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 multi-lingual 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

SCIENTIF REVIEW

XYLEM STRUCTURE AND THE ANNUAL RHYTHM OF CAMBIAL ACTIVITY IN WOODY SPECIES OF THE EAST MEDITERRANEAN REGIONS

by A. Fahn, Associate Professor at the Department of Botany, The Hebrew University, Jerusalem, Israel.

Introduction

The series of investigations summed up in the following was initiated in view of the scanty knowledge of the structure of wood and the annual rhythm of its production in arid zones. It was felt that an area such as that of Israel, where several phytogeographic regions meet, may constitute a suitable field laboratory for the study of cambial activity. Another aim of the investigation was the selection of woody species suitable for ring analysis. Such an analysis might be of considerable significance in the study of climatic cycles of the past centuries in the Middle East, for which there are only fragmentary data of this kind.

Types of secondary xylem

The species examined were found to vary in the organization of their secondary wood.

I. Ordinary secondary wood: Wood produced by normal cambium.

1) Growth rings indistinct (e.g. Retama raetam, Webb, Thymelaea hirsuta Endl., Acacia raddiana Savi, Acacia tortilis Hayne).

2) Growth rings distinct:

a) wood ring-porous or semi-ring-porous (e.g. Quercus ithaburensis Boiss., Quercus infectoria Oliv., Tamarix gallica L. var. maris-mortui Zoh., T. jordanis Boiss. var. negevensis Zoh., Pistacia atlantica Desf., Zygophyllum dumosum Boiss., Calligonum comosum, L'Hér.)

b) Wood diffuse-porous (e.g. Ceratonia siliqua L., Reaumuria palaestina Boiss., Crataegus azarolus L., Artemisia monosperma Del.).

Terminal or initial parenchyma appears in both species with ring-porous wood (e.g. Zygophyllum dumosum and Calligonum comosum) and in others with diffuse-porous wood (e.g. Reaumuria palaestina and Ceratonia siliqua).

II. Secondary wood with included phloem: wood produced by polycambia. Various species of the Chenopodiaceae.

Particular features of the secondary xylem

A characteristic feature of the majority of the woody species of Israel's desert and Mediterranean regions is the fact that their xylem fibres are thick-walled.

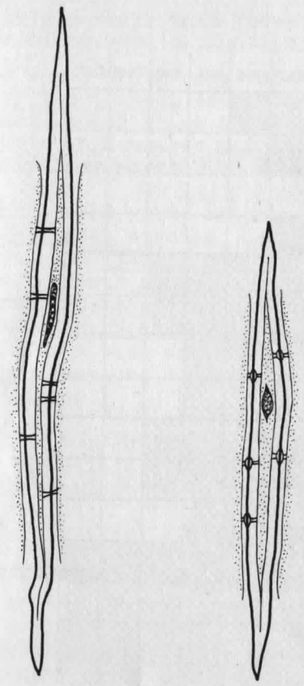

Fig. 1 Fig. 2

Figure 1: Living libriform fibre of Suaeda monoica Forsk.

Figure 2: Living fibre-tracheid of Teucrium divaricatum Sieb.

Almost all the xylem fibres of the sapwood in some trees and in most of the shrubby species contain living protoplasts. The fibres of 34 among 43 examined species of shrubs and subshrubs were living (Fahn and Leshem 1961). They were either found to be typical libriform fibres (e.g. Calligonum comosum l'Her., Suaeda monoica Forsk.) (Fig. 1) of fibre-tracheids (e.g. Gymnocarpos fruticosum Pers., Thymus capitatus Lk. et Hoffm., Teucrium divaricatum Sieb.) (Fig. 2). The fibres of Tamarix aphylla trees were found to retain their living protoplasts in the entire sapwood throughout a period of about 17 years (Fahn and Arnon 1961). The possible advantages of living fibres to plants in arid zones is now being studied.

Interxylary cork has been observed in certain desert species as for example in Artemisia herba-alba Asso., A. monosperma Del. ssp. Deserti Waisel, Achillea fragrantissima Sch. Bip. and Peganum harmala L. (Ginzburg, Fahn and Zohary, 1961). This property is probably of adaptive significance in arid-zone species (Moss 1940).

Annual rhythm of secondary xylem production

The climate of the regions under study can be summed up as follows: in the Mediterranean region, monthly mean minimum temperatures as recorded in Jerusalem vary from 5°C in January to 18°C in August, and monthly mean maximum temperatures from 12°C in January to 30°C in August. Rainfall is restricted to the winter months (October/April), and the mean annual rainfall is 575 mm. The monthly means as recorded near the Dead Sea are as follows: monthly mean minimum temperatures: 10°C in January to 23°C in August, monthly mean maximum: 20°C in January to 40°C in August. Rainfall is again limited to winter months, and its annual mean is 54 mm.

Studies on the annual rhythm of cambial activity in woody plants growing in Mediterranean and desert regions of Israel (Fahn 1953, 1955, 1958 a,b; 1959 a.b, Fahn and Sarnat 1960) have revealed various periods of wood production during the year, which are summarized in the following table.

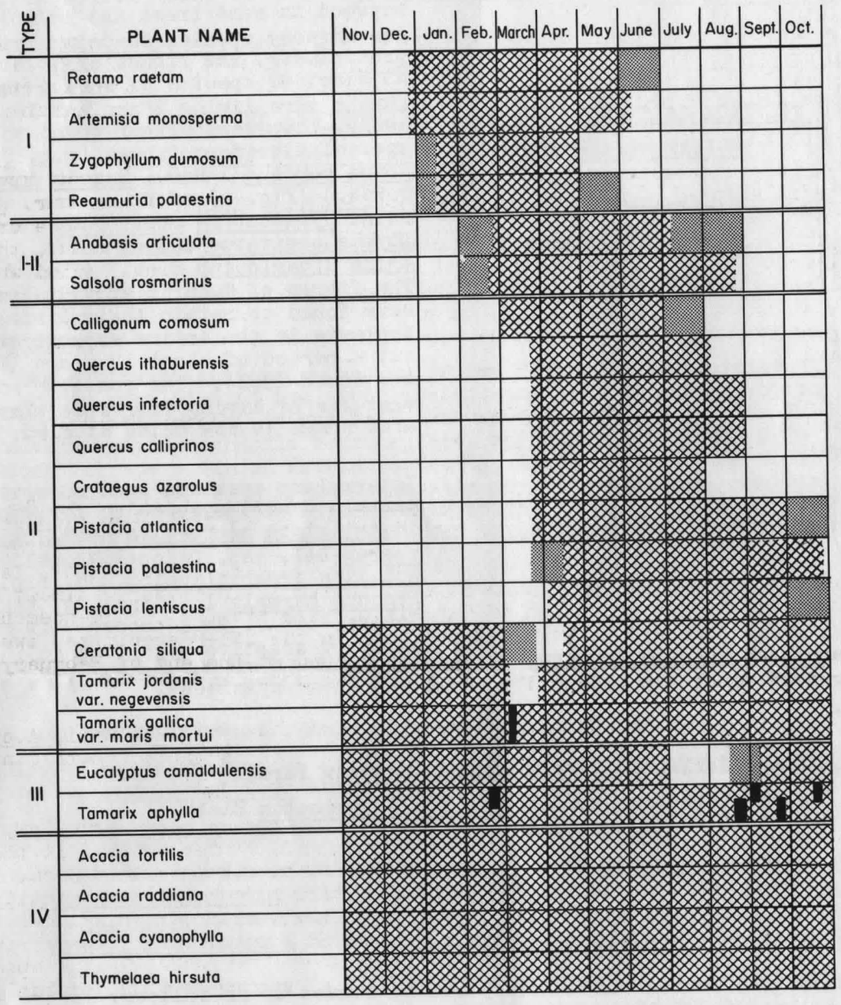

Table showing annual rhythm of wood production: cross-hatched areas indicate cambial activity in all plants examined; dotted areas indicate partial cambial activity; black sections indicate commencement of growth-ring production in plants that have no dormancy period.

In one specimen of Tamarix aphylla one growth-ring began forming in February and a second one in August; in a second specimen the two rings began being formed in February and October respectively.

In two other Tamarix aphylla specimens only one ring was produced which began being formed in August and September respectively.

The table reveals that there are four groups of plants as regards annual rhythm of secondary wood production.

I. The first group comprising Retama raetam Webb., Artemisia monosperma Del., Zygophyllum dumosum Boiss. and Reamuria palaestina Boiss. exhibits more or less distinct growth rings which start to develop during the early winter months - i.e. between November and January. The cambium in these species is dormant during a fairly long period.

II. The second group comprises Calligonum comosum L'Hér., three Quercus species, three Pistacia species, Ceratonia siliqua L. Tamarix jordanis Boiss. var. negevensis Zoh. and Tamarix gallica L. var. maris-mortui Zch. All exhibit more or less distinct growth rings which commence to develop in the period March/May, that is in spring. Some of the plants in this group have a marked dormant period whereas in others, such as in Ceratonia and the two Tamarix species, the cambium is inactive for a very short period only - or may even be active throughout the year, in which case one could only determine the times when late and when early wood was produced.

I-II. The two shrubs, Anabasis articulata Moq. and Salsola rosmarinus Solms-Laub. are intermediate between the first group in that the commencement of their growth ring development takes place during February.

III. In the third group, which comprises Eucalyptus camaldulensis Dehn. and Tamarix aphylla Karst., the formation of early wood starts in September (August), i.e. toward the end of the dry summer season. In Eucalyptus, the late wood which consists of one or two bands of flattened fibres two to three layers thick, is produced during the spring or early summer. The cambium is inactive or almost so during July/August. In two specimens of Tamarix aphylla examined, commencement of growth-ring production was in August/September. In the other specimens, two such periods were seen: one in late summer and the second at the end of February, so that two growth rings are produced annually in these specimens.

IV. To the fourth group belong Acacia tortilis Hayne, A. raddiana Savi, A.cyanophylla Lindl. and Thymelaea hirsuta Endl., none of which exhibit growth rings and which produce the same type of wood throughout the year.

In the specimens of A. cyanophylla, even in the hill-region near Jerusalem, the cambium was strongly active during the relatively cold winter months. It therefore seems that, under all variations of climatic conditions in this area, temperature is not a limiting factor of cambial activity. In Eucalyptus camaldulensis the data collected concerning the annual rhythm of growth-ring development, show ring formation to commence in September, which coincides with the spring in Australia. So the endogenous growth rhythm in this and other Eucalyptus species persists and withstands the external factors of the new environment probably because of the relatively mild winters here. This feature may be confined to evergreen plants. In deciduous plants, the endogenous rhythm of cambial activity may become suppressed under the influence of sudden climatic changes leading to sudden leaf-fall and bud-burst. In the grapevine, a second bud-burst in one year was induced artificially (instead of being brought about by change of climate) by defoliating plants growing in the Jordan Valley, which has long summers. This second bud-burst was seen to be accompanied by the formation of a second growth ring (Bernstein and Fahn 1960).

From the behaviour of tropical woody species and of Eucalyptus introduced to a mild climate, such as that of the area under study, the annual rhythm of growth-ring production at least in evergreens may possibly be considered as a conservative character. The four above-described types may each be of a different geographic origin.

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 grape-vine. 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.Counc. 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.Counc. 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

INTERNATIONAL ASSOCIATION OF WOOD ANATOMISTS

NEWS BULLETIN 1962/2

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 mimeo-graph 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