PLANT PHYSIOLOGY

Seedless Fruits Formed in Unpollinated Flowers

Salve Containing Growth-Promoting Chemicals Rubbed On Cut Surface of Ovary Induced Fruiting in Plants

SEEDLESS tomatoes and peppers have been induced to form in unpollinated flowers by treating the fruit-producing parts, or ovaries, with any one of four different organic acids, Dr. Felix G. Gustafson of the University of Michigan has reported to the National Academy of Sciences through that body's official *Proceedings.* (November.) Similar results were also obtained with the fruits and seedpods of other vegetables and garden flowers.

While no immediate commercial application is contemplated, it is interesting to note that in the tomatoes at least the seedless specimens had very small locules or seed-spaces—indeed in some of the smaller ones the flesh was completely solid. Immediate commercial exploitation is regarded as impracticable at present because each flower requires individual operation by a skilled botanist. The real significance of the experiments is proof that fruit production without pollination is possible by use of growth-promoting substances.

Growth-Promoting Chemicals

The chemicals used by Dr. Gustafson were indole-propionic acid, indole-butyric acid, indole-acetic acid, and phenylacetic acid. All of these have been used by a number of botanical researchers to promote the growth of stems, leaves, etc., on dormant plants and parts of plants. One, indole-acetic acid, has been found in extracts of plants and has been called heteroauxin because it acts in promoting growth like auxin, the natural growth-promoting substance.

The four acids were mixed into a kind of salve with hydrous lanolin for application to the places where growth promotion was desired. In this, Dr. Gustafson followed the technique developed at the Boyce Thompson Institute for Plant Research at Yonkers, N. Y., by Drs. P. W. Zimmerman and A. E. Hitchcock, which won for its originators the $1,000 annual prize of the American Association for the Advancement of Science a year ago.

In the experiments, the stigma or natural pollen-receiving surface was cut off and the growth-promoting acid preparation smeared on the cut surface. From there it diffused into the unpollinated ovary and caused the development of all parts except the fertile seeds themselves. In some of the species used, seeds did develop, but when they were cut open they were found to be hollow, without the tiny embryo plant necessary for germination. In other cases, as in the seedless tomatoes, the fruits grew and ripened normally and did not contain even hollow seeds. In still other cases, relatively little fruit developed.

In all the experiments, parallel controls were carried through. This was done in two ways: by pollinating companion flowers to the ones under treatment, and by keeping others both untreated and unpollinated. The pollinated flowers developed fruits or pods with seeds, as was expected, while the unpollinated ones died and dropped off.

Dr. Gustafson sums up the results of his numerous experiments in two sentences: "The significance of these experiments seems to be that definite substances, which are not specific, cause the ovary of a flower to develop into the fruit. These substances seem to be closely related to the auxins."

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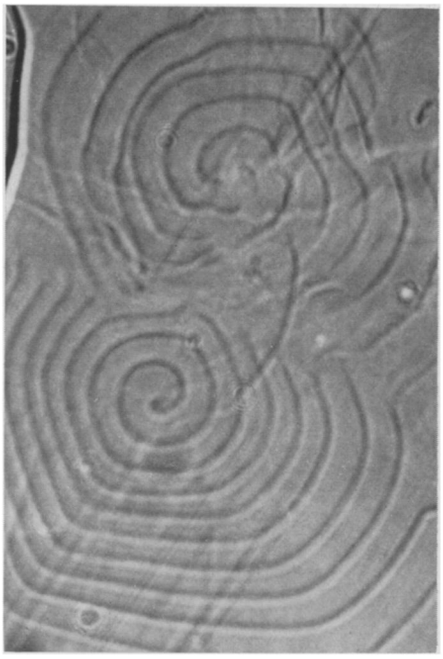
PHYSICS

Spiral Organization Now Found in Paraffin Crystals

See Front Cover

SPIRAL ORGANIZATION, so common in plant and animal life and almost universal in nebulae, is a very rare phenomenon in inanimate molecular structures. Preserved in Princeton's museum is a carborundum crystal that has on it a spot the size of a pin head, which when magnified, shows a simple but perfect spiral. Also, in rare cases the face of a quartz crystal properly etched will show a type of spiral.

Spirals in abundance and of rare beauty have recently been discovered by Prof. C. M. Heck of North Carolina State College, and that too in common paraffin. Shown on the cover of this week's SCIENCE NEWS LETTER is one of these spiral crystals as it grew from a solution of paraffin in mineral oil. It is magnified 1,200 diameters and shows each convolution repeating with exactness the exterior outlines of the crystal, a significant element of the discovery.



UNUSUAL

Crystals seldom have a structure in spiral form if they are of inanimate substance. These paraffin crystals are an exception. Notice the clockwise and counter-clockwise direction.

Professor Heck discovered these crystals while researching on the equilibrium conditions shown between solid and liquid compounds of the paraffin chemical series. His findings are proving of much interest to the refiners of oils and gasolines as they show paraffin crystals to be sensitive detectors of foreign materials when in these products. The crystals vary their shape and internal structure markedly. For example, these spirals are found to double and become twin spirals in certain cases, one spiral turning clockwise and the other counter-clockwise in most cases.

No explanation of the spiral formation is given by Professor Heck though he finds strong indications that all tabular paraffin crystals have a spiral structure which becomes visible only in exaggerated cases. Analysis with polarized light so far has not shown any difference between crystals with visible spirals and those without them.

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