SYMPOSIUM ON CHROMOSOME BREAKAGE*

THE suspicion that chromosome breakage and rearrangement may be one of the causative agents of malignancy has highlighted a study of these phenomena which had already assumed importance in view of their presumed role, along with gene mutations, in organic evolution. The foundation for investigations on chromosomal breakage had been laid nearly three decades back, when Muller discovered that the rate of their spontaneous occurrence could, like gene mutations, be accelerated by exposure to radiations. In spite of this, active work in this field is of very recent origin

The volume under review consists of twenty-four papers which have been arranged in four parts, *viz.*, (*i*) Radiation Breakage, (*ii*) Chemical Breakage, (*iii*) Secondary and Spontaneous Breakage, and (*iv*) General. Even though the phenomena dealt with are of sufficient importance to warrant a careful perusal by biologists belonging to the different disciplines, the use of specialized and exclusive terminology and symbols has tended to make the contributions intelligible only to those who have actively followed work in this field.

Many of the earlier conclusions have had to be modified in view of the evidence now available that chromosome breakages may be of different types "Now we see that with each kind of treatment, the period of breakage may be limited in its own way. And with each kind of cell or nucleus, the period of union may be similarly limited or concentrated" (p vii). There are many differences between the action of radiations and chemical mutagens. Unlike ionising radiations, chemical mutagens are capable of inducing breakage of heterochromatin in resting nuclei. In *Vicia*, while the breakage induced by chemicals is of chromosomes, the union is between chromatids.

The doubt is engendered whether breakages induced by chemicals are comparable to those arising after exposure to ionising radiations. As Revell remarks: "There is thus no *a priori* reason to expect that effects produced by mutagenic chemical compounds should show the same random distribution as those produced by ionising radiations, since there is no reason to suppose that a chemical substance can act on the chromosomes in the sort of randomly corrosive fashion which has sometimes been assumed" (pp. 107-08)

The tetraploid cells and diplochromosomes seen in X-rayed tissue of *Triticum* (pp. 86-89) are attributed to the suppression of mitosis During tissue differentiation the cells are known to become endopolyploid. Such transformations take place in the absence of a spindle. Whether ionising radiations could be used as a tool in investigations on the problem of endopolyploidy in relation to tissue differentiation would be worth attention Reference is made by La Cour (pp. 173-74) to the very high percentage of breakage in the activated cells of the pericycle as a result of damage to the meristem. Unfortunately evidence is not available that differentiated cells when activated are all capable of normal dedifferentiation.

The cytological changes that accompany tissue differentiation still remain unexplored. Under the circumstances, it would be sheer optimism to expect that by pulling apart the chromosomes and thus the genes we would be able to get an idea not only of "how they work" but also of "what is needed to make them work" (Darlington, p v). A careful perusal of published literature relating to *Drosophila* would show that when a cell becomes endopolyploid there may be differential reproduction of (*a*) chromosomes constituting the mitotic complement, (*b*) eu- and hetero-chromatin of the same chromosome, and (c) may be of even the different regions of the euchromatin If these changes really do occur, different genic balances would be produced in different tissues. Thus the final picture may have no relation to what is seen in meristematic or germ cells As Darlington states, the Symposium has produced answers to questions "that did not concern us more easily than those that did" (p. viii).

The volume would be a welcome addition to any cytological library.

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