Chromosomes of *Secale Kukrijanovi* Grossh.

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中島吾一：ククリャノヴィライの染色体

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Introduction

So far, in the genus *Secale*, 7 species, *Vavilovii*, *fragile*, *ancestrale*, *africanum*, *montanum*, *dalmaticum* and *Kukrijanovi* were described by taxonomists in addition to *cereale*. In the genus *Secale*, researches on the chromosomes of cereale were carried out by many investigators from early days. Vast number of reports have been published on the cytological researches on the species *cereale* since Sakamura (1918), Kihara (1924) and others. Moreover, the researches on some of the other species were reported by Kostoff, Dokadkina and Tichonova (1935) and many others.

Yet no cytological studies have been carried out, so far as I know, on the remaining two species, *dalmaticum* and *Kukrijanovi*. Some cytological studies on the species *Kukrijanovi* were made by the present author and the results obtained will be dealt with in this paper.

Material and Methods

The seed of *Kukrijanovi* was sent, through the hand of S. Hori, Professor of Gumma University, from G.F. Makkink of Netherlands.

The root tip cells fixed with Nawaschin's solution, were used for the observation of somatic chromosomes and the permanent preparations were made by the paraffin method. The anthers were fixed in Carnoy's fluid and preserved in 70% alcohol, and by means of aceto-carmine smeare method the meiosis in PMC's were observed.

Results of observations

The number of somatic chromosomes in root tip cells of this species was counted to be 14, just as in the other 6 species of the genus *Secale*, and the chromosomes have almost equal size and they are all

Fig. 1.

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bent slender rod or stick in shape (Fig. 1) as in the case of *Triticum*. 2 members (one pair) of these 14 chromosomes (7 pairs) have each a satellite at one end.

At heterotypic metaphase in meiosis of PMC's of this plant, 7 gemini of equal size were observed as in the case of other species of the genus. The group of the 7 gemini is composed of ring shaped and stick shaped ones. The former ones are more frequently observed than the latter, viz., the former ones were observed up to 7 and the latter are at most 4 in one PMC. The frequency of stick shaped bivalents in one PMC's is shown in Table 1.

Table 1. Frequency of stick shaped bivalents at heterotypic metaphase in one PMC's

Number of stick shaped bivalents	0	1	2	3	4	Mode	Total
Frequency	17	42	57	15	6	2	137
%	12.41	30.65	41.61	10.95	4.38	41.61	100.00

In heterotypic metaphase, one of the 7 bivalents was often observed to split into two univalents earlier than the other ones (Fig. 2, 4, 5). Such cases as this were already observed in the species *Vavilovii* (Nakajima 1953). These precociously dividing univalents were usually distributed to opposite poles at ana-telophase, but though rare, the 2 univalents were seen to distribute to one pole together (Fig. 5).

In heterotypic ana-telophase, every bivalent is divided into two elements, each of which being separated and finally distributed to the opposite poles as in the case

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

of many normal pure species. In rare cases, however, a chromosome bridge or 1~3 laggards were observed at heterotypic ana-telophase (Fig. 6).

In homotypic metaphase 7 chromosomes were observed and one of them was divided into two parts earlier than the other ones. In homotypic ana-telophase one or two laggards were sometimes observed (Fig. 9).

Generally speaking, the meiosis of PMC's was proceeding normally as in most pure species.

Fig. 8.

Fig. 9.

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Explanation of Figures

Fig. 1. Somatic plate in a root tip cell of *Secale Kukrijanovi* Grossh. $\times 3000$

Figs. 2-9. Maturation division of PMC's. $\times 2300$

2. Polar view of heterotypic metaphase, $6II+2I$ (2 univalents drawn in white were derived from one bivalent earlier);
3. do. $7II$, one stick shaped and 6 ring shaped;
4. do. $6II+2I$, univalents distributed to opposite poles;
5. do. $6II+2I$, 2 univalents distributed to one pole together;
6. do. 2 laggards;
7. do. 4 laggards;
8. do. one chromosome bridge;
9. do. 2 laggards in each cells.