Whether anything corresponding to 'double fertilization' (a term here obviously inappropriate) occurs is not certain, though the evidence points to it. The definitive nucleus begins to divide before the fertilized egg. Its divisions are rapid and simultaneous, and, as might be expected from its multinuclear origin, the endosperm nuclei are large, with a great number of chromosomes and several nucleoli. They are distributed in the parietal layer of protoplasm, and walls appear only at a very late stage, forming a loose tissue in the lower part of the embryo-sac, which is entirely used up by the growing embryo.

These investigations were carried out in the Botanical Laboratory of the South African College, Cape Town, at the suggestion and under the supervision of Professor Pearson; they are being continued at the Botany School, Cambridge.

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THE EMBRYO-SAC OF PANDANUS. PRELIMINARY NOTE.—A preliminary study of the embryo-sac of *Pandanus* which I have recently made shows that it differs decidedly from the usual Angiospermous type, and to some extent resembles more nearly that of *Peperomia*. Two species of *Pandanus* have been examined—*P. odoratissimus* and *P. Artocarpus*—which agree very closely in the structure of the embryo-sac. Up to the second nuclear division in the young sac, *Pandanus* agrees with most of the Angiosperms, and at this stage the embryo-sac shows the usual two nuclei at the micropylar and chalazal ends. The two micropylar nuclei undergo no further division, but the chalazal nuclei divide until there may be twelve of these, and this seems to be the normal number, to judge from an examination of a number of the largest sacs that were studied. These always showed two nuclei at the micropylar end, surrounded by a relatively small amount of granular cytoplasm, while the large chalazal nuclei were scattered, apparently without any definite order, in a large mass of granular, more or less vacuolated, cytoplasm, which filled nearly one-third of the sac. The differentiation of antipodal cells was visible, and there was no certain evidence of nuclear fusions.

Whether any further differentiation of the embryo-sac structures occurs before fertilization remains to be seen.

DOUGLAS H. CAMPBELL.

STANFORD UNIVERSITY,
Feb., 1908.

SUPPLEMENTARY NOTE TO 'STUDIES ON SOME JAVANESE ANTHOCEROTACEAE'.¹—Since this paper was written, Dr. Lang² has published an account of the sporogonium of *Notothyas Breutelii*, which closely agrees with that given in my paper for *N. javanicus*. The most marked difference is the greater development of sporogenous tissue from the endothecium in *N. Breutelii*.

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Campbell, Douglas Houghton. 1908. "The embryo-sac of Pandanus." *Annals of botany* 22, 330–330. <https://doi.org/10.1093/oxfordjournals.aob.a089175>.

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