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1. Estimation of S period by different methods.

In previous News Letters, we have reported on the nuclear cycle in maize. The nuclear cycle calculations depend, at least in part, on the ability to estimate accurately one or more component and the total time. In earlier studies, estimates for tS (the duration of the DNA Synthesis period) have been extrapolated from the histogram plot (at the 50 percent intercept) of the frequency of labelled prophases. Such a measure is valid for all populations possessing the following constraints (Quastler and Sherman, 1959):

(1) The cycle is in a steady state;
(2) The cells are proliferating asynchronously;
(3) The DNA Synthesis time (tS) shows no variation from cell to cell.

However, the complete absence of variation from cell to cell in the duration of the component phases of the nuclear cycle is never or rarely found in proliferating cells. As a consequence of such variation, the 100% plateau of the percent labelled prophase curve is shortened. In 1970, Gerecke introduced a new method for estimating the S period. The advantage of his method is the fact that it allows for any variation of tS, tG_2, and tM so that the constraints about the cell system under observation can be reduced. The aim of this note is to report the application of Gerecke's method to our data. The following equations were proposed by Gerecke (1970a, 1970b):

$$D. \ (\bar{t}S + ta) = D. \int_{t_1}^{t_2} p\,(t).\,dt \qquad (1)$$

Therefore:

$$\bar{t}S + ta = \int_{t_1}^{t_2} p\,(t).\,dt \qquad (2)$$

Where

p (t) = the percentage of labelled cells seen at different times after ^3H - TdR incubation,

D = the absolute number of cells in prophase (cells/unit time).

$\int_{t_1}^{t_2}$ p (t).dt= the area under the percent labelled prophase curve.

According to equation 2, the area under the curve is a direct measure of the sum of the mean DNA Synthesis period ($\bar{t}S$) and incubation time (ta = 30 minutes). A third method has also been introduced in this study. The area under curve was calculated from a determination of the perimeter by the use of a planimeter.

The estimates of the duration of the S period calculated by the three methods are presented in Table 1. Harvey's (1970) method employing the F-test was performed to test for differences among methods. An $F_{(2,6)}=0.098$ (ns) was ascertained. It was concluded that the three methods yielded similar results. It is presumed that the accuracy of estimating tS by any of three methods depends on the sample size and the mechanics of plotting the curve.

Table 1. The results of using different methods for estimating the DNA synthesis period (tS, in hours) in several stocks of *Zea mays* L. at 25°C.

Stocks	Methods		
	Gerecke (1970a)	Planimeter	Q & S (1959)*
Seneca 60	4.5	4.5	5.5
W-23	5.8	5.8	6.0
9-tester	5.0	5.5	5.0
KYS	5.4	5.4	5.5

*Quastler and Sherman (1959); (at the 50% intercept).

References:

1. Gerecke, D. 1970a. Die Naturwissenschaften 7:360-361.
2. ________ 1970b. Exptl. Cell Res. 62:487-489.
3. Harvey, W. R. 1970. Biometrics. 26(3):485-504.
4. Quastler, H., and F. G. Sherman. 1959. Exptl. Cell Res. 17:420-438.

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2. Induction of mutations in maize with mitomycin C.

Mitomycin C (MC) is a mutagen in some strains of *E. coli* in which it also increases the frequency of recombination (Iijima and Hagiwara, 1960). In *Ustilago* and *Saccharomyces*, Holliday (1964) indicated that MC is nonmutagenic in these organisms although it does increase the frequency of mitotic crossing over. The purpose of the present study was to examine the effect of MC on mutations in maize.

In the first experiment, homozygous triple dominant stock of "Seneca - 60" (S-60), Yg_2, Sh_1, and *Wx*, and homozygous recessive No. 9 tester were used. The experiment was carried out in the field. Before crossing, tassels of the S-60 male parent were treated with 0.0005% MC for 6 hrs. The time for treatment was 4-6 days before pollen shedding. The leaves surrounding the shoot were slit open with a razor blade. The tassel branches individually were imbedded tightly in cotton. Leaves were closed and wrapped with masking tape. A 0.0005% solution of MC was injected into the cotton with a hypodermic syringe until saturation was reached (about 20-25 ml per tassel). The cotton and the masking tape were removed after 6 hrs. of treatment. During flowering, the pollen from treated plants was collected and used to cross on to the No. 9 tester plants. Mutation frequencies of the sh_1 *wx* loci were determined from the F_1 seeds.

The total mutation frequency (Table 1) induced by MC was 0.123% for the sh_1 locus and 0.090% for the *wx* locus, as compared to 0.012% for shrunken and for waxy in the control, an increase of almost X10.