

Effect of the Fungicide 'Granosan' on Atypical Growth and Chromosome Doubling in Plants

IN studying the effect of several insecticides and fungicides upon the procedure of meiotic processes I found that they induce a series of abnormalities, which further lead to production of hereditary variations, thus speeding up the process of the 'degeneration of the pure lines' in various degrees^{1,2}.

I studied recently the effect of the fungicide 'Granosan' (2 parts of $\text{CH}_3\text{CH}_2\text{HgCl}$ + 93 parts of talc) upon mitosis. Treating germinating grains of *Secale cereale*, *Triticum vulgare*, *T. persicum*, *T. durum*, *T. polonicum*, and *T. aestivum* with 0.5-0.1 per cent Granosan (that is, 0.01-0.002 per cent ethyl mercury chloride) for 3-6 days (some experiments were continued for three weeks) swellings of the root tips and of the whole seedlings occurred. Studying these seedlings cytologically, I found that the agent has induced abnormal mitosis similar to those induced by colchicine and acenaphthene, namely, failure of (rather abnormal) achromatic figures, chromosome multiplications, multinucleations, and formation of large amoeboid nuclei.

Occasionally chromosome doubling and large nuclei in the root tips of similarly treated seedlings of *Pisum sativum* occurred; but amoeboid nuclei and multinucleations were not so frequently observed. Consequently, Granosan is a more effective agent in treating leguminous plants than acenaphthene. Germinating seeds treated by Granosan for induction of polyploidy are not attacked by fungi, while those treated by colchicine are usually severely attacked.

The induction of atypical growth and chromosome doubling in Gramineæ by Granosan, and in a degree of colchicine and acenaphthene, shows that these biologically active properties of the compounds have nothing to do with the cyclic or heterocyclic structures of the molecules of the active compounds.

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¹ Kostoff, D., "The Degeneration of the Pure Lines", Sofia (1930).
² Kostoff, D., *Bull. Soc. Bot. Bulgarie*, 4, 87-92 (1931).

Points from Foregoing Letters

H. Carmichael and C.-N. Chou have measured cosmic ray ionization bursts underground and have calculated the rate of production of such bursts by mesons; they obtain fair agreement. Their measurements of bursts at sea-level, however, provide evidence of wide cosmic ray showers which originate in the atmosphere but evidently do not come from mesons. These wide air showers may be of two kinds.

In order to explain the anomalous dense spacing of nuclear resonance levels in the region of the rare earths, I. Gurevich suggests that nuclear matter undergoes a phase-transition at a certain temperature in a similar way as liquid helium and conductivity electrons in metals.

E. J. W. Verwey finds that the transition point in magnetite at about 120° K. is of electronic nature, and is probably connected with an order-disorder transition in the distribution of 8 electrons about 16 equivalent metal ions in the unit crystal cell. When a sample of pure, sintered magnetite is cooled a sudden increase of the electrical resistance by a factor of the order 100 occurs at the transition temperature; this phenomenon can be suppressed, however, by an excess of oxygen in the lattice.

In his investigations of the change in the coefficient of expansion α of CS_2 at low temperatures (+ 20° to - 112°), J. Mazur finds that the minimum of α is reached at a temperature of - 80° C.

R. O. Carter and J. L. Hall find the molecular weight of calf thymus nucleohistone to be approximately 2,100,000 and the molecule to be highly elongated. The protein is electrophoretically homogeneous but the effective charge of the molecule calculated from titration data is not in agreement with the charge calculated from mobility data alone.

Contrary to our present views, Kurt G. Stern and Joseph L. Melnick have found that a heart muscle preparation containing succinic dehydrogenase, cytochromes *a*, *b* and *c*, and cytochrome oxidase is unable to catalyse the oxidation of succinate by molecular

oxygen. When an activating principle of protein nature is added to the system, the aerobic activity towards succinate is restored.

M. Frankel and E. Katchalski state that certain amino acid esters (glycine ethyl ester, alanine ethyl ester) can under suitable conditions be condensed to hitherto unknown polypeptide esters of considerable chain length.

L. Zechmeister and O. Frehden find that the accumulation and isolation of two interesting compounds can be carried out by submitting a petroleum extract of lignite to the chromatographic analysis: one, showing high reducing power and belonging to the ascorbic acid-reducing acid-reductone group, and another, which seems to belong to the triterpenes.

J. B. Gatenby and Olive E. Aykroyd have shown that curettings from early interrupted pregnancy cases may be recognized by the presence of large secretion granules in the uterine gland cells.

G. M. Findlay and F. O. MacCallum state that spontaneous yellow fever has occurred, at an interval of 71 days, in two rhesus monkeys, *Macaca mulatta*, kept under laboratory conditions in separate animal houses. Mosquitoes were not present, but certain arthropods, which must be considered as possible vectors, were found.

An instance is recorded by R. M. Neill of a female salmon (*S. salar*) returning to sea, after spawning migration with matured ova undischarged and after a year's normal growth in the sea, reascending into fresh water; when the ovary showed in addition to undischarged ova in an advanced stage of resorption, a new crop of young developing ova normal to fish ascending in spring.

H. Pettersson, F. Gross and F. Koczy describe a vertical plankton shaft which affords facilities for culture experiments on a large scale. Satisfactory results were obtained with both phyto- and zooplankton.