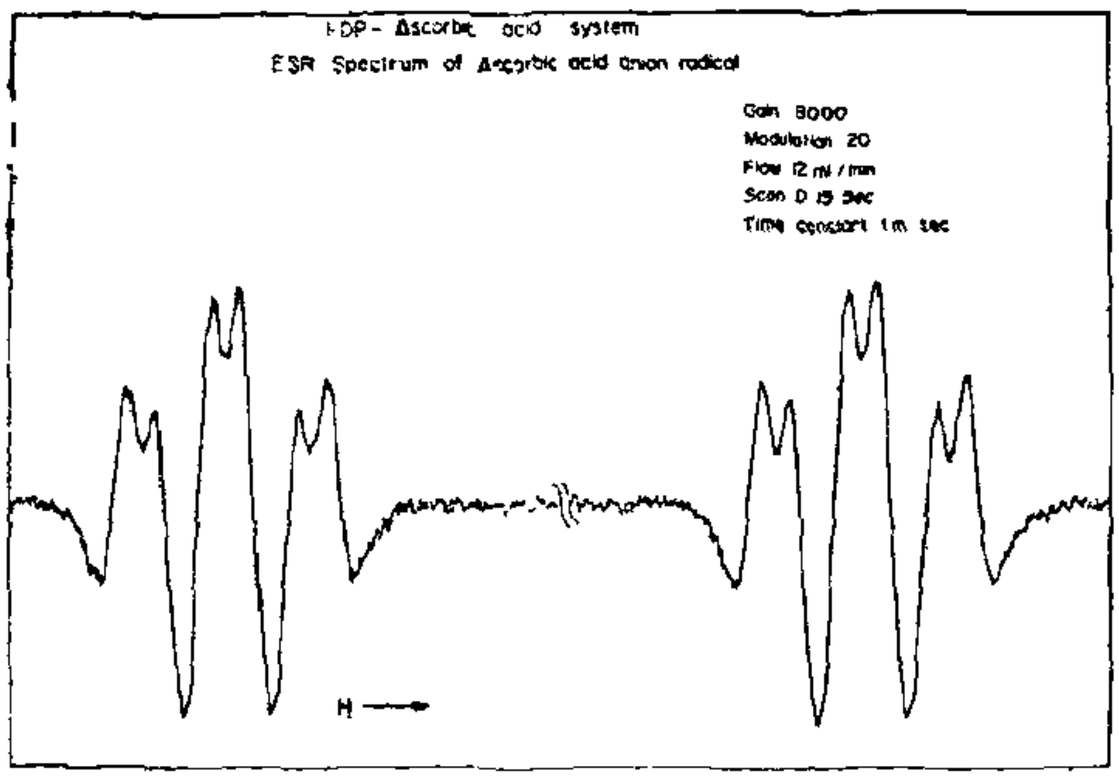
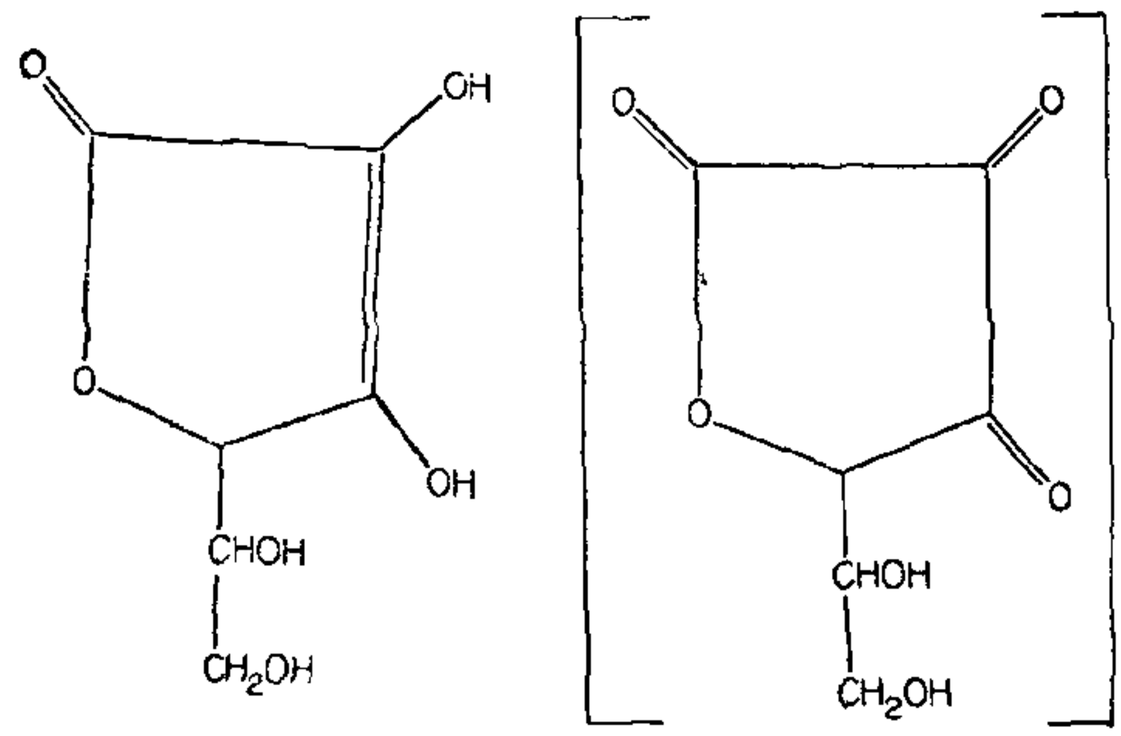


FIG. 1

with account taken of the magnetic field difference between ESR sample and NMR probe positions. Photolysis was performed under flow conditions with a flow rate of 1–2 ml/min.



ASCORBIC ACID ASCORBATE ANION RADICAL

The ESR parameters of this radical (Fig. 1) are found to be $a_{1_H} = 1{\cdot}76$ G; $a_{2_H} = 0{\cdot}07$ G; $a_{3_H} = 0{\cdot}19$ G (2) and $g = 2{\cdot}00517$ which are in good agreement with the literature values[4,5]. The radical anion is relatively unreactive and the pH depndence of the ESR parameters of this radical shows[4] that its pK value is $-0{\cdot}45$. So even in very acidic solution it exists as anion radical and the unpaired electron is spread over the highly conjugated system.

Because of the biological importance of ascorbic acid, a variety of chemical production methods and identification of $\dot{A}S^-$ and the interest on the various thermal reactions of peroxodiphosphate which in many of the cases produces phosphate radical intermediate, the present investigation was carried out and it serves as a clear evidence for the production of AS^- as the transient intermediate. The same radical may also be produced in similar redox reactions involving ascorbic acid as reductant and radical producing oxidizing agents such as peroxodisulphate[13] and many of the one electron oxidants[14] as well.

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SYNTHESIS OF 4-PHENYLCOUMARINS

DURING a programme to synthesise[1] 5, 6- and 7, 8-benzo-4-phenylcoumarins, cinnamic acid was condensed with β- and α-naphthols in presence of $SbCl_3$, $ZnCl_2$, conc. H_2SO_4 in the first step and later dehydrogenated using Pd + C in the second step. It was felt phenylpropiolic acid could be employed advantageously to prepare 4-phenylcoumarins in one step[2]. Accordingly phenylpropiolic acid was condensed with β-naphthol, £-naphthol, phenol, *p*-cresol, *m*-cresol, resorcinol, seasamol and 3,4-dimethoxyphenol in the presence of $ZnCl_2$ at 140–145° to melt the mixture and then heated at 100° for 3 hrs. The corresponding 4-phenylcoumarins were isolated in pure state although their yields were low and in the range of 10–35%. The melting points and properties of the different 4-phenylcoumarins agree in all respects with compounds already

reported[1-7]. Thus the use use of phenylpropiolic acid for the synthesis of 4-phenylcoumarins appeared to be promising though the yields are low and a new synthesis of methyldalbergin has thus been achieved.

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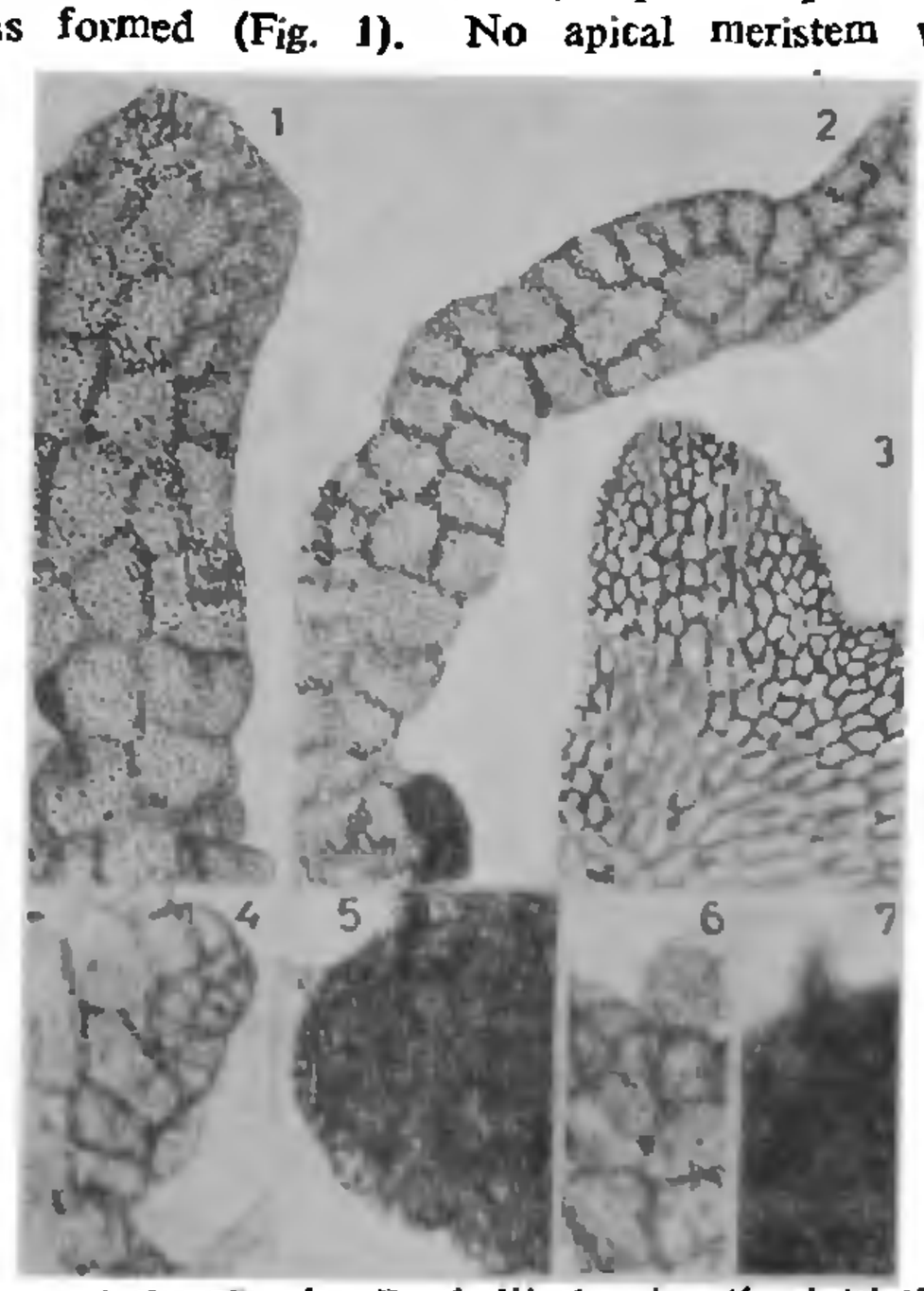
IN VITRO MORPHOGENETIC STUDIES ON THE GAMETOPHYTE OF *ANOGRAMMA LEPTOPHYLLA* (SW.) LINK.

AFTER the first publication of morphological description of the gametophyte of *Anogramma lepotophylla* by Goebel[2], no detailed information is available regarding its development, formation of tubers and sex organs[3]. The gametophyte, being perennial, bears a striking resemblance with that of a bryophyte plant rather than a short-lived gametophyte of other homosporous ferns[4]. Secondly, the growth is predominantly lopsided; and the axiate growth pattern, which characterizes the fern gametophyte in general[1], is deranged, because of the unique nature of this gametophyte, it was felt desirable to see how far the above-mentioned deviations affect the pattern of prothallial development, formation of tubers and sex organs of this interesting plant.

The spores were collected from Mussoorie in late September and surface sterilized in 2% aqueous calcium hypochlorite for 8–10 minutes and sown on Knop's medium of mineral salts, 10 mg/l ferric citrate and 1 ml/l Nitsch trace elements gelled with 0·8% agar. The cultures were maintained under 12 hr. photoperiod at 25 ± 2° C.

Development of the Prothallus

The spores germinated five days after inoculation. The papillate germ cell emerged after rupturing the spore wall, and underwent first mitotic division resulting in two highly unequal cells, the smaller rhizoidal initial and the larger prothallial initial. The rhizoidal initial developed into a rhizoid and the prothallial initial underwent successive transverse divisions to give rise to a uniseriate filament upto five cells long. But sometimes in 2-celled filaments, a vertical division was laid in its terminal cell and the two resultant cells underwent further transverse divisions to give rise to V-shaped twin protonemata. In yet other cases, the spore cells divided by a vertical wall and gave rise to two almost equal-sized cells; the two resultant cells gave rise to a filament each. In such cases the first rhizoidal cell was dealyed since it differentiated after a transverse division in one of the two cells of V-shaped protonemata. The two branches of the V-shaped protonema sometimes grew equally or in other cases, one of the branches over-topped the other. Thus unlike most of the homosporous fern gametophytes, the pattern of protonemal development was variable. A vertical division in the terminal cell of the filamentous protonema initiated two-dimensional growth. After a short period of transverse and vertical divisions, a spatulate prothallus was formed (Fig. 1). No apical meristem was



FIGS. 1–7. Fig. 1. Prothalli showing the initiation of two-dimensional growth in the absence of a distinct meristem, × 138. Fig. 2. Irregularly-shaped prothalli, × 138. Fig. 3. A part of mature gametophyte showing diffused meristematic activity, × 70. Figs. 4–5. Initiation and subsequent developmental stages of tubers, × 160. Figs. 6–7. Formation of antheridia in the proximal region (Fig. 6) and of archegonia in the distal part (Fig. 7) of the tuber, × 160.