

identifiable by the genetic marker, striped leaves and short stalk (8 inches at tasseling stage) under the short-day condition. Two seeds were obtained from one of the id/id tassel-seed plants by selfing. Another 100 seeds from self pollination of the monohybrid (Id/id) were sown in the long-day room on 4/15, 1968. Eighty plants which showed Id/- phenotypes produced tassels and silks on 6/14, 1968. A total of 60 days was required to reach the flowering stage. There were 12 id/id seedlings with typical characteristics on 7/1, 1968, but only 3 survived. At the end of 30 days, 3 id/id plants grew too tall (more than 7 feet) to be housed in the growth chamber and were moved into the greenhouse on 7/15, the normal long-day season. These 3 plants were grown in the greenhouse till 9/15, 1968 and reached 10 feet in height. No tassel or silk emerged at that time.

Kernels of the long-day stock, Gaspe Flint, were sown in the long-day room on 7/11, 1968. Tassels and silks emerged on 7/29, 1968. Only 18 days were needed to reach the flowering stage.

From these findings under the controlled environmental conditions, we may conclude that photoperiod alone regulated the gene action which in turn controls the physiology and differentiation of the plant.

Te-Hsiu Ma

UNIVERSITY OF WESTERN ONTARIO  
London, Canada  
Department of Plant Sciences

1. Mitotic inhibition and chromosome damage produced by 5-Bromodeoxyuridine (BUdR) in *Zea mays* L. root tip cells.

Bromodeoxyuridine (BUdR) is an analogue of thymidine and is incorporated, with concomitant thymine replacement, into the DNA molecule. According to Kit et al. (1958) and Szybalski (1959) 5-BUdR is incorporated into cellular DNA but does not interfere with other metabolic processes. Although Djordjevic and Szybalski (1960) were able to show that a partial substitution of BUdR for thymine in the DNA leads to an increase in U.V. radiosensitivity, they were unsuccessful in extending their observations to changes detectable at the chromosomal level. The present investigation is

designed to investigate UV sensitization with respect to mitotic inhibition and chromosome damage.

Preliminary experiments were performed to ascertain the suitable concentration for BUdR treatment. It was found that root growth was not visibly altered with 100 ug/ml BUdR. All treatments were carried out on attached 3 day old singlecross (Seneca 60) primary root tips at 25°C as described in earlier reports from this laboratory. In one experiment, all roots were treated with BUdR (100 ug/ml) for 10 hours. Following the treatment, the roots were washed thoroughly and were divided into two batches. One batch was returned to the germination chamber for further growth and fixed at 5 hour intervals up to 25 hours post-treatment. A second batch was exposed to UV for 15 minutes ( $51 \text{ uW/Cm}^2 \times 100$ ) and then the roots were returned to the germination chamber and again fixed at 5 hour intervals up to 25 hours. After hydrolysis, the root tips were processed by the Feulgen smear technique (Verma, MGCNL 45: 214-217). A minimum of four slides, one root tip per slide, from each collection period was scored for the nuclear stage. The mitotic index was determined for each collection period. The values are recorded in Table 1.

The decrease in mitotic index to 1-2% was apparent after 10 hours of treatment with BUdR. Thus, it may be presumed that mitotic indices may be affected even during the incubation period. The mitotic indices returned to the control level 15 hours after treatment. It is apparent from Table 1 that the exposure to UV did not alter the mitotic indices. These results suggest that some interphase processes have been delayed or inhibited. BUdR was, however, introduced into cultured Chinese hamster cells in a concentration of 200 ug/ml for 1 hour by Zakharov and Egolina (1972). The results of their experiment suggested that there was no difference in total duration of the nuclear cycle and duration of its phases between cells under BUdR treatment and those in control; it should be noted that the incubation period was very short.

In order to record the chromosome aberrations, in a second experiment intact roots were treated, after BUdR incorporation and UV exposure, with 0.002M 8-Hydroxyquinoline for 2.5 hours prior to fixation. A sampling of these slides suggests that there has been produced in the treated material:

Table 1

Mean mitotic indices (M.I., with standard deviations, S.D.) after treatment with BUdR, with or without U.V. [(51 uW/cm<sup>2</sup> x 100) (15 Minutes)] at 25°C.

Hours after treatment	BUdR without U.V.			M.I. with S.D.	BUdR with 15 Min. U.V.			M.I. with S.D.
	I*	M**	Total		I*	M**	Total	
0	3931	46	3977	1.2 ± 0.2	5613	119	5732	2.1 ± 0.20
5	3443	107	3550	3.0 ± 0.3	3731	138	3869	3.5 ± 0.30
10	2113	159	2272	7.0 ± 0.35	2771	150	2921	5.1 ± 0.41
15	2667	273	2970	9.2 ± 0.53	3084	276	3350	8.4 ± 0.47
20	1810	192	2002	9.5 ± 0.65	1651	169	1810	9.4 ± 0.68
c <sup>a</sup>	8439	844	9283	9.1 ± 0.29				

\*Interphase

\*\*Mitosis

<sup>a</sup>Control

1. Fragments at metaphase;
2. Bridges at anaphase;
3. Dicentric chromosomes;
4. Chromatid breaks;
5. Aberrant spindle fiber development.

To enhance the incorporation of BUdR into DNA, in a further experiment FUdR has been combined with BUdR (5 ug/ml + 100 ug/ml, respectively). We are in the process of recording mitotic indices and chromosome aberrations from this experiment.

#### References

- Djordjevic, B., and W. Szybalski. 1960. *J. Expt. Med.*, 112: 509.  
 Engel, W., and W. Wole. 1967. *Mutation Res.*, 4: 353.  
 Kit, S., C. Beck, O. L. Graham, and A. Gross. 1958. *Cancer Res.* 18: 598.  
 Szybalski, W. 1959. In: *Brookhaven Sym. in Biol.* 12: 75.  
 Zakharov, A. F. and N. A. Egolina. 1972. *Chromosoma* 38: 341.

Ram S. Verma

#### 2. Nuclear cycle: a parameter for selection?

During the last five years, we have reported extensive data on the nuclear cycle in 'Seneca 60', chromosome 9 tester, and W23 stocks of Zea mays L. The present report describes the duration of the nuclear cycle and its component phases in KYS. This stock was chosen as an exemplar, late maturity stock to complement 'Seneca 60', and W23 as early and medium maturity material, respectively.

The experiment was conducted at 25°C. Autoradiographs were prepared according to the schedule reported earlier (MGCNL 43: 186-190; 44: 192-195). A minimum of four slides, one root-tip per slide, from each collection period, were coded and scored blindly.

The classification data are presented in Table 1. Employing the proportion method, the nuclear cycle duration and its components were estimated and are presented in Table 2. Table 3 contains the S.D. of the nuclear cycle components. The duration of the nuclear cycle and its component phases of KYS were compared with 'Seneca 60', W23, and the 9 tester stock; it was found that the nuclear cycle in the several stocks was of similar duration.