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H.H.B

Symposium on treated Wood for Marine Use -- STP 275

70 + v pages, Hard Cover, 6 x 9", $ 2.50

A major problem in harbor development and especially in maintenance is the prevention of marine borers from seriously shortening the life of wood piling. These voracious wood-boring organisms attack and destroy millions of dollars worth of wood piling annually. The seriousness of the problem varies in different parts of the world and in different harbors, depending in the salinity of the water.

Treatment with creosote and other coal-tar solutions has long been considered the most effective means of marine borer protection. Even this type of treatment has not been fully effective. Consequently, research continues in the attempt to solve this costly problem.

ASTM Committee D-7 on Wood, in recognition of the problem, has sponsored this symposium on the subject of wood and treatments of wood for marine use. The volume is well illustrated and contains numerous references.

A.L. Batik

Zurich, February 1961 Edition 200 copies

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INTERNATIONAL ASSOCIATION OF WOOD ANATOMISTS

NEWS BULLETIN 1961/2

Edited by the Secretary Treasurer Zurich, Switzerland

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

## EDITORIAL

Our News Bulletin has become a respectable publication which is read not only by the members of our Association, but also subscribed to by libraries, experimental stations, establishments and plants of wood industry. As a consequence we thought it advisable to separate communications on our domestic affairs from the more scientific section. This is done by a mimeographed leaflet which members of the Association will find enclosed in this number. The procedure has been started with the last 1961/1 number of the bulletin, and since no objections have been raised by any of our members, we intend to continue this new pattern.

Besides wood technology, wood chemistry becomes increasingly interested in micromorphological problems. SPERLING AND EASTERWOOD (Applied Polymer Science 6.25; 1960) show that the troubles of haze and bad filterability in solutions of wood cellulose acetate is not only due to impurities of fibre rests, but above all to a nearly monodisperse fraction of spherical or potato-shaped particles with about 0,3 µ diameter in dispersion (light scattering) or 0,1 µ dry (electron microscopy). They comprise about 1 % of the total mass and contain hemicelluloses, principally xylan and mannan. This morphological and chemical behaviour recalls certain properties of the warts which coat the tertiary membrane in certain Gymnosperm tracheids and Angiosperm wood fibres. In a letter to your Secretary Treasurer, the authors ask for the wood anatomist's comment on this question. Tempting as an identification of the involved particles (which cellulose chemists call "gels") with cell wall warts may be, especially since the wood pulp used was from pine whose tracheids are richly dotted with submicroscopic inside excrescences, there is a serious difficulty for such an interpretation: Unexpectedly, a cellulose acetate solution of linters contains the same "gel fraction" of submicroscopic insoluble particles as wood cellulose! Therefore, I wrote to Dr. SPERLING (The Buckeye Cellulose Corporation, Memphis, Tenn. U.S.A.):

"I am astonished that cotton linters produce a result similar to pine pulp; because there are no warts in cotton hairs. I never looked at linters which are short cotton hairs of only some mm, instead of some cm length. But I cannot imagine that warts lacking in cotton hairs would occur in linters!

"As to recent publications on warts of woody fibres I would mention: WARDROP, A.B., LIESE, W. and DAVIES, G.W.: The Nature of the Wart Structure in Conifer Tracheids, Holzforschung 13.115 (1959).

"These authors have isolated warts mechanically. They find globular bodies which absorb UV and display a staining reaction of the lignin (e.g. phloroglucin/HCl). For their study they have chosen tracheids of Actinostrobus with large warts visible in the light microscope. It would be of interest to know whether your particles contain residues of lignin. Further you should examine their UV absorption spectrum which could give some information on the nature of their compounds.

"If there was not the intriguing similarity of linters and pulp particles, your interpretation of their identity with warts would certainly be an excellent working hypothesis.

"To conclude, I should like to ask why you call your particles "gels". According to our terminology "gel" means a submicroscopically disperse system consisting of some reticular solid phase imbibed by some liquid. The solid part may consist of globular particles, as in your case; but, to my mind, the particles themselves cannot be called "gels", although they may have gel properties such as swelling."

A. Frey-Wyssling

Secretary Treasurer

## SCIENTIFIC REVIEW

### The Organization of the Hydrosystem in the Stemwood of Trees and Shrubs

by Dr. Helmut J. Braun, Lecturer at the Institute of Forest Botany, University of Freiburg/Breisgau, Germany.

#### Introduction

Stemwood has very often been examined from cytological and histological standpoints. In spite of this, the overall picture of the wood has remained somewhat unclear. This was above all due to the fact that the problem of the combination of the individual tissues in the wood and their correlation with each other has been considered insufficiently. Therefore, we have at first analysed the individual tissues in the wood of numerous trees and shrubs of the cool-temperate, mediterranean, subtropical and tropical climate zones and then treated the tissue combinations thoroughly. Thus we proved that the tissue combinations in the stemwood can be divided into 14 histological structure types. With the histological structure types as a starting point, we further examined the question of which kinds of tissue in the outer living annual rings serve for special water conduction. The behaviour of the individual species showed that there were 5 hydrophysiological function types. From the histological structure types and the hydrophysiological function types the organization of the hydrosystem of trees and shrubs could be developed.

Here we can outline only part of our results, and therefore refer to the original work, an inaugural dissertation (Habilitationsschrift) written for the University of Freiburg/Breisgau, which will presumably be published as a monography: H.J. Braun: Der histologische Aufbau und die Funktionssysteme des Stammholzes der Bäume und Sträucher. Wissenschaftliche Verlagsgesellschaft, Stuttgart, Germany.

#### A. Important characteristics of individual tissues

In order to explain the tissue combinations, which are essential in the specification of histological structure types, we will first give an account of the most important characteristics of the individual tissues.



I. Tracheid tissue. The tracheid tissue consists of tracheids or fibre-tracheids. As a rule, these cells carry bordered pits on their radial and tangential walls. In the tangential cell walls, bordered pits are also mostly found right at the annual ring boundary so that the tracheid tissues of subsequent annual rings are here connected by bordered pits. The tracheid tissues thus bridge the annual ring boundaries.

II. Wood fibre tissue. The wood fibre tissue consists of dead or living wood fibres. The living wood fibres differ substantially from the dead in that they retain the protoplasm and the nucleus in the process of differentiation, and normally store much starch and fat. The dead and the living wood fibres have, as a rule, a few linear, simple pits on the radial walls only. On the tangential walls there are usually no pits at all. The wood fibre tissues, therefore, have no pit communication with each other at the annual ring boundary, i.e. they are restricted to the individual annual rings.

Because of their fibriform cells, tracheid and wood fibre tissues may be regarded as "fibriform tissues". As a rule, these fibriform tissues represent the ground tissue of the wood.

III. Net system of vessels. In an earlier paper (H.J.BRAUN: Die Vernetzung der Gefässe bei Populus. Zeitschrift für Botanik 47 (1959), 421-434), it could be shown that the vessels of the populus interlace to form a network which stretches over the annual ring in the radial and tangential direction. Our further examinations showed that these vessels form a network in almost all trees. In this connection we will not consider how the nets of vessels are individually shaped, but are interested in how the nets of vessels behave at the annual ring boundaries. There are two possibilities:

In many trees no vessels approach from the late wood to the annual ring boundaries: in these cases the nets of vessels are restricted to the individual annual rings. In numerous other species of trees, however, the nets of vessels of the individual annual rings connect directly at the annual ring boundaries. This is due to the fact that individual vessels of late wood approach close to the annual ring boundaries and unite, in certain stretches, with the early wood vessels by forming common cell walls with numerous bordered pits. Thus a complex network of vessels originates, which bridges the annual ring boundaries.

IV. Paratracheal parenchyma and the paratracheal sheaths of parenchyma. As to the strand parenchyma running in the axial direction, we are interested only in the paratracheal parenchyma, which lies immediately adjacent to the vessels. In many species of trees, the vessels are only accompanied by single parenchyma strands so that these vessels are directly embedded in the fibriform ground tissue. In other species, however, the vessels are surrounded by paratracheal sheaths of parenchyma which insulate the vessels from the fibriform ground tissue. The vessels may be embraced completely by the sheaths of parenchyma: these are the so-called "complete sheaths". It is also possible, however, that the sheaths of parenchyma embrace the vessels only in part. These paratracheal, parenchymotous "incomplete sheaths" are mostly situated on the outer sides of the vessels.

#### B. Structure types

If we consider the wood of trees and shrubs with regard to the abovementioned important characteristics of the individual tissues, we can see that certain forms of these tissues are combined differently with each other, but always in a characteristic manner. To begin with, let us consider only two examples:

a) In Fagus sylvatica L. we find that, with tracheid ground tissue, the vessels are directly embedded in this tracheid ground tissue, and that numerous bordered pits connect tracheid and vessels. The parenchyma accompanies the vessels only in single strands and is otherwise dispersed in the annual rings. The tracheidal ground tissues of subsequent annual rings touch at the annual ring boundaries, the common tangential walls being covered with bordered pits. The network of vessels is restricted to the individual annual rings. Bridging between the nets of the vessels belonging to the annual rings over the annual ring-boundaries is effected by the tracheid ground tissue.

b) As a second example Fraxinus excelsior L. may be mentioned, where we find the exact contrary of the first example. Here we have a dead ground tissue of wood fibre. Wood fibres and vessels are clearly separated from each other, as the vessels are enveloped by paratracheal sheaths of parenchyma. Here the ground tissues mostly do not touch each other at the annual ring boundaries, as terminal layers of parenchyma often expand in the late wood. However, if they do touch, they are not connected with each other, since normally the tangential walls of the wood fibres are entirely without pits. Instead of this, vessels of late and early wood touch each other at the annual ring boundaries, so that there is now a complex network of vessels which extends over the annual ring boundaries.

The tissues, however, do not only form these two diametral types of tissue combination. If we consider the wood of trees and shrubs in this respect,we even find 12 further possibilities of combination, so that a total of 14 combination types can be recognized. The most important other wood anatomical criteria, i.e. position, width and perforation of the vessels and intercellular canals in the fibriform ground tissues, can mostly be easily interwoven in these combination types of the characteristics of tissue mentioned above. Only structure, height and width of the rays cannot be classified under these types. The 14 combination types of tissues, therefore, comprise all important characteristics of wood, except for the rays, so that they become the basis of <u>14 histological structure types</u>, which are arranged according to the following characteristics:

<u>1. Within the annual rings:</u> a) Structure of the fibriform ground tissue; b) Position and width of the vessels as well as the kind of perforation of the transverse walls of the vessels; c) Connection of fibriform ground tissue and vessels; d)Position of the parenchyma; e) Existence of intercellular canals between the fibriform cells of ground tissue.

<u>2. At the annual ring boundaries:</u> a) Behaviour of the fibriform ground tissue and b) of the net system of vessels; c) Arrangement of the parenchyma.

We cannot describe the individual structure types in greater detail owing to lack of space; however it should be mentioned that several of many species of trees belong to one structure type. We have named the individual structure types after the most important representatives or after an especially characteristic species. As a result we have the following structure types (see corresponding illustration): <u>Gymnosperm structure type</u>; <u>primitive Angiosperm and Castanea structure type</u> (examples: Fagus sylvatica L. and Castanea sativa Miller respectively); <u>Hedera, Rhamnus, Quercus, Ulmus and Juglans structure types</u> (examples: Hedera helix L., Rhamnus cathartica L., Quercus robur L., Ulmus laevis Pall. and Juglans regia L. respectively;) <u>Vaccinium, Aesculus and Aucoumea structure type</u> ( examples: Vaccinium myrtillus L., or Aesculus hippocastanum L., or Aucoumea klaineana Pierre); <u>Acer, Fraxinus and Albizzia structure type</u> (examples: <u>Acer pseudoplatanus L. or Fraxinus excelsior L., or Albizzia odoratissima Benth.</u>).*

* Some structure types can be subdivided into sub-types; thus, for instance, the primitive Angiosperm structure type into Alnus and Daphne sub-type and the Albizzia structure type into the Bombax sub-type.



<u>C. Organization of the hydrosystem</u>

Following the histological examinations we investigated to what extent water was conducted and stored in the vessels and fibriform ground tissues of tracheids, fibre tracheids and wood fibres. These experiments were performed by means of radioactive phosphorus, fluorochromes, especially barberinsulphate, and normal colours. At this point we are interested only in the hydrophysiological behaviour of the outward year rings, the functions of which are working well. We saw that the hydrophysiological behaviour of the individual structure types can be fixed in <u>5 functional types</u>. These hydrophysiological functional types show the characteristics which were significant of the structure types. Therefore we are going to deal with the function, as well as the structure types, in greater detail now; and develop the organization of the hydrosystem of trees and shrubs out of the 5 functional types and the 14 structure types (cf. illustration).

We begin with functional type I., as this type is represented by the Gymnosperm structure type only, that means it contains the Gymnosperms and trees of the order of the Winterales, which are, from the phylogenetic point of view, very primitive. The ground tissue of this functional type, which is still without any vessels , consists of tracheids which have bordered pits on the radial and also on the tangential walls. At the annual ring boundaries the tracheid ground tissues are in contact with one another through the tangential wall bordered pits. Thus the water in this tracheid ground tissue can be conducted in the axial, tangential and radial directions, in the latter case even beyond the annual ring boundaries. Except for water conduction and water storage, this tracheid ground tissue serves as a means of stabilization. Functional type I and primitive Gymnosperm structure type together form the <u>Ist organization stage (tracheid stage)</u> of the hydrosystem.

Characteristic of functional type II, to which the primitive Angiosperm and the Castanea structure types belong, is the fact that here, too, tracheidal ground tissues are found, which go beyond the annual ring boundaries. These ground tissues serve for water conduction and water storage. However, water-conducting vessels are embedded in these tracheidal ground tissues; vessels which are in direct strong contact of the bordered pits with the tracheids, or fibre tracheids respectively, and the connection of which make up networks of vessels. The vessel nets, however, are restricted to the single annual rings, as they do not touch at the annual rings. Thus water conduction in the axial, tangential and radial directions within the individual annual rings takes place in the <u>IInd organization stage</u> of the hydrosystem in the tracheid ground tissue and in the vessels (<u>tracheid vessel stage</u>). However, the water can pass over the annual ring boundaries via the tracheid ground as in the I$^{st}$ organization stage.

In the III$^{rd}$ functional type, to which the Hedera, Rhamnus, Quercus, Ulmus and Juglans structure types belong, there also exist, besides the tracheids (or fibre-tracheids respectively) and vessels, living and, above all, dead wood fibre complexes forming part of the ground tissue. All the vessels are positioned in the tracheid complex. As regards water conduction, much the same is true of the tracheid vessel areas, as in organization stage II, although it must be mentioned that, in the <u>IIIrd. organization stage</u> of the hydrosystem, the vessels can connect directly at the annual ring boundaries besides the tracheid complex of the ground tissues. The wood fibre complexes are clearly isolated from tracheids and vessels within the annual rings and at the annual ring boundaries. They have no part in water conduction, and have thus nothing to do with the hydrosystem. These wood fibres are filled with air (<u>limited tracheid vessel stage</u>) if they are not living and storing starch (Hedera structure type).

In the next, IVth.functional type with Vaccinium, Aesculus and Aucoumea structure type, the tracheids have to a great extent and often completely disappeared from the ground tissue which now consists of living or dead wood fibres. In this IVth. organization stage of the hydrosystem, therefore, the vessels are found right in the wood fibre tissues - in contradistinction of the IIIrd. organization stage. Vessels and wood fibres often touch directly and simple pits can be found on the common walls. Thus the water from the vessels can pass into the wood fibre ground tissue, especially in the Aesculus structure type. The wood fibre ground tissue of this IVth. organization stage performs, however, no water conduction function any more, as the pits between the wood fibres are linear and simple, and moreover, as there are usually no pits whatsoever on the tangential walls, so that the wood fibre ground tissues are no longer connected with other tissues or vessels at the annual ring boundaries. Wood fibre ground tissue, in this organization stage, can therefore only serve for water storage. Water conduction over long distances must now be performed by the vessels only, which now unite to form proper networks at the growth ring boundaries so that the water can be conducted over the growth ring boundaries in these networks (vessel wood fibre stage).

In the Vth.and last functional type, to which the Acer, Fraxinus and Albizzia structure types belong, the ground tissue consists of dead wood fibres. However, the vessels in this Vth. organization stage of the hydrosystem are isolated entirely from the ground tissue wood fibres by paratracheal sheaths of living wood fibres (Acer structure type) or parenchyma cells (Fraxinus and Albizzia structure type). Thus water can be conducted only in those vessels whose network stretches beyond the growth ring boundaries. The dead wood fibre ground tissue serves only as a means of stabilization and is filled with air; the many intercellular, ducts which are now often formed between the wood fibres (vessel stage), also point at this fact.

If we consider the various organization stages of the hydrosystem as a whole, we notice a diverging histological differentiation of the wood structure, which leads from the tracheids (that exist alone in the beginning) through several stages to the formation of wood fibres and vessels. By this histological differentiation, a split of physiological activity is conditioned. In the beginning, the tracheids in the hydrosystem of the Ist organization stage still serve for water conduction as well as stabilization. Functional changes take place more and more during the subsequent IInd, IIIrd, and IVth organization stages. Finally, in the Vth organization stage, there are paratracheal sheaths of living cells, and water conduction is therefore effected by the vessels only whilst the wood fibre ground tissues serve only as a means of stabilization. The wood fibres have taken over another function: they are now filled with air and are the basis of a "pneumatic system".

## Explanation of Illustration

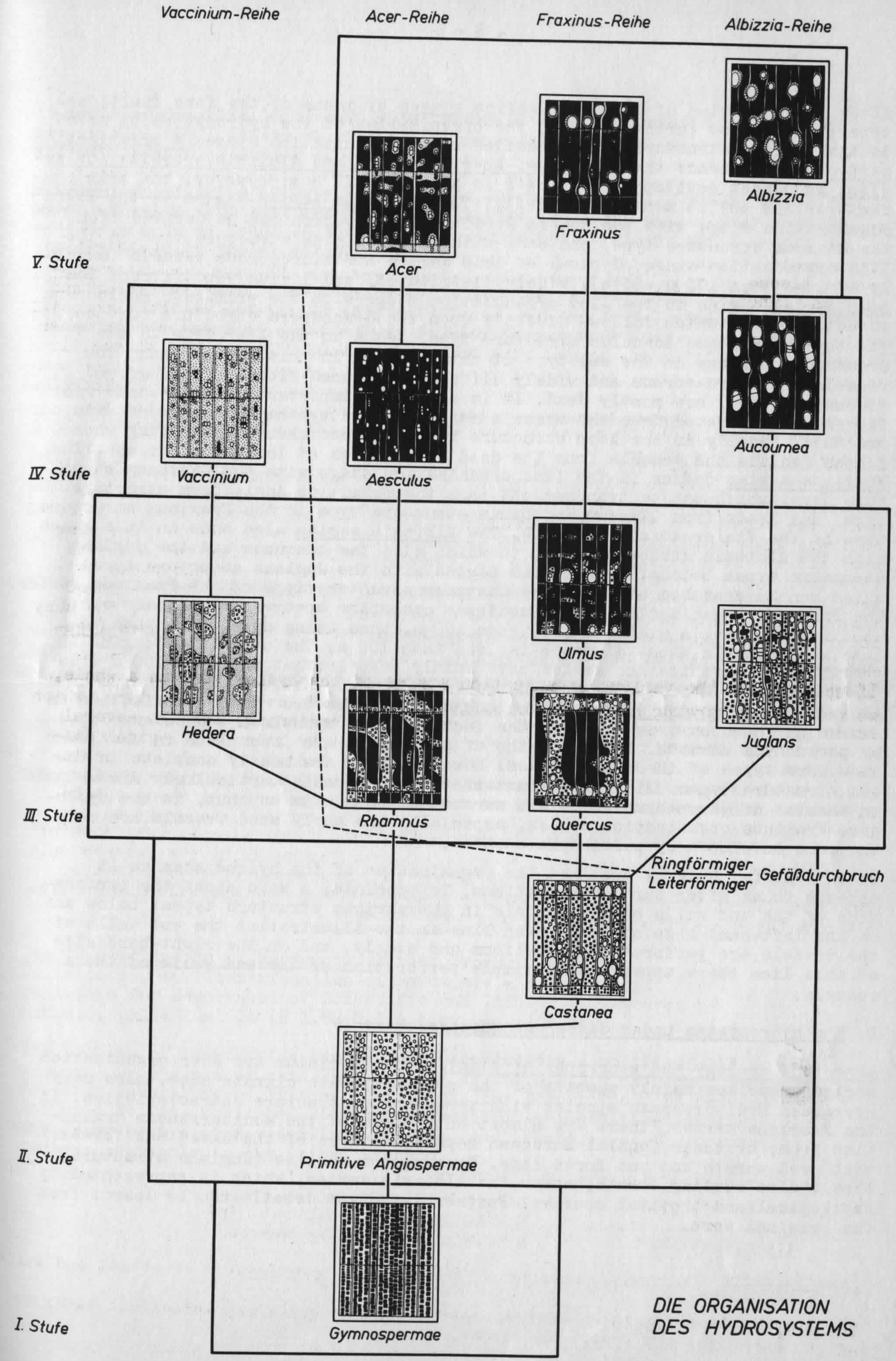
- ○ ∞ vessels and vessel groups respectively
- ▪ tracheids and fibre-tracheids
- ■ dead wood fibres
- ▒ living wood fibres
- ▥ paratracheal sheaths of parenchyma and terminal layers of parenchyma

The metatracheal parenchyma is not shown.

| | | |
|---|---|---|
| "I.Stufe" to "V. Stufe" | = | Ist to Vth organization stages |
| "Vaccinium-, Acer-, Fraxinus-, Albizzia-Reihe" | = | Vaccinium, Acer, Fraxinus, and Albizzia organization series |

"Ringförmiger / "Leiterförmiger Gefässdurchbruch" = simple / scalariform perforation of vessel end walls

The original work includes besides numerous other pictures, individual examples of the structure and functional types.




DIE ORGANISATION DES HYDROSYSTEMS

After determination of the organization stages by means of the five functional types; we can now further develop the organization of the hydrosystem by means of the various structure types. Besides the 5 organization stages 4 organization series can be found: the Vaccinium, Acer, Fraxinus and Albizzia organization series. We cannot develop these series in great detail now; however, the main characteristics may be mentioned briefly. The Vaccinium series begins in the IIIrd organization stage with the Hedera structure type, which can be derived from the Rhamnus structure type, and ends with the Vaccinium structure type in the IVth organization stage. Typical of this series are microporous vessels (usually of less than 100 µ width), widely distributed, and living wood fibres. The Acer series begins in the IInd organization stage with the primitive Angiosperm structure type, which follows directly upon the Gymnosperm structure type and, via the Rhamnus and Aesculus structure type, leads to the Acer type in the Vth organization stage as the end type of this series. In this series again the vessels are micro-porous and widely diffused; the wood fibres of the ground tissue, however, are mostly dead. It is also very important that the dead wood fibres are separated from the vessels more and more by the reduction of pits; and that, finally in the Acer structure type complete sheaths of living wood fibres isolate the vessels from the dead wood fibres of the ground tissue. The Fraxinus series begins in the IInd. organization stage with the Castanea structure type, which can be branched off from the primitive Angiosperm structure type, and leads from Quercus and Ulmus structure type to the Fraxinus structure type in the Vth. organization stage. The Albizzia series also ends in this stage with the Albizzia structure type, to which also the Aucoumea and the Juglans structure types belong; this series begins with the Juglans structure type which can be branched off from the Castanea structure type of the Fraxinus series. The Fraxinus organization series contains cyclopore species only; their early wood vessels have a width of more than 100 µ, thus being much wider than the late wood vessels whose diameter is less than 100 µ. The species belonging to the Albizzia organization series have mainly vessels that are over 100 µ wide (megapore) and diffuse. The main difference, however, between the Fraxinus and Albizzia organization series on the one hand and the two other organization on series on the other, is found in the fact that the vessels are here enveloped by parenchyma sheaths. These sheaths of parenchyma are incomplete in the lower structure types of these two series; however, they are mostly complete in the end structure types. It is important that those vessels particularly are wrapped in sheaths of parenchyma which are more than 100 µ wide so that, in the cyclopore Fraxinus organization series, especially the early wood vessels are more and more enveloped by parenchyma sheaths.

We have so far briefly outlined the organization of the hydrosystem as it appears to us after our investigations. To conclude, a word about the perforation of the end walls of the vessels in the various structure types: below and on the left-hand side of the broken line in the illustration the end walls of the vessels are perforated scalariform and simply, and on the right-hand side of this line there appears only simple perforation of the end walls of the vessels.

### D. The hydrosystem under different aspects

Aspect of ecology and geography of plants: The Vaccinium and Acer organization series comprises mainly species of the cool-temperate climate zone, also many evergreen Mediterranean species with xeromorphic structure characteristics. In the Fraxinus series, there are almost only trees of the Mediterranean transition zone, or their Central European representatives of the mixed oak forest, that need warmth and put forth late. The Juglans species (Juglans structure type), also needing warmth, opens the Albizzia series, which is represented by subtropical and tropical species. Further important details can be learnt from the original work.



In the original work it is explicitly shown how the hydrosystem in the individual organization series is adapted to the various transpiration conditions of the different climatic zones.

Systematic-phylogenetic aspect: The lower three organization stages comprise mainly species from phylogenetically primitive families, whilst mainly those species are to be found in the two upper organization stages which belong to phylogenetically rather derived families.

In the original work these results are discussed at some length; it is shown that the organization of the hydrosystem, as derived from recent forms in the illustration, has thus perhaps also developed phylogeneticly.

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The wide bibliography used will be published in the monograph . Here are only a few of the more important works.


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## BOOK REVIEW

The Identification of Hardwoods: Forest Products Research Bulletin No. 46 "Identification of Hardwoods - A Microscopic Key", published for Department of Scientific and Industrial Research by H.M.S.O. price 10s. 0d ($ 1.80 U.S.A.) by post 10s 7d.

The problem of identifying timbers has been greatly simplified - if not solved - by the use of card keys devised at the D.S.I.R.'s Forest Products Research Laboratory at Princes Risborough. The Forest Products Research Bulletin No. 46, published with the corresponding identification cards today, completes a series dealing with the identification of the commercial timbers available in the United Kingdom.

This Bulletin has been produced primarily for the benefit of the trained wood anatomist with facilities for preparing thin sections of timber for examination under a microscope. The anatomical features used in the identification of hardwoods are defined clearly and concisely and illustrated by means of more than 80 photomicrographs of wood structure. The features characterising the 380 commercial timbers included in the key (representing some 800 botanical species) are set out in a form suitable for recording on a special type of perforated card. Some of the descriptions are amplified by supplementary notes and references to published work. Identification involves the sorting of the pack of prepared cards according to the features observed in the sample under examination.

To prepare the complete key, nearly 900 cards are necessary, as many of the timbers require more than one card. Some users may wish to confine their interest to the timbers of a restricted group, for example the timbers of a particular industry or from any part of the world, and in such cases relatively few cards need be prepared. The cards are obtainable from H.M. Stationery Office, price 3d. each or 21/- per 100 - larger quantities are available at bulk prices.

1960 SUPPLEMENTS TO BOOK OF ASTM STANDARDS

Heavy Paper Covers; 10 parts; $ 4.00 per part; $ 40.00 per set;
available at: American Society for Testing Materials,
1916 Race Street, Philadelphia 3, Pa.

Part 6: Wood, Paper, Shipping Containers, Adhesives, Cellulose, Leather, Casein (212 pages).

The 1960 Supplement to Part 6 of the 1958 Book of ASTM Standards contains the revised standards and the new and revised tentatives in its material fields accepted since the appearance of the 1959 Supplement to the 1958 Book of ASTM Standards.

Interesting revisions have especially been made in the test methods on fibre and particle panel materials, material fasteners, wood preservatives and cellulose products.

The regularly published supplements, which continuously adjust keep standards and test methods of the American Society for Testing Materials to the latest results of research, are a great help to all institutions working on wood and wood products.

Zurich, October 1961 Edition 250 copies

INTERNATIONAL ASSOCIATION OF WOOD ANATOMISTS

NEWS BULLETIN 1962/1

Edited by the Secretary Treasurer Zurich, Switzerland

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

## EDITORIAL

Your Secretary Treasurer has the pleasure to announce publication of the German translation of our "International Glossary of Terms used in Wood Anatomy". It is the work of a special committee composed of the members Drs. B. Huber (Munich), J. Kisser (Vienna), A. Frey-Wyssling (Zurich) and H.H. Bosshard (Zurich) who were appointed at our meeting in Montreal (Canada) 1959. This new glossary is not quite a literal translation, but it also considers some recent developments in terminology since 1957 when the English edition appeared.

We now have a Portuguese, an Italian and a German edition. As soon as French and Spanish translations are available the ultimate aim of a multilingual edition should be achieved. Tentative negotiations in order to find a suitable editor in the range of our financial possibilities are afoot.

In view of this major project the German translation has not been printed but only mimeographed. Neither does it seem advisable to send it to all our members who will later receive it in print in the multi-lingual edition. But we possess a sufficient number of copies to distribute free of charge to all members interested in having this translation in its present condition as a preliminary mimeograph. Please place your orders with the office of the Secretary Treasurer. The rest of the edition will be sold to Forestry Schools with German as a teaching language.

A. Frey-Wyssling
Secretary Treasurer