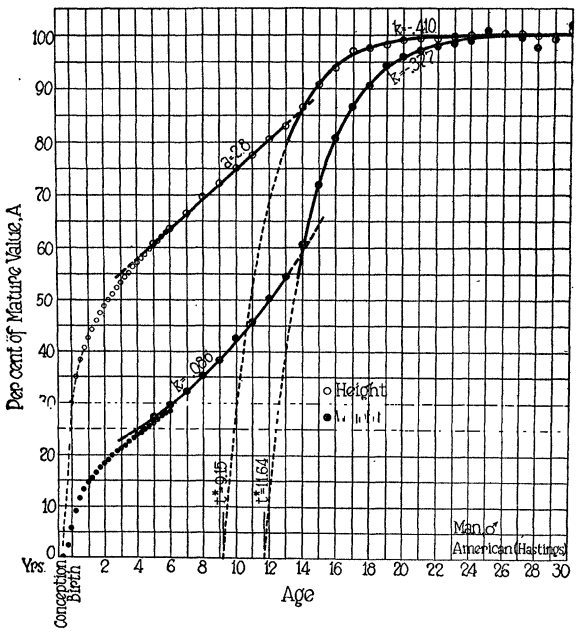

FIG. 4. Weights and heights of man at different ages expressed as percentages of the mature values. While growth in weight between 4 and 14 years takes place at a constant percentage rate (8.6 per cent. per year) growth in height takes place at a constant time rate (2.8 units per year). Data cited by Baldwin.

stant percentage rates of growth in volume and constant time rate of terminal growth both imply that the physiological environment with respect to the growth-limiting process remains constant.

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PROGENIES FROM X-RAYED SEX CELLS OF TOBACCO

IN January of this year two greenhouse plants of *Nicotiana tabacum* var. *purpurea* (U. C. B. G. 27014)[1] in full flower were exposed to moderately hard X-rays. Immediately thereafter all open flowers were removed and the remaining buds trimmed to a series of size classes. Within 48 hours all buds except those in which pollen was formed had fallen. In these larger buds the primordia of female sex cells had been set apart and in the majority the megaspore mother cells were in meiotic prophases or divisions. Seed from 7 capsules produced by selfing the flowers from these larger buds have given some 1,000 plants, which began to flower in July.

At the seedling stages the presence of variant plants was apparent. At maturity over 20 per cent. of the total were striking variants; in one population of some 200 plants there were over 70 per cent. of variant individuals. While it is possible roughly to separate these variants into classes on the basis of total external morphology, no two of them are identical. In estimating individual character contrasts an attempted classification has shown 5 flower color types, 8 flower shape types, 6 habit types, and 10 leaf shape types, with many other less obvious but constant differences in expression as compared with the control. Apart from recessive effects which may appear in subsequent generations, the results of hundreds of larger or smaller changes appear in these progenies. With some marked exceptions, fertility in general parallels extent of total variation—the more abnormal, the more sterile. However, only a very few individuals, if any, fail to produce at least a few viable eggs.

Detailed cytological examination of a number of variant plants indicates (a) that they often are $2n = 48$ as in the control—*i.e.*, that the variants are not solely the result of a disturbance of the meiotic distributional mechanism; (b) at diakinesis, P. M. C. may show lack of ability to pair on the part of one or more pairs of chromosomes, indicating that some decided genetic modification has occurred; (c) that occasional production of 2n pollen grains occurs, possibly as a result of failure of cytokinesis in the archesporium; (d) that their somatic tissues may show nuclear and other abnormalities equivalent to those often described as following irradiation of somatic tissues and thus suggesting that these latter effects may be solely the expression of initial nuclear modification and possibly heritable.

Progenies from these populations and from subsequent X-raying of *tabacum* and other *Nicotiana* species are being grown. Special attention is being given to effects of irradiation on mature pollen, since with such material the X-ray technique may be standardized and simplified. Despite the absence of direct evidence of the heritable nature of the effects produced, the extent and character of the variations in hand, the fertility relations displayed and the cytological information obtained suggest that data, in the case of a plant of economic importance, confirming the results of Muller's X-ray experiments, may be forthcoming.

It is interesting that two similar efforts, one on the animal and the other on the plant side, to accelerate evolutionary processes should have been carried on simultaneously.

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[1] This variety has been grown here in the pure line for many years and has been subjected to genetic and cytological examination in many intra- and interspecific hybrids (*cf. Univ. Calif. Publ. Bot.*, vols. 5 and 11).