FIBRE-LENGTH VARIATIONS BETWEEN EARLY WOOD AND LATE WOOD OF THE ONE GROWTH RING IN SELECTED ANGIOSPERMS

Species	Mean fibre-length of First formed early wood (mm.)	Mean fibre-length of Last formed late wood (mm.)	Percentage difference based on early wood length
A. Eucalypts with distinct growth rings			
E. gigantea Hook. f.	0·71	1·15	62
E. regnans F. v. M.	0·81	1·19	47
E. dalrympleana Maiden	0·97	1·28	32
E. pauciflora Sieb.	0·70	1·00	43
B. Ring-porous timbers and diffuse porous timbers with distinct growth rings			
Castanea sativa Mill.	0·62	1·35	118
Quercus robur L.	0·71	1·33	87
Fraxinus excelsior L.	0·51	1·46	186
Ulmus campestris L.	0·72	1·54	114
Cedrela toona Roxb. var. *australis* C.DC.	0·75	1·37	83
Tectona grandis Linn. f.	0·93	1·34	44
Fagus sylvatica L.	1·18	1·44	22
Populus tremuloides Michx.	0·83	1·28	54
C. Species without distinct growth rings			
Castanea javanica Blume*	1·17	1·27	8·5
E. deglupta Blume *E. grandis* (Hill.) Maiden *Lithocarpus perclusa* Mgf.	No significant variation over several growth zones		

* Some indication of growth rings

In view of the results obtained, it is appropriate to discuss briefly the variation of tracheid-length within one growth ring of various Gymnosperms. Gerry[5] reported that in *Pseudotsuga taxifolia* (Lamb.) Britt. the late wood tracheids were shorter than those of the early wood. Lee and Smith[6], working with the same species, obtained contrary results; their observations are supported by those of Kribs[7] (with *Pinus banksiana* Lam.) and Chalk[8] (with *Picea sitchensis* (Bong.) Carr.), both of whom state that the tracheids of the late wood are slightly longer (12 per cent in *P. sitchensis*) than those of the early wood. Recently, Wardrop[9] referred to the decrease in the tracheid-length of *Pinus radiata* D. Don from the early wood to the late wood of the one growth ring. We have examined a number of Gymnosperms, including those mentioned above, and have found that, in all cases where compression wood is not present, the late wood tracheids are slightly longer (up to 11 per cent) than the early wood tracheids, thus confirming the observations of Kribs and Chalk. It would seem, therefore, that the variation within a growth ring follows the same general trend in both Angiosperms and Gymnosperms in which distinct growth rings are present, although the variation in length from early wood to late wood is much less marked in the Gymnosperms.

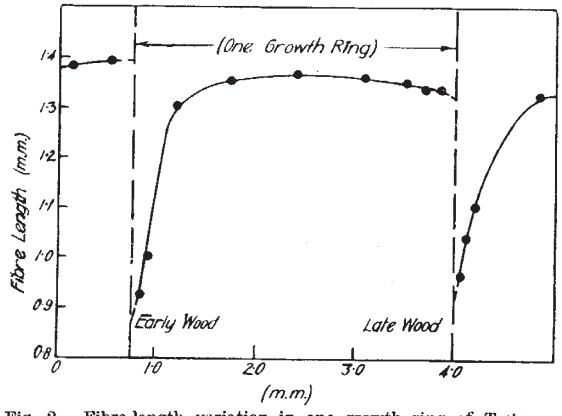

Fig. 2. Fibre-length variation in one growth ring of *Tectona grandis* Linn. f.

In all the investigations reported here, fibres (or tracheids) were obtained by the maceration of serial tangential sections (80 or 120 μ thick) cut through one or more growth rings of the timber under examination. Fifty fibres from each section were selected at random for measurement. The differences in mean fibre-length as given in the table have been shown by statistical analysis to be highly significant.

This work, which will be reported in detail elsewhere, forms part of the programme of the Division of Forest Products, Commonwealth Scientific and Industrial Research Organisation, Australia.

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[6] Lee, H. N., and Smith, E. M., *For. Quart.*, **14**, 671 (1916).
[7] Kribs, David A., Univ. Minnesota, Agric. Exp. Station, Tech. Bull., 54 (1928).
[8] Chalk, L., *Forestry*, **4** (1), 7 (1930).
[9] Wardrop, A. B., *Leeds Phil. Soc. Proc. (Sci. Sect.)*, **5** (2), 128 (1949).

NATIONAL RESEARCH COUNCIL OF CANADA

ANNUAL REPORT

THE thirty-second annual report of the National Research Council of Canada* contains the report of the president, Dr. C. J. Mackenzie, and the financial statement for the year ended March 31, 1949, and provides a general conspectus of the work which is now described in fuller detail in the "National Research Council Review". Progress with atomic energy has continued, and the Isotope Branch has distributed thirty-four different isotopes to twenty-one institutions for experimental work in pure and applied science. The Chemical Engineering Research Branch has been enlarged to investigate new plant-processes for separating and purifying the products, and the Technical Physics Branch has notably improved the design and reliability of electronic engineering devices and microchemical equipment. In the Division of Applied Biology some further fundamental work was undertaken in the study of the fermentative breakdown of cellulose, the installation of electrophoresis and diffusion-rate equipment for the study of proteins and carbohydrates, studies on halophilic bacteria, and the physiology of muscle in rigor. Work on the Fritz continuous butter-making machine continued, as well as pilot-plant investigations on the fermentation of beet molasses and the processing of gluten from wheat flour.

The Division of Building Research, which started work during the year, has concentrated its attention on questions of building practice in relation to house construction. In the Pure Chemistry Branch photo-

* Thirty-second Annual Report of the National Research Council of Canada, 1948–49. (N.R.C. No. 1961.) Pp. 35. (Ottawa: National Research Council, 1949.)

chemical and other kinetic investigations have been made on ether, acetone, acetaldehyde, ethylene oxide and a number of hydrocarbons. Radioactive carbon is being used for labelling particular functional groups to follow their course in photochemical reactions. The compressibility of pure helium in the temperature range 0–600° C. has been determined with a high degree of accuracy. Work has continued on the infra-red spectra of complex organic compounds, especially those of biological importance, and on plant alkaloids, particularly on the chemical constitution of those alkaloids previously discovered in the laboratory; the investigation of the acid-dyeing of wool has also continued.

Besides its advisory functions to other government departments on the supply or testing of chemicals, the Applied Chemistry Branch is investigating the use of the fluidized bed technique for the recovery of oil from Athabaska tar sands, the mechanism of detergency and of the inhibition of corrosion by silicates and chromates, the high-temperature corrosion of heat-resistant alloys, the evaluation of anti-freeze materials as regards the corrosion of the cooling system of internal combustion engines, and the occurrence, purification and chemistry of natural and synthetic unsaturated fatty acids. Problems relating to the use of a Canadian-produced synthetic rubber have been investigated in collaboration with the Polymer Corporation, and work on the catalytic oxidation of ethylene to ethylene oxide has been directed towards acquiring the engineering data for the design of a pilot plant. Some work has been done in extension of Reppe's work on the synthesis of acetylene derivatives. Investigations in the Division of Mechanical Engineering have included further work on the control and stability of tailless aircraft and on the model of the Fraser River, and problems in connexion with the use of fuels and lubricants at low temperatures. The design and construction of special instruments required in the laboratories is a responsibility of the instrument laboratory.

The Division of Physics made plans for a spectroscopy group in July 1948, and the building up of equipment for precision electrical standards and work continued on the thermostatic control of refrigerator cars as well as on the colorimetry of railway fusees. Investigations were initiated on the possibilities of a camera mount with very soft restraints for minimizing the effect of pitch, yaw and roll on image movement in air photography and on the factors affecting the resolving power in a print made by a projection. The Division of Radio and Electrical Engineering was occupied mainly in fundamental research in radar and radiophysics and application of radar techniques to peace-time problems, including the development of two electrostatic generators of the Van de Graaff type and a study of methods of applying Shoran radar techniques in measuring the distance between two fixed points on the ground with sufficient accuracy for geodetic purposes and in determining the position of an aircraft engaged in taking photographs at intervals along a flight line.

The research programme of the Division of Medical Research is entirely extra-mural, and 118 projects were supported during the year, including fundamental research on such subjects as the physiology and biochemistry of muscular activity, cellular development, growth, destruction and regeneration; the physiology and biochemistry of nervous and special-sense activity; mechanisms of secretion; metabolic studies, including the role of vitamins; and studies on blood constituents, including the cells, enzymes, lipids and clotting agents. Thirty medical fellowships were held at seven universities during the year; the Council also granted 169 scholarships for postgraduate work, and 148 were actually held as against 145 in the previous year, mainly in physics (51), physical chemistry (29), chemistry (14) and organic chemistry (13). The work of the Technical Information Service also substantially increased, and the section now handles about four hundred inquiries a month. Pending the development of a national library in Canada, the library of the Council endeavours to provide some of the services which the science branch of such a national library might give.

RESIDENTIAL COURSES FOR SUPERVISORS

AMONG the subjects discussed at the British Institute of Management Conference at Margate in 1949 was whether there is a need for short residential courses to be provided on a national scale for foremen and supervisors. The subject was introduced by Major W. F. Scott, director of training to Tube Investments, Ltd., who stated that during the past thirty years the number of people employed in large businesses has greatly increased, processes of production have become much more scientific, and autocratic management has either yielded place to democratic or is fighting a hopeless rearguard action. Industry rests to-day upon the willingness of the operative to perform his task, and the supervisor is the propeller shaft linking the motive power of management with the operative. The link, therefore, should be fit for its important function, and this implies good initial selection and training of supervisors followed by some method of ensuring that he is kept up to date on all developments, technical, administrative and psychological, which affect his daily life.

Under the old order, the foreman's principal tool of control was the power of dismissal, but the stress and strains of war and the need for higher production under the conditions of the Essential Work's Order laid bare the weaknesses in this system. In most factories it was necessary to introduce one ancillary department after another, and each of them removed from the foreman's authority some function which had previously been his unchallenged prerogative. In the pressure of events, little was done to make him understand why changes were necessary.

Efforts to solve the difficulty were made by many technical colleges, which arranged special courses for foremen during the evenings; but their total impact on the problem was small. The Training Within Industry Scheme which was introduced from the United States also proved a useful help to the supervisor; but it did little to re-orientate him to the changed environment of an industrial world of full employment and a more complicated administrative structure. Supervisors' societies have also grown in number, and the Institute of Industrial Supervisors has come into being for the express purpose of helping its members to a better understanding of their jobs.

It is significant, however, that several large industrial organisations have come to the conclusion that something more is needed and have instituted internal courses for their supervisors. A few of these courses are residential in character, and with these,