

The present note relates to a simple method of separating the two components.

The new method consists in bringing about a preferential sedimentation in a centrifugal field in presence of alcohol. Malt extract was centrifuged for 20 minutes at 6,000 revolutions per minute in presence of 50 per cent. alcohol. The centrifuge tube was taken out and the centrifugate analysed for the presence of the two components. The activity of the saccharifying component was not impaired but on the other hand, the dextrinogenic component was reduced by about 47 per cent. The results of a typical experiment are given in table I.

TABLE I.

Control Experiment			Centrifugal Sedimentation	
Time in minutes	Activity of the saccharogenic component in mg. of maltose	Activity of the dextrinogenic component by coloration with iodine	Activity of the saccharogenic component in mg. of maltose	Activity of the dextrinogenic component by coloration with iodine
10	70.2	Blue	73.4	Blue
20	..	Violet	..	Blue
30	104.4	Red	106.0	Blue
45	..	Yellow	..	Violet
60	117.0	..	118.2	Violet
85	..	..	..	Yellow

The concentration of the enzyme, the  $P_{II}$  of the medium and the duration of the experiment are the main factors which determine the successful operation of this method. The optimum conditions for the complete separation of the two components are being investigated.

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<sup>1</sup> Ohlsson, *Compt. rend. trav. Labr. Carlsberg.*, **16**, No. 7, pp. 1-68, 1926.

<sup>2</sup> Narayanamurti and Norris, *Jour. Indian Inst. Sci.*, **11A**, 134, 1928.

<sup>3</sup> Venkata Giri and Subrahmanyam, *Jour. Indian Inst. Sci.*, **15A**, 107, 1933.

<sup>4</sup> Hamberg, *Biochem. Zeit.*, **258**, 134, 1933.

<sup>5</sup> Keshava Iyengar, *et al.*, *Curr. Sci.*, **1**, 238, 1932-33.

### The Homoxyleæ and the Ancestry of Angiosperms.

THE homoxylous genera of angiosperms, namely, *Drimys*, *Zygogynum*, *Trochodendron* and *Tetracentron*, belong to the primitive group Magnoliales of Hutchinson. The gymnospermic vessel-less character of the wood of these primitive dicotyledons is of considerable interest and may be of theoretical importance. A fairly large scattered literature is available on the wood anatomy of these genera, and various botanists have discussed the theoretical bearings of the facts, but a comparative study of all the four genera and an attempt to distinguish them on the wood structure alone has not yet been undertaken. This object has now been achieved to a considerable degree and the resemblances between certain related fossil woods and these primitive genera of dicotyledons have been elucidated in a fully illustrated paper which is now in the press.<sup>1</sup>

The author has also reviewed the more important literature extending over a period of nearly a hundred years, dealing with the anatomy of homoxylous angiosperms and some related fossils. The important observations on the wood anatomy recorded by Goeppert, Groppler, Harms, Solereder, Van Tieghem, Bailey and Sinnott and others have been confirmed in the main points; in addition, the anatomy of the genera *Tetracentron* and *Zygogynum*, about which not much was known before, has been described and illustrated on the basis of the material kindly supplied to Prof. Sahni, by Professors Harms (Berlin) and Record Yale respectively.

The modern homoxylous angiosperms can be conveniently divided into two groups which are rather sharply defined both structurally and geographically.<sup>2</sup>

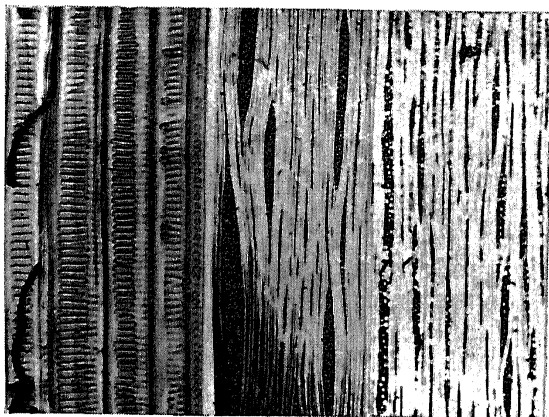
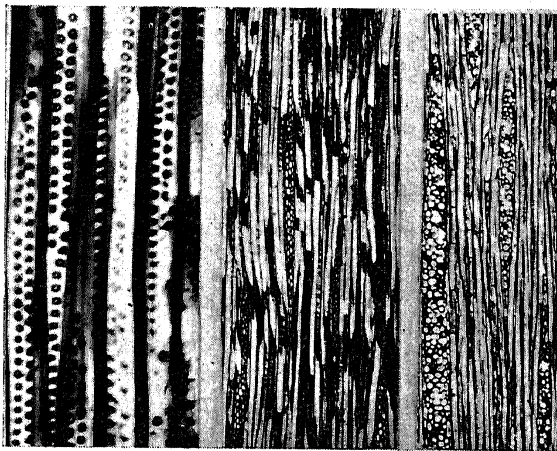
1. The *Drimys* group, comprising the two genera *Drimys* and *Zygogynum* and having several species distributed in the Australasian and American regions. These genera are essentially similar in their wood structure: growth-rings either absent or very faintly marked; medullary rays scarcely or not at all enlarged at the junction of the growth-rings; ray cells more or less uniformly pitted on their horizontal and tangential

<sup>1</sup> Expected to be published in the current volume of the *Journal of the Indian Botanical Society*.

<sup>2</sup> See also Sahni, *Proceedings of the Indian Science Congress, Patna, 1933*.

walls. The usual pitting in the spring wood, both on the radial and tangential walls, is of the multiseriate type (Fig. 1).

2. The *Trochodendron* group, with *Tetracentron* and *Trochodendron*, both monotypic eastern genera confined to China and Japan respectively. Growth-rings well marked, with strongly developed autumn wood and medullary rays distinctly enlarged at the junction of the growth-rings. The usual pitting in the spring wood both on the radial and tangential walls is of the scalariform type (Fig. 2).



1. *Zygogynum* sp. Rad. sec.  $\times 70$ .
2. *Trochodendron aralioides*. Rad. sec.  $\times 70$ .
3. *Zygogynum* sp. Tang. sec.  $\times 30$ .
4. *Drimys* sp. Tang. sec.  $\times 30$ .
5. *Trochodendron aralioides*. Tang. sec.  $\times 30$ .
6. *Tetracentron sinense*. Tang. sec.  $\times 30$ .

All the four genera can also be distinguished by the shape of the medullary ray cells as seen in tangential sections of the wood. Thus: in the *Drimys* group, *Zygogynum* has its multiseriate rays somewhat broader than *Drimys* and the rays consist of large

roundish or sometimes angular cells (Fig. 3), while in *Drimys* the shape of the central cells is drawn out into long ovals (Fig. 4). Similarly *Trochodendron* can be distinguished from *Tetracentron* by the fact that the multiseriate rays are broader (6-7 seriate) and the central cells are perfectly round and small (Fig. 5), whereas in *Tetracentron* (Fig. 6) the rays are less broad (2-3 seriate) and made up of long oval cells.

Such a combination of characters has not so far been found in any living angiosperm woods except the few types reviewed in the present paper; among fossil angiosperms the only comparable types are *Homoxyylon rajmahalense* Sahni<sup>3</sup> and *Tetracentronites Hartzii* Mathiesen.<sup>4</sup> My sincere thanks are due to Professor Mathiesen who kindly sent a piece from the type specimen, thin sections of which have been examined by me. This early Tertiary fossil from East Greenland very closely resembles the living homoxyulous angiosperms, specially the *Trochodendron* group. It is vessel-less and in radial section typical scalariform pitting with transitional stages is seen as described in *Trochodendron* and *Tetracentron*. My thanks are also due to the authorities of the Geological Survey of India who so kindly sent me the type sections of *Homoxyylon*. It is an interesting fact that among gymnosperms such a combination of characters has only been recorded in a few Cycadeoids.<sup>5</sup>

The author has briefly discussed in his full paper the theoretical importance of these genera as far as speculated in the light of recent discoveries. He concludes that the magnoliales might have either arisen from a group of fossil angiosperms contemporary with the Caytoniales or directly from some mesozoic Pteridosperms which may, as the recent work of Hamshaw Thomas suggests, be the ancestors of the modern flowering plants.<sup>6</sup>

If the age of *Homoxyylon rajmahalense* Sahni, a fossil angiospermous wood devoid of vessels is proved to be definitely Jurassic in the

<sup>3</sup> Sahni, 1932, "*Homoxyylon rajmahalense* gen. et sp. nov." *Memoirs G. S. I., Pal. Ind.*, **20**, Memoir No. 2.

<sup>4</sup> Mathiesen, 1932, "Notes on some fossil plants from East Greenland." *Meddelelser om Groenland*. Bd. **85**. Nr. 4, pp. 1-62.

<sup>5</sup> Wieland, 1916, *American Fossil Cycads*, Vol. II, pl. 35, figs. 4, 5; pl. 36, figs. 2, 3.

<sup>6</sup> H. H. Thomas, 1933, *Phil. Trans. Roy. Soc.*, London, . . . . ., 1931; *Ann. of Bot.*, **45**, 647-672.

future, it would indicate a parallel development of the Magnoliales and the Bennettiales, rather than a derivation of the former from the latter. The group Bennettiales is perhaps best regarded as a blindly ending line which may have gradually died out because real angiospermy could not be attained in that group.

In the end I must express my gratitude to Professor B. Sahnî at whose suggestion this investigation was undertaken and who placed at my disposal all the material of living as well as extinct homoxyloous woods, including some sections prepared by himself and Mr. B. P. Srivastava, M.Sc.

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#### Female Gametophyte of *Argemone mexicana* Linn.

In a communication to the September issue of this Journal, Messrs. Bose and Banerji have criticised some of the work done by the writer on megaspore-formation and embryo-sac of *Argemone mexicana* with these remarks: "His account differs in certain fundamental points from our observations." A careful perusal of their communication, however, shows to me no such points.

The note deals with three main points, the primary archesporium megaspore-tetrad and comparative size of the antipodals and the egg apparatus. I had not seen the first, but from the arrangement of the cells at the tetrad stage of the megaspores, it was concluded that there is most probably a single hypodermal archesporial cell. Bose and Banerji find this presumption to be true. The megaspore-tetrad, I had studied only from one ovary and had found it to be T-shaped. They find not only this arrangement, but the linear one also; the latter is more frequent. It is not the case that they do not find the T-shaped arrangement. What they can very well study now is whether these different arrangements are confined to different flowers or can both arrangements be seen inside the same gynæcium. My observation leads to the first conclusion, but it may be exceptional and not the general rule. The comparative size of the antipodals and the egg-apparatus was studied by me when a good deal of endosperm had been formed. At this stage the antipodals were formed to be 8 to 10

times bigger than the egg. According to the estimates of Bose and Banerji themselves the egg at this stage is about  $22\mu$  long and the antipodals  $154\mu$ . So there is no great difference between the two accounts, although I found the antipodals to be as big as  $200\mu$  or a little more even. I had myself suggested the possibility of the antipodals being much smaller at an earlier stage. This Bose and Banerji really find to be true.

On the whole, what appears to me is that having been working on the subject for a very much longer time and on a much larger amount of material (compared with the two ovaries that I had studied), they have been able to get several more facts—quite a natural thing; and there are no fundamental differences between their observations and mine own.

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#### Oil-Soluble Vitamins in Some Pulses and Fishes of Bengal.

In the last (September) issue of the *Current Science* we communicated certain facts regarding the presence of Oil-Soluble Vitamin A in some pulses and fishes of Bengal. The accompanying spectrographs are typical of many more which we have been able to obtain. The difficulties of recording successfully the absorption bands at the right moment are many. A reference may be made to the very valuable paper on "Specificity in Tests for Vitamin A"<sup>1</sup> in which some spectrographs are given obtained with Halibut Oil and  $SbCl_3$  reagent. In our spectrographs presented here, just below the wavelength scale is placed Cadmium spark spectral lines. Just above the scale is the absorption spectrum of *Cicer arietinum* Oil and  $SbCl_3$  reagent. We have examined two varieties of *Cicer arietinum*—(1) Kabuli and (2) Common—and both gave similar spectra. Above this is an absorption spectrum obtained with a sample of *Cod liver Oil* of approved quality. The uppermost one really consists of two halves—the upper half was taken last and given a longer

<sup>1</sup> Heilbron, Gillam and Morton, "Specificity in Tests for Vitamin A," *Biochemical Journal*, 25, No. 4, 1346-66, 1931.