STUDIES OF HYBRIDS IN THE GENUS DIGITALIS

I. THE CYTOLOGY OF A STERILE HYBRID BETWEEN DIGITALIS DUBIA AND DIGITALIS PURPUREA

by

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Several years ago Professor HESLOP HARRISON produced hybrids between Digitalis dubia × D. purpurea and between D. dubia × D. purpurea var. alba for certain investigations of his own; these plants, after he had dealt with them, were transferred to the garden attached to the department of Botany and Genetics and handed to me for cytological purposes.

Of the species used D. dubia is a form endemic to the Balearic Islands. The D. purpurea var. alba was a pure breeding race with completely white flowers. The hybrids were intermediate in most characteristics but displayed marked heterosis. Attempts to secure seeds by self pollination and by backcrossing on the parents were undertaken for two successive seasons without success; it may be concluded therefore that these hybrids were completely sterile.

A detailed cytological examination 1) was made of the reduction division stages in the hybrid D. dubia × D. purpurea and its parents, accompanied by certain observations of the somatic chromosomes in the root-tips; further, some stages of the reduction divisions in the

1) The results of this work have been briefly summarised in "Abstracts of Theses for Doctorates presented by candidates who have received the degrees in Convocation during the Academic Year 1932—1933".

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hybrid *D. dubia* × *D. purpurea* var. *alba* were studied with similar results although sufficient material was not obtained for such a complete survey as in the case of the former hybrid.

**Methods**

Buds were fixed in Champy's fluid and also the Carnoy-Langlet method was tried. The root-tips were fixed in Nawaschin's Modification of Langlet's Fluid. All fixatives were satisfactory.

The material was embedded in paraffin wax, sections were cut at 6μ thickness and all staining was done by the Heidenhain Ironalum and Haematoxylin method.

**Cytological Observations**

The parental plants were first examined. *D. dubia* was found by examining root-tips to have a somatic chromosome number of fifty six. The chromosomes are in the form of short curved rods, each about 1.3μ to 1.4μ in length, with only very slight size variation among them. In appearance they resemble those of *D. purpurea* (fig. 1). In many cases on examination of metaphase plates in root-tips, at least two of the chromosomes could be seen each to carry a satellite.

The reduction divisions were also examined, and these were always found to be perfectly regular. Twenty-eight bivalent chromosomes were counted at the heterotype metaphase stage and when homotype plates were observed twenty-eight chromosomes were found to be present (fig. 2).

The *D. purpurea* parent was studied in the same manner. As was to be expected the somatic number was fifty-six, and the haploid number twenty-eight. Two of the chromosomes in each somatic plate bore satellites (figs. 3—4).

Root-tips from the hybrid plants were examined, and here again the somatic number was fifty-six, the sum of the haploid numbers of each parent. In many cases at least two satellited chromosomes could be observed in the metaphase plates (fig. 5).