and from the perfect, unbroken walls of the individual cells.

K. N. KAUL.

Department of Botany,
University of Lucknow,
July, 1935.

"Dionyle P. W." for Rapid Penetration of Fixatives.

IT is well known that plant material containing air, for example, flower buds and leaves, etc., does not easily sink to the bottom of the tube containing liquid fixatives specially in those which do not contain alcohol and thus the process of fixation is not as rapid as it should be. When there is plenty of air within the tissues the material remains floating on the surface for a long time or it does not sink at all. Usually suction pumps or water aspirators are used to get rid of the air but in many cases even these are not of much help.

A French Engineer Chemist, Mr. Auguste Blondon of the firm S.A.P.I.C., 33, Quai de Seine, L' Ile-st-Denis, Paris, has recently manufactured a chemical product in the powder form known as Dionyle P. W. which, if added to any plant fixative, allows the material to settle to the bottom with great ease. I have seen Dr. A. Eichhorn using this chemical very successfully with roots, flower buds, etc. I myself have used it with success for fixing the ærial mycelium of Pythium. Dr. G. Archambault[1] has tried this chemical and is of opinion that it is very good for rapid penetration of fixatives. He compared the sections of plant material fixed with and without Dionyle in the fixatives and found that the addition of the chemical did not produce any undesirable effects. It has some physical action on account of which pieces of roots sink down rapidly in the fixatives, but in case of leaves and flower buds water aspirators may have to be used for about 2 to 5 minutes. Dionyle is an ether salt of β-naphthalene sulphonic acid with butylic alcohol and isopropylic alcohol. It is easily soluble in water and is neutral in reaction. During the process of its manufacture a little sulphuric acid appears which is neutralised by sodium sulphate, which is not bad for fixation.

In fact it is used in Zenker-formaol[2] fixative the composition of which is given below:

Bichloride of Mercury	.. 5·0 gm.
Bichromate of Potassium	.. 2·5 gm.
Sulphate of Sodium	.. 1 gm.
Distilled Water	.. 100 c.c.

To 9 c.c. of this add 1 c.c. of neutral formaline at the time of using the fixative.

Dr. Eichhorn adds Dionyle to any fixative whatever its composition may be.

In France this chemical is used as steeping agent in Dyeing Industry of wool and cotton in the proportion of 0·4 gm. per 100 c.c. of water. Dr. Eichhorn and Dr. Archambault use the same proportion for plant material. It is added to the fixative before the material is put for fixation or even afterwards. It is not necessary always to weigh it.

The Dionyle P. W. is very cheap and can be had from N. Boube 'e and Cie, 3 place St.-Andre-des-arts, Paris (VI). The price for 50 gms. is 4·50 francs and for 100 gms. is 8 francs, *i.e.*, Re. 0–14–0 and 1–10–0 respectively according to the present rate of exchange. It is better to keep it in glass-stoppered bottles.

R. K. SAKSENA.

Department of Botany,
University of Allahabad,
August 12, 1935.
At Present :—
C/o Prof. A. Guilliermond,
Memb. de l' Inst.,
12 Rue Cuvier, Paris, Ve.

[1] Archambault, G., *Revue de cytologie et cytophysiologie Vegetales*, 1935, **1**, 173-174. (Published by Prof. Guilliermond, Paris.)

[2] Laugeron, M., *Precis de Microscopie, Masson, Paris*, 1934, pp. 342.

A Rare Instance of Change of Tropism in *Arachis Hypogæa*, Willd.

THE ovary of the groundnut flower, after fertilisation, develops a stalk or gynophore at its base. It elongates rapidly carrying the ovary at the apex which piercing the soil buries the ovary, where it develops into a pod. The structure of the gynophore is almost the same as that of the stem. But, peculiarly enough, while the stem is negatively geotropic, the gynophore is always positively geotropic. This tendency is shown very early even when the gynophore is just a few millimetres long. In 1932, the authors came across a unique specimen of a groundnut plant of A.H. 32—a Spanish Bunch variety, grown under dry conditions (Fig. 1) in which the "pegs" or gynophores exhibited different degrees of geotropism :—14 pods developed normally and produced seeds; 7 gynophores were quite erect showing

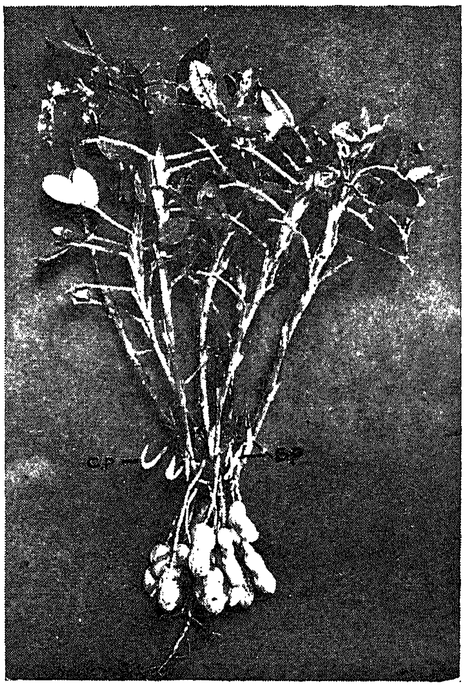


Fig. 1.

Groundnut plant with negatively geotropic gynophores. E.P.—Erect peg. C.P.—Curved peg. × 1/4 Nat.

complete, negative geotropism; 4 gynophores after a period of normal downward growth began curving upwards, exhibiting change of tropism.

There was development of chlorophyll at the dilated and pointed apices, *i.e.*, the ovule-bearing portion of some of the abnormal pegs. One of these was quite green like a stem. The abnormal pegs did not produce normal pods and seeds.

With regard to the other morphological characters there was nothing unusual. The few normal seeds obtained from the abnormal plant were sown; but the offspring was quite normal and no peg showed either partial or complete negative geotropism. The chances for the occurrence of the abnormality seem to be very rare being less than one in a million, and no specimen other than the one mentioned could be found during the last three years.

With a view to explain the abnormality, a histological study was attempted. The epidermal cells at the tip of the normal gynophores (Fig. 2) are found to contain many round bodies—plastids. There are as many as 5–20 bodies in each of the cells at the tip. The number of the bodies gradually decreases away from the tip. They are round and 1 μ to 4 μ across. In specimens fixed in formalin-acetic alcohol, and stained with Haidenhain's hæmatoxylin, the plastids are

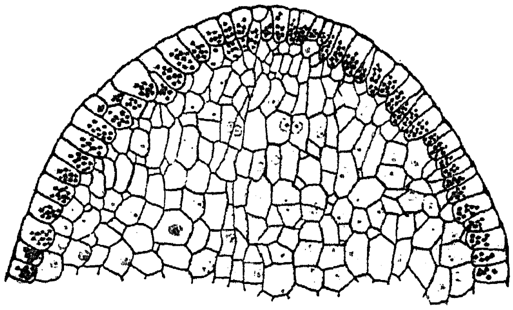


Fig. 2.

Longitudinal section of positive geotropic gynophore with numerous dark bodies in the epidermal cells. ×120.

seen as dark bodies almost filling the upper part of the cell cavity (in sections 10 μ thick) (Fig. 2). But in the abnormal pegs, the plastids are comparatively few or wanting (Fig. 3). When present they appear shrunken and much smaller than the normal.

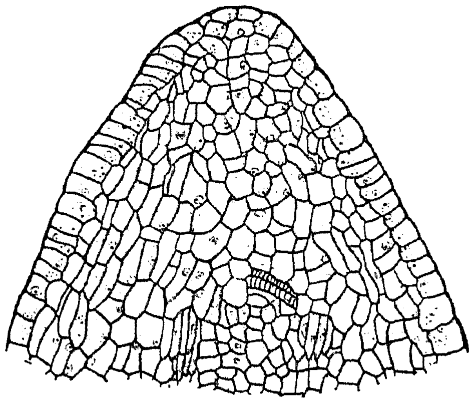


Fig. 3.

Longitudinal section of negatively geotropic gynophore with a few disintegrating bodies in the epidermal cells. ×120.

Waldron, R. A. (1919) while recognising the effect of gravity in bringing about the downward growth of the gynophore, considers that "the presence of definite granules in the lumen of each of the epidermal cells of the gynophore at the tip and their absence anywhere else suggest the possibility of such being the structures by which the organ perceives when it is out of line with gravity". He had, however, no opportunity to study the behaviour of negatively geotropic gynophores.

The effect of gravity alone is not the immediate, decisive factor in bringing about the downward growth or positive geotropic movement of the normal peg. Because in spite of gravity some of the pegs changed the direction of growth, there must be a cause more directly responsible. From the abundance of the plastids in the normal pegs and their scantiness in the abnormal ones, it may be inferred that these bodies or the organs of perception that respond to gravity and bring about positive geotropic movement. The plastids appear first after fertilisation. If they are not formed at that time, the peg grows quite erect. In some pegs, the number and the size of the plastids get diminished, or they might disintegrate, after a period of normal growth; and then the peg curves upwards and becomes negatively geotropic. The function of the plastids is not analogous to that of the freely moving starch grains in certain grass roots, where they are said to bring about curvatures due to internal excitement set up by them (Statolith theory of geotropism). Unlike the starch grains, the plastids are confined to the upper part of the lumen of the cell. Their exact nature and the reason why after a period of normal functioning, they become affected and functionless, in certain rare instances, are not known; further study is expected to throw light on this very interesting subject.

The abnormal pegs did not produce any pods and seeds possibly for want of medium of sufficient resistance. In a set of experiments conducted in the Oil Seeds Section, the developing gynophores were made to enter artificially made up media. For this bamboo tubes about six inches long and about an inch in diameter and having a node septum at one end to act as bottom, were filled each with wet and dry, ordinary soil, stiff clay, sterilised sand, powdered wood charcoal, saw dust, cotton wool and also water separately. Empty tubes, dry and moist, were also set up. The tubes were buried in the soil to keep them in position and were covered with circular paraffined straw boards to make the tubes dark inside. Small perforations just to allow the passage of the gynophore were provided. Pods developed uniformly in the soil, clay and powdered charcoal irrespective of the medium being moist or dry; but pods did not form in the other media, *viz.*, saw dust, cotton wool and air, possibly for want of sufficient resistance.

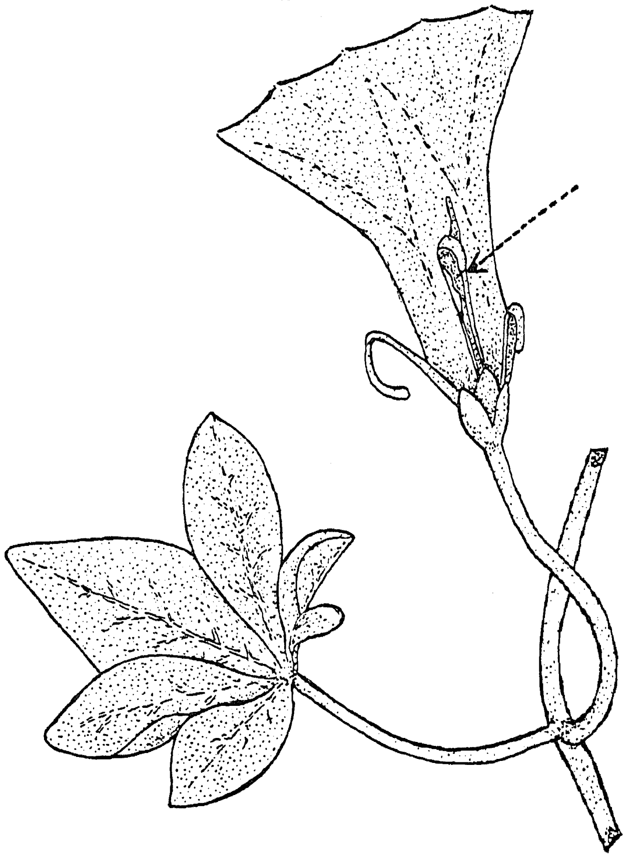
J. S. Patel.
G. V. Narayana.

Oil Seeds Section,
Agricultural Research Institute,
Coimbatore,
June 7, 1935.

Duplicate Corolla in *Ipomœa palmata* Forsk.

Ipomœa palmata Forsk is a common garden convolvulus in Bombay. Ordinarily its flowers have a single infundibuliform corolla.

Recently, a plant of this species has been observed putting forth flowers which bear five additional free petaloid structures about



3 cm. long and 0·5 cm. broad; arising outside and jointly with the base of the corolla. The facing of this new whorl is inside out.

This additional development in a large number of flowers on a single plant is worth registering.

S. C. Dixit.

Wilson College,
Bombay 7,
July 22, 1935.

Studies in the Development of the Pollen Grain and Embryo Sac of *Wolffia arrhiza*.

This interesting plant—the smallest angiosperm known—is seldom seen flowering. In November, 1933, the writer found it flowering abundantly near Agra. A study of the development of the gametophytes revealed several important differences from those of *Lemna minor* (Caldwell, 1899).[1]

Microsporogenesis and Male gametophyte.—The stamen, in early stages, consists of a very short filament and a spherical anther containing a mass of homogeneous cells