors are, in our opinion, somewhat oversimplified and designed for the manual operation of perforated cards rather than for the use of automatic computers, which, naturally, restricts the possibilities of this method. On the contrary, the list of diagnostic characters of wood we compiled some time ago (1954) is probably too detailed, still it appears to us that it might be proposed as a draft, as a basis for discussion.

9. It seems obvious to us that the use of automatic computers for the identification of woods would render possible not only a solution of many practical problems, but also the elucidation of a number of the most urgent theoretical problems touching on the correlations between the structural characters, the bearing of the anatomical characters on the taxonomic position and their dependence on the environmental factors. All the attempts to attack these problems were hitherto made with the use of far more scanty data.

#### IDENTIFICATION OF HARDWOODS; A MICROSCOPE KEY

Bulletin No. 46, F.P.R.L., Princes Risborough;  
96 pages; London 1961, Her Majesty's Stationery  
Office. Price 10 s.

by J.D. Brazier, B.Sc. and G.L. Franklin.

J.D. Brazier and G.L. Franklin, two outstanding wood anatomists, present in this Bulletin a revised and enlarged version of the original key devised by S.H. Clarke, C.B.E., M.Sc. who replaced the traditional dichotomous keys by the system of multiple entry on punched cards. - In the preface, the authors summarize their work as follows: "The Bulletin comprises descriptions of the anatomical features, as seen with a microscope, of about 380 commercial hardwoods representing some 800 botanical species. The features are set out in a coded form for recording on marginally perforated cards, and a sample can be identified by sorting the prepared cards according to the features observed in it.

Definitions of the features employed are illustrated by examples and photomicrographs. Where appropriate, the coded descriptions of the timbers are amplified by supplementary notes. References to relevant literature are included."

In our review, we should like to point out three different aspects: 1) The coded descriptions of woods, 2) The choice of morphological features, and 3) The use of the card key for identification and studies of comparative anatomy.

#### 1) The coded description of woods.

The main part of Bulletin 46 contains coded descriptions of commercial hardwoods registered in alphabetical order of Families, Genus and Species. In the introduction, the authors give the following statement on the descriptions of timbers: "The coded descriptions of the timbers are based on original observations and a survey of the relevant literature. As a rule, at least four specimens of each species were examined, but with commercial timbers that are the product of a number of anatomically similar species, generally fewer specimens of each were studied. The descriptions were prepared using wood of normal structure taken at some distance from the pith ("adult" wood); wood within an inch or two of the pith ("juvenile" wood) often differs appreciably from more adult wood. Specimens authenticated with herbarium material were used where available. The anatomical examination was made using transverse, tangential-longitudinal and radial-longitudinal sections stained in safranin and an unstained radial section cleared in hypochlorite solution; all the sections were mounted in Canada balsam. The cleared radial section was especially useful for the examination on crystals and silica aggregates. The structural features were examined at magnifications up to 400 times and distinctness of a feature refers to its appearance at this magnification. Selection of the most suitable magnification is largely a matter of experience; thus some features, e.g. fibre pitting, spiral thickenings in the vessels, etc., are often best examined at low magnifications. In addition to the original observations an extensive survey has been made of the relevant literature; a list of the more important standard works is given and other references of special interest are cited in the text.

The anatomical features for each timber are presented in a coded form corresponding to the schedule of features with, where necessary, supplementary notes, tables and short dichotomous keys as aids for the separation of anatomically similar woods. Following the entries for each family references are given to any relevant publications on the timbers of the family, but, to avoid repetition, descriptions and keys in the more general works listed in the Select Bibliography are not referenced under the families concerned. Published descriptions of single timbers and commercial or other similar groups of timbers have generally not been referenced."

#### 2) The choice of morphological features.

The reference list of features enumerates 86 different details within a groupment of 11 sections: Pores/Vessels (19), Intercellular canals (3), Fibres and Fibre-Tracheids (3), Tracheids (1), Rays (17), Parenchyma (13), Miscellaneous (3), Crystals (6), Physical Properties (7), Geographical Regions (9), Growth Rings (3). - Compared with the old cards, seven features have been omitted and for nine features the definitions have been newly formulated; beside that, there are 16 additional features included in the new cards. The most important improvements concern the ray and parenchyma tissues. So, instead of only one general type of heterogeneous rays, three different types of heterogeneous rays are distinguished: heterogeneous type I, having multiseriate rays with uniseriate margins longer than the multiseriate part and composed of upright and square cells, or the heterogeneous type II, having multiseriate rays with uniseriate margins shorter

than the multiseriate part and composed of upright and square cells, and the heterogeneous type III, having multiseriate rays with mostly a single row of square marginal cells. - For the description of the parenchyma tissue there are mentioned, for the first time, timbers where parenchyma is rare or absent, terminal or initial, diffuse-in-aggregates, scanty paratracheal or commonly with fusiform cells. Furthermore, the occurrence and form of cristalliferous inclusions is more specialized. Finally, three main colours of timbers are stated in the new cards; these features are included in the section of "Physical Properties"; this is convenient though the colour and odour of a wood are not physical properties of the material in the strict sense.

3) The use of the card key for identification and for studies of comparative anatomy.

The identification with dichotomous keys is characterized by the fixed sequence of features which have to be examined in the wood specimen. In numerous cases, this is a real disadvantage, e.g. when a special structural detail is lacking in the section viewed, due to an irregularity in growth conditions. Such difficulties are not relevant in the identification with a card key. The investigator is free in choosing the most evident feature of a specimen and may continue his work looking for the best combination of characteristic features. A special advantage in the new card key is the indication of features which are of secondary interest only (printed in Italics); in addition, features which are not very well developed are marked by an inked notch. - There is only one limitation of a card key, trivial but very important: one cannot hope to extract more details and farther-reaching information from the key than has been put into it. Thus, wood identification remains the art of interpreting facts with the character of dynamic scientific handling.

A card key is a special kind of morphological description of timbers and can be used for purposes other than identification only. It has been pointed out by numerous anatomists that studies in comparative anatomy are facilitated by this tool. As an example for such an application of the new card key, we should like to draw attention to a comparison of tropical timbers with those of the moderate climate region. 440 different species and subspecies have been sorted out of the cards, 359 of them belong to the tropics, 81 only to the moderate climate region. Both groups have been subdivided into five sections according to the distribution of pores in their cross-section. As indicated in the table we have separated the timbers of the diffuse-porous type from the semi-ring-porous and ring-porous type. Within the group of diffuse-pored timbers, the two categories with solitary pores and with pores in radial arrangement are separated again. We have made this arrangement, because the water-conductive system is a tissue of high adaptability and shows a very clear tendency to phylogenetic development. The succession of the pore arrangement 1 to 5 is thought to indicate such a development, showing the diffuse-pored type with solitary pores as a primitive form, and the ring-pored type as a form of higher specialisation. This latter type is represented in the examined species of the moderate climate region with 23%; but in the tropics only two species out of 359 show this feature. In the table, the numbers for the other four groups are indicated together with information on a number of other features. The study of the combination of certain structural details should disclose whether the almost total lack of species with a highly developed water-conductive system in the tropics is significant, or

Comparative anatomy of commercial timbers of the moderate (A) and tropical (B) climate regions (The figures show the relative number of species in %)

Types of pore arrangements		Pores/Vessels			Parenchyma					Rays		
		multiple perforations	spiral thickenings	pits vestured	diffuse	vasicentric	aliform-confluent	banded	axial elements storied	homogeneous	exclusively uniseriate	storied
Exclusively solitary	A	58	42	8	100	-	-	-	8	66	8	8
	B	27	-	53	47	22	-	24	2	36	31	2
Pore clusters	A	46	46	-	46	23	-	12	8	46	12	4
	B	6	1	42	7	24	20	41	42	46	11	30
Radial multiples	A	54	54	-	31	23	-	-	-	31	15	8
	B	10	5	26	29	10	10	43	17	19	22	14
Semi-ring-porous	A	9	55	-	27	9	-	45	27	55	-	18
	B	-	18	73	-	27	18	36	36	73	45	27
Ring-porous	A	16	58	10	5	58	5	10	5	68	5	-
	B	-	-	-	-	100	-	-	-	50	-	-

whether this relatively well-represented feature in timbers of the moderate climate region is due to ecological influences. - The numerous features in the table are of different phylogenetic value: multiperforate perforations, spiral thickenings and diffuse parenchyma are characteristics of primitive forms, whereas vasicentric/aliform or banded parenchyma, homogeneous rays and storied rays represent more specialized forms. - The figures in the table indicate the relative amount of species which show the corresponding features. They reveal that the many species of the tropical climate region are not at all characterized by a lower degree of specialization, the species of the moderate climate region are rather marked by a combination of primitive features although they show, in the water-conductive system, a clear tendency towards high specialization. One may thus conclude that ecological factors rather than the power of phylogenetic development have been the reason for the far-reaching development of the pore system in these timbers.

The new card key, published by the Forest Products Research Laboratory in Princes Risborough, is a most valuable instrument for wood anatomy. We thank the two authors, both members of our association, for this wealth of information on the wood anatomy of commercial hardwoods.

BOOK REVIEW

Prof. A.A. Yatsenko-Khmelevsky (Leningrad) is the author of a new handbook on General Plant Anatomy. The book is written in Russian; in 13 sections it deals with the following items: Organisation of the plant body / The cell / Meristematic tissue / Epidermis / Ground tissue / Sclerenchymatic tissue / Periderm / Bark / Xylem / Stem / Leaf / Root.

282 pages with 103 figures; Moscow 1961; Price 63 Kopeks.

Prof. Dr. B. Huber, München, has published a handbook on the same subject:

Grundzüge der Pflanzenanatomie;

Versuch einer zeitgemässen Neudarstellung.

Springer-Verlag Berlin, Göttingen, Heidelberg 1961; 243 pages, 199 fig.; DM 48.-

In the Tappi Monograph Series No. 24 the Forest Biology Committee (chairman: Dr. P.R. Larson) of the Technical Association of the Pulp and Paper Industry offers an Annotated Bibliography on:

"The Influence of Environment and Genetics on Pulpwood Quality"

On 316 pages it contains some 883 bibliographic notes on scientific publications on that subject. (Price: US \$ 5.-; Copies may be obtained from T.A.P.P.I. New York, 17, N.Y., 360 Lexington Avenue.)

The American Society for Testing and Materials announces the availability of the

Five Year Index to ASTM Technical Papers and Reports

147 + vi pages; cloth cover; 6 x 9; Price: \$ 3.50; To ASTM Members: \$ 2.80. Copies of this publication may be obtained from ASTM headquarters, 1916 Race St., Philadelphia 3, Pennsylvania.

Prof. A.A. Yatsenko-Khmelevsky has revised a book of E.V. Budkewicz:

The Wood of the Pinaceae,

Anatomical structure and key for the identification of genus and species, (written in Russian). Moscow 1961; 151 pages.

Zurich, October 1962

Edition 200 copies

Edited by the Secretary Treasurer

Zurich, Switzerland

Office: Laboratorium für Holzforschung E.T.H. Universitätstrasse 2

EDITORIAL

In July our members Professors C. de ZEEUW and A. CÔTÉ of the State University College of Forestry at Syracuse University, Syracuse, New York, sent a copy of a brief review and bibliography on the subject of recent work in wood anatomy and related topics to all colleagues on the roster of the I.A.W.A. (Trends in Literature on Wood Structure, 1955-1962, Forest Products Journal, May 1962 p. 203-212). The review illustrated by five electron micrographs by DAY and CÔTÉ, covers 316 publications from all over the world. Titles are given in English with the exception of papers written in German or French, where an English translation of the title is added.

A considerable number of the authors involved are members of the I.A.W.A., and it is gratifying to see a long list of all the work performed and problems solved since 1955. When new members are admitted to our Association, their publications are carefully studied. But after their acceptance it is almost impossible to follow all their individual work as closely as would be desirable. In this respect the review distributed is a big help, and I must say it gives a real pleasure to see the aim of the founders of our International Association of Wood Anatomy realised in that study of wood structure for scientific and applied purposes has become a real international affair.

In the name of the Association I would warmly thank Professors de ZEEUW and CÔTÉ for this gift. As I understand there are additional copies available for new members whose names are not yet on the roster circulated some years ago. Any member who is interested in this bibliography and has not received it for any reason is requested to apply for a copy directly to the above address. An up-to-date roster will be distributed in due course.