course has been found to extend throughout the first- and second-year wood.

With the idea of seeing if there was any difference in the occurrence of medullary bundles in trees growing on different stocks, I collected shoots growing on Malling XVI and Malling IX rootstocks. No medullary bundles have as yet been found in the variety Worcester Permain growing on Malling XVI, which is a vigorous stock, but only on the dwarfing Malling IX stock.

My thanks are due to Dr. B. A. Beakbane, of East Malling Research Station, for facilitating the collection of material from the orchards there.

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## Endosperm in *Cassia tora* Linn.

DURING the course of a comparative study of several members of the Leguminosæ, I found an interesting type of endosperm formation in *Cassia tora* Linn. (family Cæsalpiniaceæ), a common roadside plant in India. The primary endosperm nucleus, by repeated division, gives rise to a number of free nuclei which are at first more or less uniformly distributed throughout the embryo-sac. Afterwards, one of the nuclei situated near the chalazal end becomes more prominent than the rest of the endosperm. Wall formation takes place only in the micropylar part of the endosperm. The chalazal part, which remains free nuclear, becomes a narrow tube

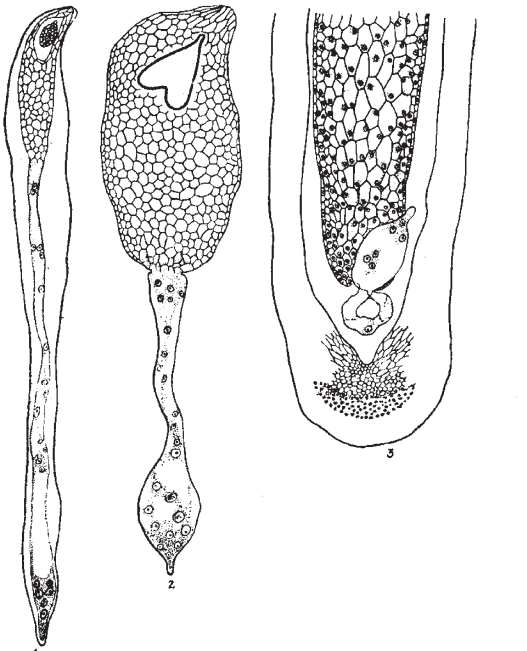

Fig. 1. Section of the embryo sac showing the embryo, cellular zone of endosperm and lower tubular portion of endosperm. × 110

Fig. 2. Whole mount of endosperm. × 55

Fig. 3. Section of chalazal half of seed showing coiled tubular part of endosperm lying superposed on the upper cellular part. × 55

with denser cytoplasm in its elongated lower end (Figs. 1 and 2). As the mass of endosperm tissue increases, the lower tubular process becomes irregularly coiled and twisted. The sac-like portion at its tip is often displaced so that it is sometimes found lying on one side of the cellular zone or superposed on it (Fig. 3). Microtome sections naturally fail to give any clear or complete picture of this interesting tubular process; but whole mounts of the endosperm showed it quite clearly.

A similar condition has been observed to exist in some other species of *Cassia*, and a detailed account of their embryology will be published elsewhere. To the best of my knowledge, this feature is unknown in the Leguminosæ and is probably rare in other angiosperms also.

I am grateful to Prof. P. Maheshwari of the University of Delhi for his valuable suggestions.

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## Non-Mendelian Segregation from Heterozygotic Yeast Asci

IF $M$ denotes a gene for the production of maltase and $m$ its allelomorph, which is unable to produce the enzyme, a heterozygotic 4-spored yeast ascus originally having the formula $Mm$ would be expected to yield a simple Mendelian segregation ratio of 2 : 2; that is, two of the spores should give rise to maltose-fermenting types, while the other two spores should give rise to non-fermenting types.

During an investigation of the inheritance of the ability of yeasts to ferment maltose, the presence of three polymeric $M$-genes, $M_1$, $M_2$ and $M_3$, in *Saccharomyces cerevisiæ* was established[1].

In subsequent studies, an $M_1M_1$ $m_2m_2$ $m_3m_3$ type was obtained, and this was backcrossed to a non-fermenting type, $m_1m_1$ $m_2m_2$ $m_3m_3$. The hybrid thus formed consequently should be the single heterozygote $M_1m_1$, and its progeny would be expected to yield a simple 2 : 2 segregation. Two such hybrids, Nos. 65 and 66, were produced by spore crossings and the segregation ratios of their progeny investigated.

Twelve 4-spored asci from hybrid 65 were analysed and all were found to give 2 : 2 ratios. Hybrid 66 gave, however, in addition to 12 normal 2 : 2 segregating asci, one ascus with three maltose fermenters and one non-fermenter. How could this behaviour be explained without resorting to Winkler's so-called "conversion theory"[2] (which Lindegren also supports in his investigations on yeast genetics[3]), namely, that in a heterozygotic yeast a gene may be contaminated by its allelomorph and thereby may be transformed into the latter? We consider this theory to be highly improbable. It occurred to us, however, that an obvious explanation could be that the four nuclei of the divergent 3 : 1 segregating ascus had each undergone an additional mitosis, resulting in the formation of four $M$ nuclei and four $m$ nuclei, but that four of these had afterwards degenerated so that at sporulation only four uninucleate spores had been produced. The segregation ratio in such a case would be entirely a matter of chance. A search was therefore made for asci containing more than four spores, and we were successful in finding