Journal of the Minnesota Academy of Science

Volume 19 | Number 1 Article 8

4-1951

A Study of Microspore Quartet Types in Corn Heterozygous for Translocations

R. H. Whalen

THE EXISTENCE OF A TOXIC PRINCIPLE IN RAW SOYBEAN MEAL

IRVIN E. LIENER
University of Minnesota

Published in J. Biol. Chem. 1951, Vol. 193, pp. 183–191.

MEIOSIS OF SAMBUCUS PUBENS

MARY M. KEEFFE
College of St. Thomas

ABSTRACT

Winter twigs of *Sambucus pubens* were collected on three occasions during March, 1951. They were placed in water and within a week the buds grew rapidly and underwent meiosis which extended over a period of approximately eight days. Acetocarmine smears were made after pretreatment of the buds. *Sambucus pubens* has a chromosomal number of 36, whereas most of its relatives have 18. Sax reported that the 36 chromosomes of *Sambucus pubens* might be due to allopolyploidy arising from a cross of two naturally occurring species of Sambucus. The present observations of the meiotic process disclosed nine large chromosomes at diakinesis and metaphase I. Therefore, there is indication that *Sambucus pubens* represents, not an allopolyploidy as Sax suggested, but an autopolyploidy.

A STUDY OF MICROSPORE QUARTET TYPES IN CORN HETEROZYGOUS FOR TRANSLOCATIONS

R. H. WHALEN
Student, University of Minnesota

In corn, the sixth chromosome pair is associated with the nucleolus. This is due to the presence of a nucleolar organizing region located on the short arm just back of the terminal satellite portion. Normally, when meiosis is completed, each of the four spores of the resulting microspore quartet will have one number 6 chromosome and consequently one nucleolus. If, however, a spore of the quartet fails to receive an organizer the nucleolar material will remain scattered in several small bodies.

A plant heterozygous for a translocation between two different chromosomes forms a ring of four chromosomes at metaphase I. When one of these chromosomes is number 6, a study of spore quar-

tets gives information on disjunction of the chromosomes in the ring. If the break in chromosome 6 is in the short arm, a crossover in certain segments results in one spore of the quartet having diffuse nucleoli. When two adjacent chromosomes in the ring go to the same pole, two spores in the quartet have this diffuse appearance. By counting the different types of spore quartets it is possible to obtain information on disjunction of chromosomes in the ring (e.g., whether adjacent chromosomes pass to the same or to opposite poles). Such studies have been reported by McClintock[1] and by Burnham.[2, 3] He found a wide variation in the frequency of crossover type quartets in a translocation between chromosomes 5 and 6 (T5-6c).

To study further the variation in this translocation, sporocyte collections from the same plant were made at 2- or 3-day intervals. Acetocarmine smears of microspore quartets were prepared from these collections for two plants. The frequencies of quartets having 0, 1, or 2 spores with diffuse nucleolar material were recorded. The 1-diffuse quartets were the crossover quartets, while the sum of the 0- and 2-diffuse quartets was the non-crossover quartets. The data are presented in the following table:

CROSSOVER TYPE QUARTET FREQUENCIES BY DATES IN PLANTS HETEROZYGOUS FOR TRANSLOCATION 5–6C

Plant	*July*	*C. O.*	*Total*	*% C.O. type*
4–8	22	231	382	60
	24	293	442	66
	26	288	453	64
			Average	63
5–2	26	211	442	48
	29	637	1164	55
	31	308	472	65
			Average	56

Chi-square comparisons of the individual dates with the total for a given plant showed no significant differences in frequencies of crossover type quartets for the three dates in plant 4–8. In plant 5–2 the differences between the collection dates were highly significant. Further study is needed to determine the cause of the variation.

The author wishes to express his gratitude to Professor C. R. Burnham for supplying the material and facilities for this study and for his assistance throughout the course of the work.

[1] McClintock, B. Neurospora I. Preliminary observations of the chromosomes of *Neurospora crass*. Amer. J. Bot. 32:671–678. 1945.

[2] Burnham, C. R. Chromosome segregations in maize translocations in relation to crossing over in interstitial segments. *Proceedings of the National Academy of Sciences*, 35 (7): 349–356. 1949.

[3] ———. Chromosome segregation in translocations involving chromosome 6 in maize. *Genetics*, 35:446–481. 1950.