IAWA BULLETIN

1972/1

OUR COVER

The cover of the IAWA Bulletin for 1972 consists of photomicrographs (cross- and tangential sections) of *Apeiba membranacea* Spruce ex Benth., Family Tiliaceae. Broad bands of radially aligned parenchyma cells are prominent features in this species.

The material was collected on 5 August 1933 by Boris A. Krukoff (No. 5304) in the Territory of Acre, on the Rio Purus, Brazilian Amazonia. The slide was prepared by Mr. A. C. Day from specimen BWC_W No. S12437 which was borrowed from the Harry Philip Brown Memorial Wood Collection at State University of New York College of Forestry. Photomicrographs were prepared with the assistance of Mr. J. J. McKeon. Magnification: 70X.

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The International Association of Wood Anatomists was organized in 1931 to advance the knowledge of wood anatomy in all its aspects. It does this in part by attempting to promote and facilitate cooperation among the relatively small number of specialists in wood anatomy.

Prospective members are invited to write to the Office of the Executive Secretary for a copy of the Constitution, an application form, and information about IAWA. Membership dues, which includes a subscription to the IAWA Bulletin, are currently $3.50 (U. S.) per year.

EDITORIAL

As this issue of the Bulletin goes to press we are still concerned over the dock strikes because of the extended delays created in getting this publication into your hands. Timely items lose their significance if a three or four month period has elapsed since publication. We hope that this time we can avoid such a difficulty, but additional strike threats can be anticipated.

Our earlier appeals for contributions of articles, technical notes and news for future issues is repeated because the backlog of material is very small. Any photographs to be included in the article should be submitted unmounted so that some flexibility in page lay-out will be maintained.

We appreciate the cooperation of the more than 100 members who sent their forms and dues so promptly. To concentrate all business items during one period is helpful as we attempt to provide efficient service with limited resources. The new Directory of Members is not enclosed with this issue because we have not yet received replies from about 80 members. If possible the Directory will be sent with the 1972/2 issue of the Bulletin, but we would like to have returns from at least 95% of the members before publishing the list.

We wish you a prosperous and productive 1972!

W. A. Côté

C. H. de Zeeuw

TRABECULAE IN A HARDWOOD

By

B. G. Butterfield[1] and B. A. Meylan[2]

Our knowledge of trabeculae has been ably summarized recently by Keith (1971). These rod-like extensions of cell wall material traverse the cell lumen from one tangential wall to another in certain wood cells. Although Hale (1951) states that trabeculae "occur frequently in both hardwoods and softwoods, although most often in the latter," many wood anatomists associate these structures with coniferous wood only. It is interesting to note that some standard references on wood anatomy state that trabeculae occur in the tracheids of conifers (e.g. Panshin and de Zeeuw, 1970). Others infer that they occur only in this group of plants by confining the description of them to the chapters devoted to the structure of coniferous woods (e.g. Jane, 1970). During a recent study on perforation plate development using the scanning electron microscope, we observed trabeculae in the vessel members of an angiosperm, Knightia excelsa. It seems desirable therefore to record this occurrence and to note the similarities between these and the trabeculae observed in the various gymnosperm woods examined by Keith.

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[1]Lecturer, Department of Botany, University of Canterbury, Christchurch, New Zealand.

[2]Research Scientist, Physics and Engineering Laboratory, Department of Scientific and Industrial Research, Lower Hutt, New Zealand.

Wood samples were removed from a mature tree of Knightia excelsa R. Br. (New Zealand honeysuckle or rewarewa), a member of the Proteaceae endemic to New Zealand. Cubes of wood of about 4 mm on a side were then prepared from the collected samples using a new razor blade for each new surface cut. These cubes were each mounted tangential face uppermost on specimen stubs, transferred to a high vacuum evaporating unit and lightly coated first with about 20 nm of carbon and then with a similar amount of gold palladium while being rotated at about 150 rpm. The specimens were then examined in a vacuum dry state in the column of a Cambridge Series II scanning electron microscope.

Trabeculae in the vessel members of Knightia are illustrated in Figures 1 to 3. Very few such structures were observed and these were seen only in vessels exposed by tangential cuts (Fig. 1). Unfortunately none could be detected in transverse or radial cuts of the wood to determine whether or not they occur in the radial lines so characteristic of most trabeculae in gymnosperm woods. Since the wood of Knightia is built up of repeating concentric bands of vessels, parenchyma and thick walled fibers (Meylan and Butterfield, 1971), they are unlikely to be repeated in more than a few cells in radial file.

Like these recorded by Keith (1971), the trabeculae in Knightia show an increase in diameter where they come into contact with the tangential walls of the vessel members (Fig. 2). The symmetry of their bases is sometimes broken by the pit apertures in the vessel walls. In section they have a three layered structure (Fig. 3). The narrow inner core is surrounded by a thick layer presumably of secondary wall material. This in

turn is enclosed by a thin sheath of material similar to the S3 layer lining the rest of the secondary wall of the cell.

LITERATURE CITED

1. Hale, J. D. 1951. The Structure of Wood. In Canadian Woods--their properties and uses. Forest Products Laboratories Division, Ottawa.
2. Jane, F. W. 1970. The Structure of Wood. Black, London.
3. Keith, C. T. 1971. Observations on the anatomy and fine structure of the trabeculae of Sanio. I. A. W. A. Bulletin 1971/3: 3-11.
4. Meylan, B. A. and Butterfield, B. G. 1971. The Three Dimensional Structure of Wood. Syracuse University Press, New York.
5. Panshin, A. J. and de Zeeuw, C. 1970. Textbook of Wood Technology. McGraw-Hill, New York.

FIGURES

Figure 1. A trabecula in a vessel member of Knightia exposed by a tangential cut. The simple perforation plates at each end of the vessel member can be clearly seen. The trabecula is projecting radially out across the lumen about halfway along the cell. The two thin saucer-shaped discs of material (one lying behind the trabecula and the other against the left hand wall at the top left of the photograph) are the former partitions of primary wall and middle lamella material from the perforations. Note the pit "membranes" traversing the

bordered pit-pairs in the cut radial walls of the vessel members and the oblique angle of the simple perforation plates with their overarching borders (2,700X).

Figure 2. The base of a trabecula showing its contact with a tangential wall (7,300X).

Figure 3. A close up view of the cut trabecula shown in Figure 1. The lines on the cut surface are due to the cutting action during specimen preparation. The trabecula shows a three layered structure consisting of an inner core surrounded by a thicker sheath of wall material which is in turn overlaid by a thin outer layer (23,000X).

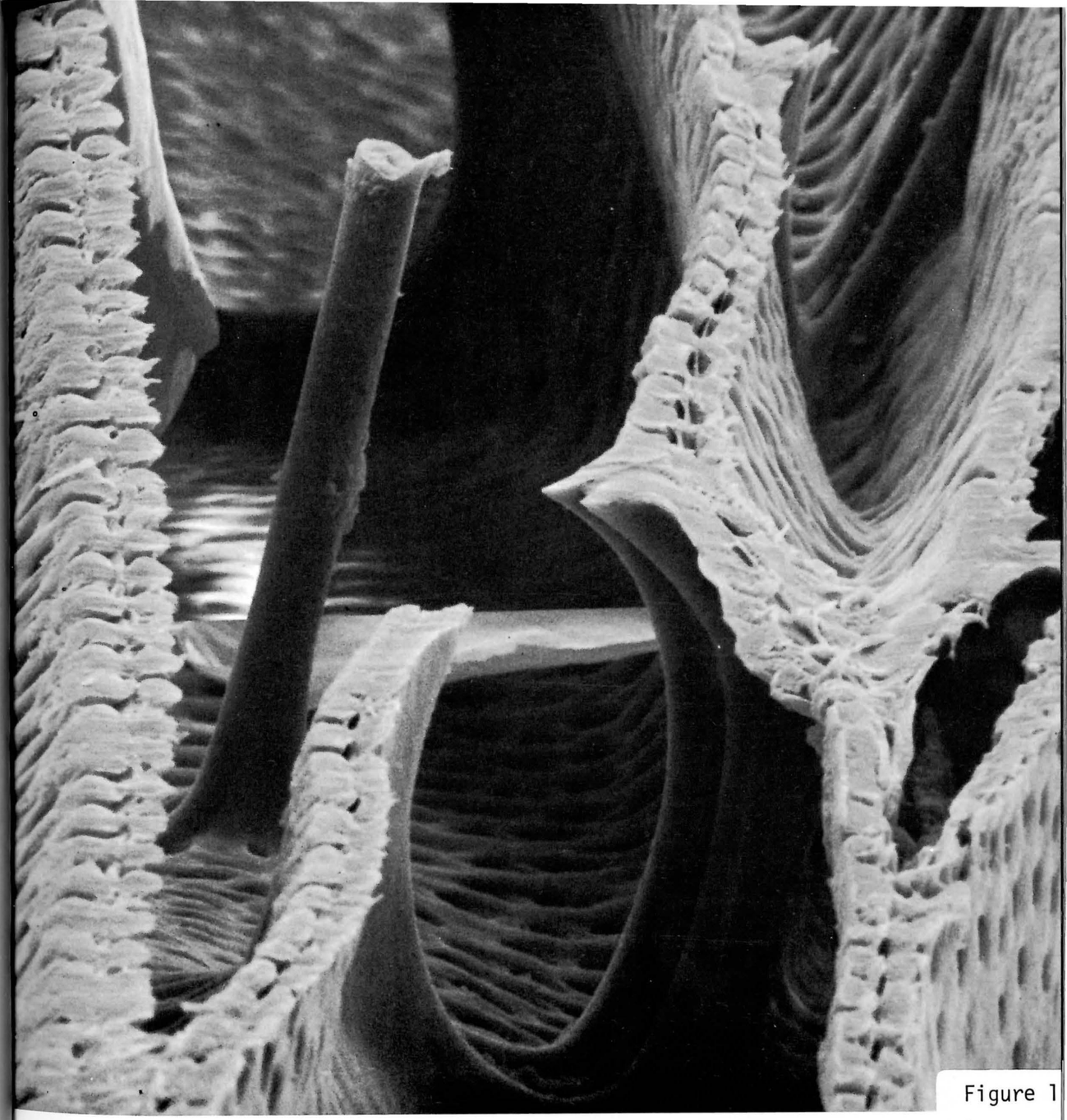

Figure 1

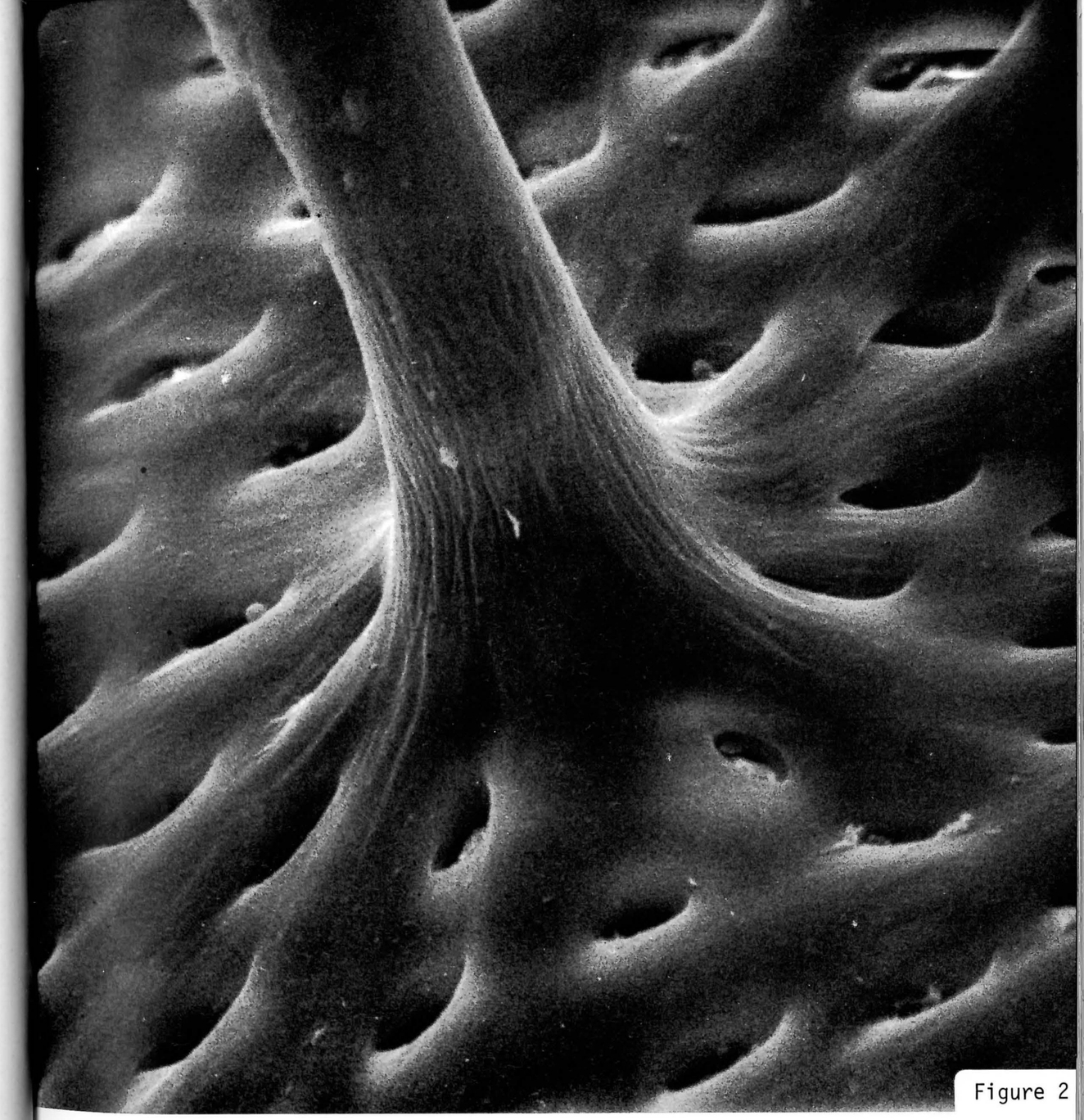

Figure 2

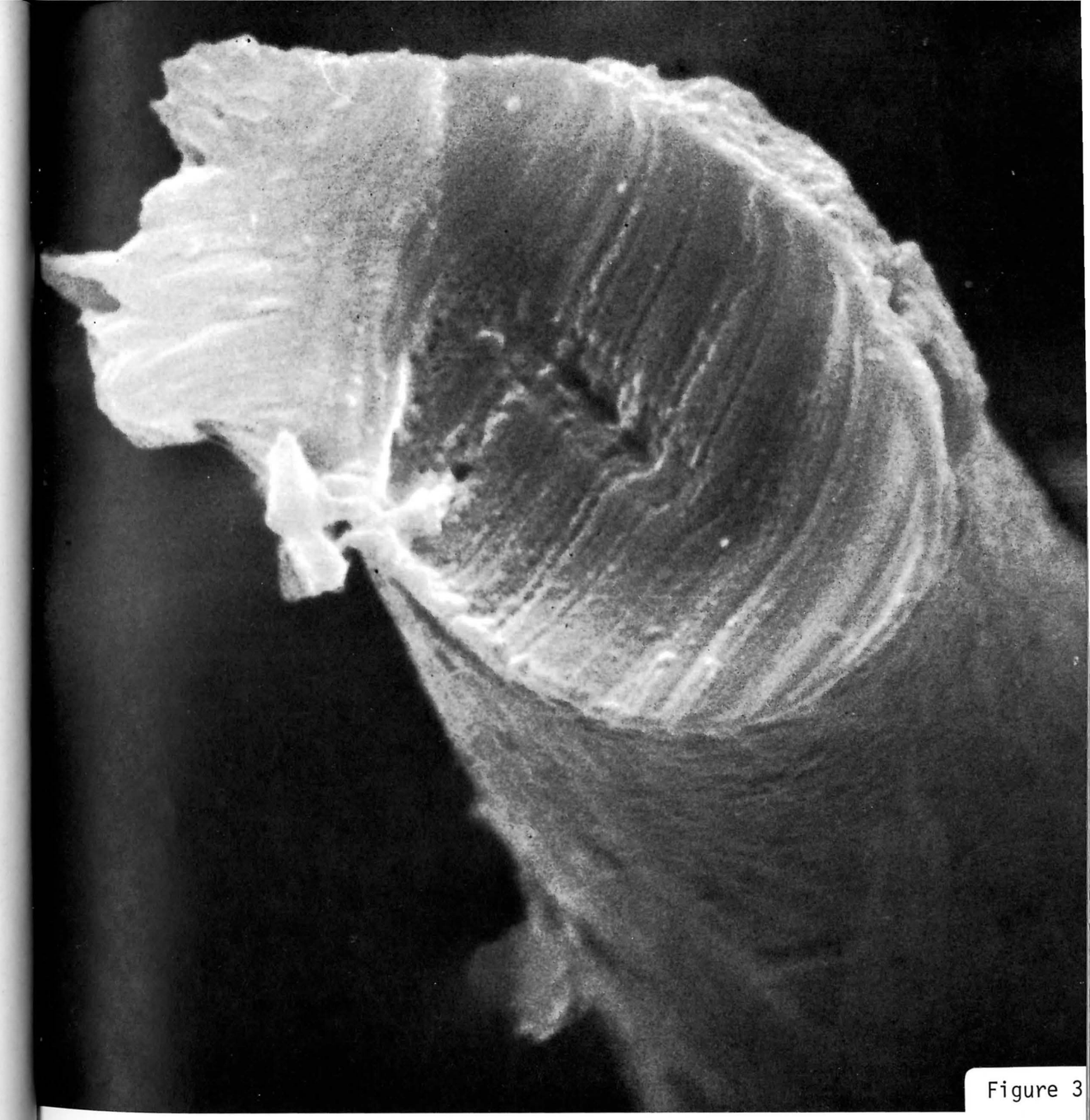

Figure 3

CALLUS-LIKE TISSUE IN *Piptadeniastrum africanum* (Hook.f.) Brenan

By

J. B. Stahel[1]

Piptadeniastrum africanum (Hook.f.) Brenan is one of the Leguminosae of the West African tropical rain forest. Its timber, called Dahoma or Dabema, is hard and the vessels are prominent because of the surrounding aliform-confluent parenchyma and their large size.

During a study on buttress formation of a Dahoma tree in the Juaso Forest District in Ghana, an anomaly was observed in the mature secondary wood. Some of the vessel elements are replaced by a tissue of randomly arranged parenchymatous cells. These abnormal tissue regions are surrounded by aliform-confluent parenchyma similar to that surrounding the regular vessel elements (Fig. 1). The tangential section (Fig. 2) shows that the rather large, isodiametric parenchyma cells have completely replaced the vessel elements and no perforate water conduction elements are present.

The parenchymatous tissue is similar to callus, as it is defined by Cutter (1969) and observed by many wood anatomists in the xylem of different species (Küster, 1925). The callus-like tissue, bordered by the parenchyma strand is closely connected with the adjacent rays. The numerous, small, simple pits are conspicuous and in some places gum-like substances are excreted into the intercellular spaces.

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Unfortunately it was not possible to trace the course of the abnormal cell formation over an axial distance longer than about half an inch. Therefore it is not possible to state whether there is complete or partial replacement of a longitudinal row of vessel elements. In one case (Fig. 3) the callus-like tissue appears to merge with normally differentiated vessel elements. However, even in this case it cannot be stated with certainty, since the section may be cut at an angle so that adjacent axial rows of vessel elements are revealed.

Since the abnormal tissue is an integral part of the adjacent xylem, it is supposed that the formation occurs during the process of postcambial differentiation. Therefore the callus-like tissue formation is to be explained by disturbances within the differentiation zone. It is an unanswered question, whether this disturbance arises exogenously by insect attack, climbing plants or animals, climatical conditions or by endogenous factors. The most logical explanation seems to be that it is the result of an insect attack. It is known that the cambium miner (Lee, 1952) causes similar injury in the wood of many trees of the temperate climate as in birch or maple although in the northern hardwoods the attack is not confined to the line of vessel elements. In Dahoma ducts similar to canals can sometimes be observed, and this anatomical phenomenon may also witness to the fact that the abnormal tissue arises from insect attack. If this is the case, the insect must be very small and cleverly specialized to act only on the soft tissue of the vessel elements and aliform-confluent parenchyma rather than the thick-walled fibers of *Piptadeniastrum africanum*.

LITERATURE CITED

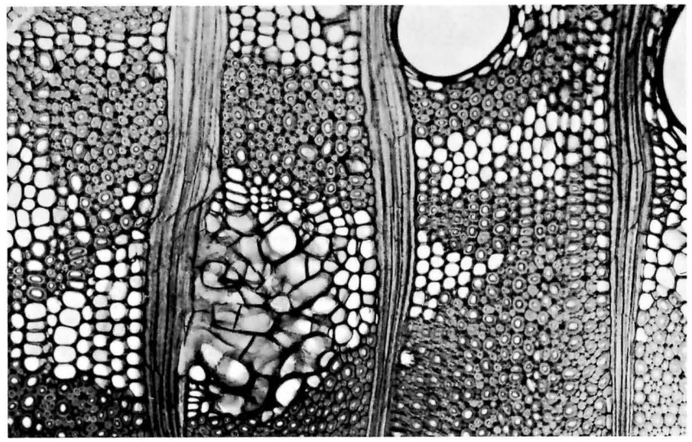
1. Cutter, E. G. 1969. Plant Anatomy: Experiment and Interpretation, Part I. Cells and Tissues. Contemporary Biology, Edward Arnold Ltd., London, p. 100, 101.
2. Küster, E. 1925. Pathologische Pflanzenanatomie. 3. Auflage, Verlag von Gustav Fischer, Jena, p. 558.
3. Lee, N. R. 1952. Note on a plum cambium miner (Agromyzidae). Ann. Rep. East Malling Research Station, p. 78-79.

FIGURES

Figure 1. Transverse section of *Piptadeniastrum africanum* showing callus-like tissue surrounded by aliform parenchyma (120X).

Figure 2. Tangential section of *Piptadeniastrum africanum* showing duct of abnormal cell formation (120X).

Figure 3. Tangential section of *Piptadeniastrum africanum* connection between vessel and callus-like tissue (120X).



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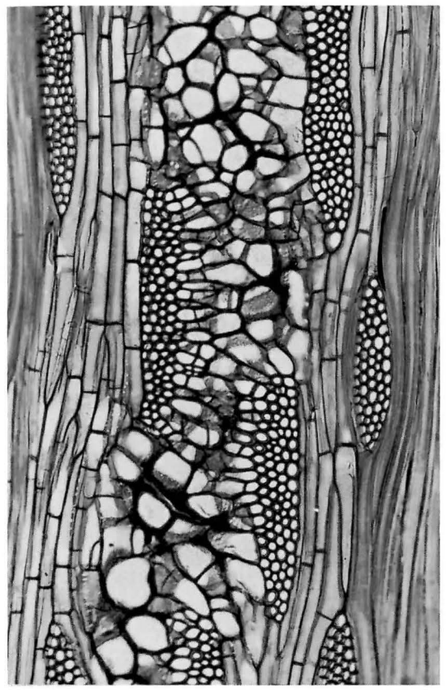

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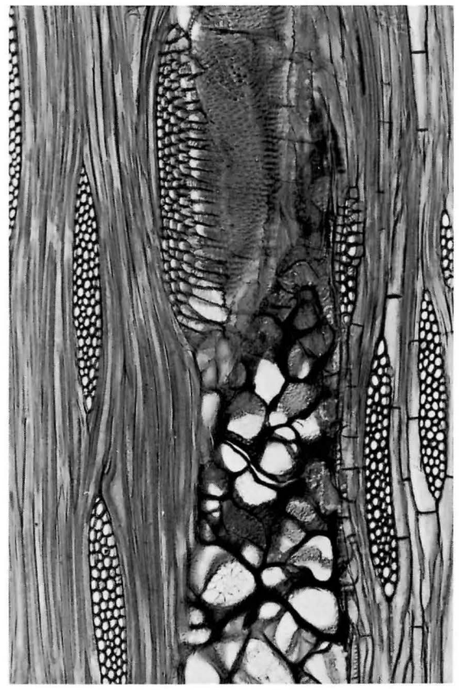

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ASSOCIATION AFFAIRS

Financial Report - 1971

Balance 1970 (Savings + Checking Accounts)	$ U. S.	$1446.34
Income		
Membership Dues		801.64
Subscription to IAWA Bulletin		143.50
Glossary and Reprint Sales		95.15
Interest (Savings Account)		23.83
Total Income:		$1064.12
1970 Balance + 1971 Income:		$2510.46
Expenditures		
IAWA Bulletin (Paper, Printing)		730.15
Postage		239.01
Office Supplies		10.89
Total Expenditures:		$980.05
Operating Balance		$1530.41

Statement of Account

December 31, 1971

Unibank Account No. 102-042-603

Lincoln National Bank and Trust Company
of Central New York
Syracuse, New York 13210, U. S. A.

Savings Account:	$549.21
Checking Account:	981.20
Total:	$1530.41

Member Deceased

We were saddened by the news received from Mrs. Riech that her husband, Dr. Fredric P. Riech, was killed in the crash of an Alaska Airlines Jet on September 4, 1971. Dr. Riech completed his Ph.D. at the University of Florida in June, 1970, and was employed in Alaska. He became a member of I. A. W. A. in 1970.

Growth of I. A. W. A.

With the close of 1971, membership in I. A. W. A. stands at 191 members. This represents a net increase of 35 members since the Association office was established in Syracuse at the beginning of 1970.

Members are urged to recruit other active wood anatomists so that the cooperative work of the Association can be spread over a broader base and the cost of operation per member can be maintained at a minimum.

The Financial Statement on the previous page indicates that the Association has an adequate balance of funds with which to operate through 1972. However, there has been a substantial increase in printing costs recently. This, coupled with the postage increase, will likely force the Council to evaluate the financial prospects for 1973 some time during the current fiscal year.

Exchange of Study Samples

The use of the Bulletin as a means to obtain study samples was strongly supported at the meeting in Hamburg in November 1970. Since that time a few such notices have appeared in the Bulletin. It is suggested that a wider use of such notices be made since it is a very efficient means of reaching a wider group of persons than might be possible otherwise.

New Members

Full Members

Professor Dr. Karl Borgin
Department of Wood Science
Faculty of Forestry
Stellenbosch University
Stellenbosch, South Africa

Dr. Fay Hyland
209 Deering Hall
University of Maine
Orono, Maine 04473

Dr. Ken Ogata
Wood Anatomy Section
Government Forest Experiment Station
Meguro, Tokyo, Japan

Dr. Cherla B. Sastry
Faculty of Forestry
University of British Columbia
Vancouver 8, B. C., Canada

Dr. Edward Martin Sweitzer
Division of Natural Science
Northern Virginia Community College
Annandale, Virginia 22003

Associate Members

Mr. Barrett Nelson Rock
Department of Botany
University of Maryland
College Park, Maryland 20742

WOOD ANATOMY ACTIVITIES AROUND THE WORLD

Report from Dr. Metcalfe - Great Britain

Dr. C. R. Metcalfe informed us recently that he and Dr. L. Chalk have been continuing the revision of Anatomy of the Dicotyledons throughout the past year. The work is progressing steadily although slowly. Our readers are reminded that in issue 1970/2 of the Bulletin (p. 9), we published an announcement in which the authors were seeking suggestions from I. A. W. A. members and others on ways of improving the book.

News from Canada

Dr. R. W. Meyer has informed us that a paper on scalariform perforation plate fine structure is due to appear in "Wood and Fiber" in the fall or winter issue 1971/72. This paper, co-authored by A. F. Muhammad, reports that the openings within scalariform perforation plates are not empty as has generally been assumed by wood anatomists and most botanists. In this article the authors suggest some terminology for the structures found in this study. Included are the following:

WEB: microfibrillar strands located within scalariform perforation plate openings

RETICULATE WEBS: net-like arrangement of microfibrils in web

ORTHOGONAL WEBS: microfibrils arranged predominantly at right angles (orthogonal) to scalariform bars

New Publishing Venture - U. S. A.

The following news release is published for your information since it involves two I. A. W. A. members, W. A. Côté and B. G. Butterfield:

Syracuse University Press announces the inauguration of a unique series of publications in the field of wood science and technology. To be known as the SYRACUSE WOOD SCIENCE SERIES, under the general editorship of Wilfred A. Côté, it will bring together for the first time in a series of volumes the many areas of wood research.

The Syracuse Wood Science Series will include publications in all aspects of wood science in the broadest sense: wood biology (from wood

formation to wood deterioration); wood anatomy and ultrastructure; wood chemistry; mechanical and physical properties and behavior; mechanical processing and utilization; the whole array of treatments for wood including preservation, coatings, adhesives, and seasoning; wood composites; wood fiber products; and virtually any aspect of technology where wood as a material is employed.

The first title in the series, FLOW IN WOOD, by John F. Siau, was published in September 1971. Four titles are announced for publication during 1972. They are: Three-Dimensional Structure in Wood, by B. A. Meylan and B. G. Butterfield, to be published in April, 1972. Subtitled: A Pictorial Atlas of Scanning Electron Microscope Photographs, it includes 58 of these photographs as well as the text. Theory and Design of Wood and Fiber Composite Materials, edited by Benjamin A. Jayne, is scheduled for June publication. Water in Wood, by Christen Skaar, and Wood Deterioration and Its Prevention by Preservative Treatments, edited by Darrel B. Nicholas and Wesley E. Loos, to be published in the fall of 1972.

At least four more titles are being planned for 1973 and others are projected for the future. Wood scientists with publication projects in progress or in mind are invited to contact the series editor.