

fertilization) has been cultured on medium 2 supplemented with coconut milk, centres of proliferation being induced on the transversely cut surface of both pith and cortex. Undifferentiated growth has also been obtained from immature seed tissue.

A detailed investigation of the cultivation of apple tissue *in vitro* is in progress. The work reported has been assisted by a grant from the Rockefeller Foundation. Thanks are also expressed to Dr. H. R. Thompson for statistical analyses, to Miss D. A. Bridson for technical assistance, to the American Cyanamid Company for a generous gift of 2-benzthiazolyloxy-acetic acid, and to Imperial Chemical Industries, Ltd., for a gift of gibberellic acid.

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Temperature Variations in Male Cones of *Encephalartos*

IN the hope that this may elicit more information than I have been able to find in the available literature, I give below a summary of observations made on the diurnal rise and fall of temperature in ripe male cones of *Encephalartos altensteinii* Lehm. and *E. lehmannii* Lehm.

Cones cut from plants of *E. altensteinii* growing in the Botanic Gardens, Grahamstown, were used for demonstration purposes during the course of practical work for students of botany, and reference was made to the fact, known to me since childhood, that such male cones, when ripe, become heated. Search of the literature available produced only one reference to this phenomenon¹, in support of my statement, and a rough test was therefore made on a cone to show the truth of the assertion. A thermometer, registering 21° C. in the laboratory, was inserted between the sporophylls of the male cone at a part which was obviously the warmest to the hand: within a matter of seconds, this thermometer registered 35°. During the course of the afternoon, the thermometer registered a rise to 37° (as against an air temperature of 20°) within the cone. This cone was at the stage of shedding pollen and had been removed from the parent plant two days before, being kept on a laboratory bench meanwhile. When discussion with workers whose knowledge of the genus *Encephalartos* is greater than mine, showed that this temperature rise was unknown to them, further rough tests were made on several cones.

These preliminary tests soon showed that besides this remarkable rise in temperature there is a diurnal rhythm, the temperature of the cones rising from about eleven or twelve o'clock in the day, to a maximum about five o'clock in the afternoon, and

then falling again until it is the same as, or very close to, the air temperature of the room. The tests were carried out with several cones over a period of several days in the laboratory, and a set of fresh cones was obtained, which gave the same results.

As these were observations made on cones cut from the plant, male cones still *in situ* were also tested. These also showed a great temperature rise and difference between the air temperature and that of the cones, during the afternoon hours.

Tests made on *E. lehmannii* Lehm. do not show the same great rise and fall, but there is apparently some rise of temperature in male cones of this species also. Cones of *E. villosus* were also tested but these were rather far advanced: also, the cones are more open in structure and, perhaps for these two reasons, no results were obtained showing any rise.

A fuller account of these facts will be published later, but if any workers on the Cycadales have information on such a rise of temperature in male cones or know of references in the literature to this fact, apart from the one I have given, their help will be appreciated. It is certainly true, as Gausson says, that "le cône présente une véritable fièvre", and it would seem that there must be more information either published or known.

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Root Nodules of *Coriaria*

THE shrubby genus *Coriaria* is one of the eight non-legume Angiospermous genera known to have the capacity of forming root nodules in response to infection from the soil by a symbiotic organism. In some instances, in confirmation of earlier work, the nodules of most of these genera have been shown by my collaborators and me^{1,2} to be nitrogen-fixing, but, despite efforts extending over several years, I have not yet raised nodulated plants of *Coriaria* in culture, owing to an apparent difficulty in securing infection of the roots under artificial conditions. However, the results of Kataoka³ make it probable that *Coriaria* nodules also are nitrogen-fixing.

As pointed out by Good⁴ this genus is at present characterized by extreme 'discontinuity' in the sense that it occurs in widely separated regions, chiefly Japan, New Zealand, the Mediterranean region, and Central and South America. So far as I am aware it is only in respect of Japan that records of nodulation in *Coriaria* are to be found in the literature⁵. From correspondence with New Zealand botanists and from material gratefully received from them it is clear that nodulation occurs in that country also. Despite the attention paid by earlier European botanists to the presence of nodules in *Alnus*, *Hippophaë* and *Elaeagnus*, there seems no previous record of the inspection for nodules of the roots of *Coriaria* species native to Europe. Through the good offices of Mr. N. Y. Sandwith, of the Royal Botanic Gardens, Kew, inquiries were made of Dr. P. Montserrat, of Barcelona, with the result indicated in the following communication, which has been translated from the Spanish by Mr. Sandwith.