

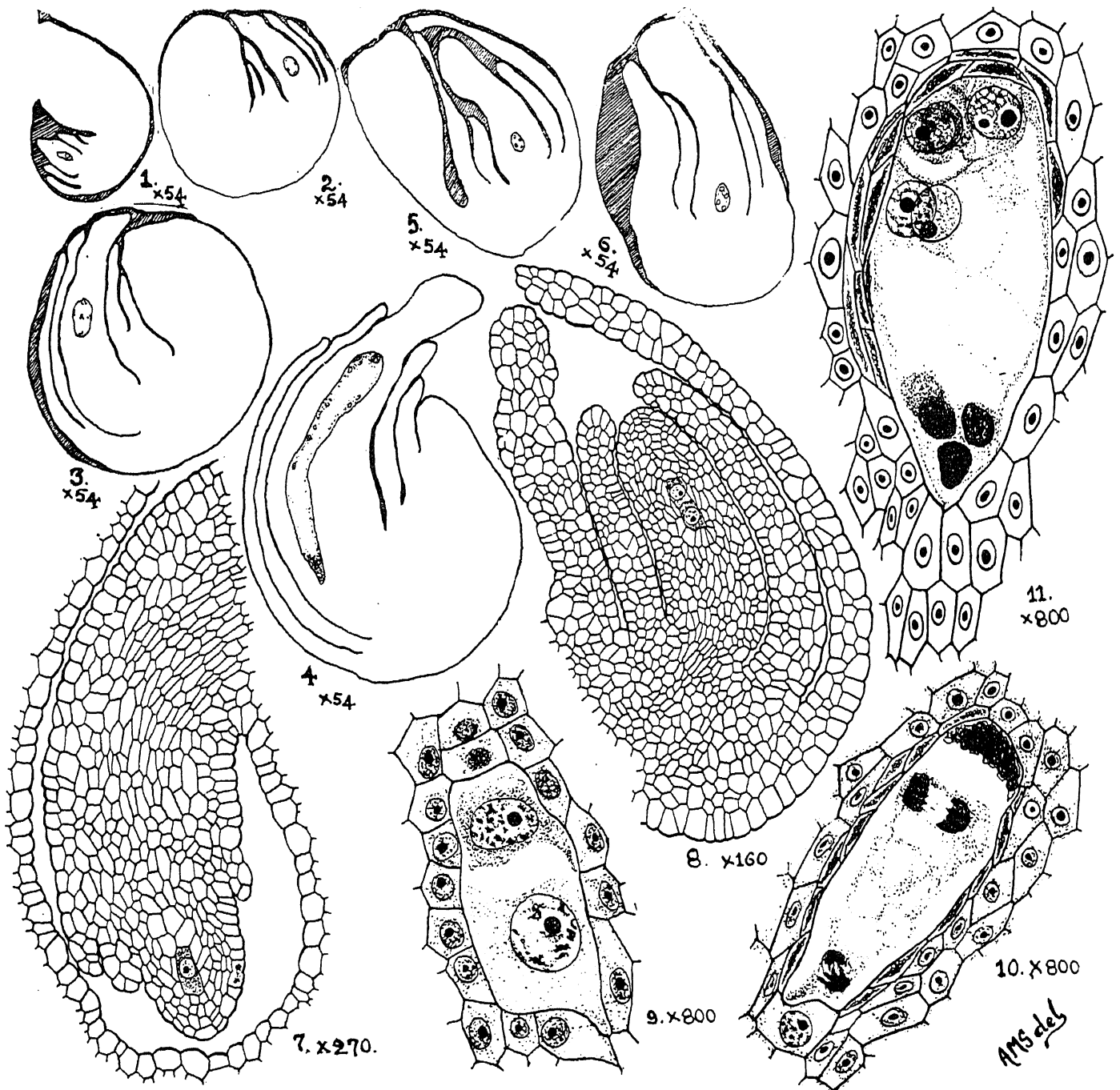
by the rapid multiplication of the parietal and epidermal cells,—projects beyond the outer integument, just when the embryo-sac is four nucleate (Figs. 5 & 6), and gives a characteristic appearance. It is difficult to identify the integuments when the ovule contains a mature embryo-sac.

In *Hiptage madablota* the outer integument remains short and the inner alone grows further (Figs. 1-4). The nucellus projects beyond the inner integument and swells up. The integuments remain distinct even when the embryo-sac has a few-celled embryo (Fig. 4).

In *Malpighia glauca* Poir., the development

of the integuments is more normal (Figs. 7 & 8). Even here the identity of the parietal cells is lost in older stages. As in *Galphimia gracilis* the nucellus is normal in size and it completely remains within the integuments without enlarging.

The ovules in *Malpighia coccifera* Linn. and *Tristellia Australis*, Linn. develop as in *Malpighia urens*. The primary archesporial cell, in both, cuts off parietal cells and becomes deeply situated in the nucellus. Of the many archesporial cells only one functions as the megaspore-mother cell. The development of the embryo-sac proceeds after the "Peperomia-



type" as described for the genera *Hiptage*, *Banisteria*, *Stigmatophyllum*, *Malpighia* and *Bunchosia*. The mature embryo-sacs are sixteen nucleate with four groups of three nuclei with no definite organisation into the egg and synergids; and four nuclei fuse in the centre to form the secondary nucleus. The plants do not set seeds here.

The embryo-sac of *Malpighia glauca* develops after the "Allium-type" (*Scilla*-type) as described by Stenar for *Galphimia gracilis*. The primary archesporial cell after cutting off parietal cells functions at the megaspore-mother cell. Multiple archesporium has not been observed. The mother cell by the heterotypic division gives rise to two approximately equal cells (Fig. 8). The chalazal enlarges and the micropylar degenerates. The nucleus of the chalazal cell divides to give rise to a two-nucleate embryo-sac which ultimately develops into an eight-nucleate one (Figs. 10 & 11). Of the four nuclei in the micropylar end, three organise themselves into the egg-apparatus and the fourth fuses with a nucleus of the chalazal end and forms the secondary nucleus. The antipodals are fairly large and degenerate by the time the fusion of the polars is complete.

Further work on the development of the embryos is in progress and the details will appear elsewhere as a separate paper.

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<sup>1</sup> Narasimhaচার, S. G., *Curr. Sci.*, 1938, 6, 507.

<sup>2</sup> Schürhoff, P. N., Extract from *Die Zytologie der Blütenpflanzen*, Stuttgart, 1926.

<sup>3</sup> Stenar, Helge, *Bot. Notiser*, 1937, 110-18. (Reprint received for reference by the kind courtesy of Dr. P. Maheshwari, University of Allahabad.)

<sup>4</sup> Subba Rao, A. M., *Curr. Sci.*, 1937, 6, 280.

<sup>5</sup> — *Studies in the Malpighiaceae*, 1939 (in course of publication).

<sup>6</sup> Maheshwari, P., *New Phyt.*, 1937, 36, 359.

### Growth of *Pythium hyphalosticton* *Sideris* in Synthetic Nutrient Liquid Media

ROBBINS AND KAVANAGH<sup>1</sup> reported that *Pythium hyphalosticton* and *Pythium aphanidermatum* (Eds.) Fitz., (*P. Butleri*) failed to grow uniformly in their medium C consisting of 5.0 gm. of  $MgSO_4 \cdot 7H_2O$ , 15.0 gm. of  $KH_2PO_4$ , 5.0 gm. of asparagine, 0.5 gm. of  $NH_4NO_3$ , 50.0 gm. of dextrose and 1 c.c. of mineral supplements per litre of redistilled water, either with or without the addition of vitamin B<sub>1</sub>. This medium had a pH of 4.3. They write (p. 231), "We are uncertain whether the failure of these organisms to develop was due to unsatisfactory material used in the inoculation, to the unfavourable character of the basic medium (hydrion concentration, solute concentration), or to lack of growth substances other than vitamin B<sub>1</sub>".

The culture of *Pythium hyphalosticton Sideris*, which is with the author, was obtained from Centraalbureau voor Schimmelcultures, Baarn (Holland). Several nutrient liquid media (10 c.c. in pyrex tubes) were tried. The asparagine was taken up in redistilled water and precipitated with alcohol. This process was repeated thrice. Stock cultures were maintained on oatmeal agar and potato dextrose agar. A bit of mycelium was used as inoculum, care being taken to avoid including any of the agar of the stock cultures with the inoculum, and each tube, after inoculation, was gently shaken the next day to allow the inoculum to sink down in the nutrient solution. The standard incubation was at 25° C. for seven days. At the end of this period cultures were examined microscopically. All experiments were performed in triplicate and all experiments were repeated. Guaranteed reagents of Merck & Co., were used. The hydrion concentrations were determined after autoclaving.

#### I Series:

Solution A: It contained 0.5 gm. each of  $K_2HPO_4$ ,  $MgCl_2 \cdot 6H_2O$ ,  $K_2SO_4$ , 2.0 mg. of  $NH_4NO_3$  and 5.0 gm. of dextrose per litre of distilled water.