

SHORT COMMUNICATION

YEAST ALSO INCREASES THE FREQUENCY OF METAPHASES IN *Drosophila* BRAIN

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INTRODUCTION

Lee and Elder (1980) reported a simple method for stimulating bone marrow mitosis in small mammals using baker's yeast. According to these authors, the method produced an elevated mitotic rate and acceptable chromosome preparations. The animal is injected subcutaneously into the dorsal region with a yeast suspension at doses depending on the animal's weight.

In *Drosophila*, as in most animals and plants, the increase of metaphase frequency has been obtained for many years with colchicine or colcemid, which are commonly used anaphase inhibiting agents. However, since these chemicals cannot be easily obtained in Brazil and their cost is becoming prohibitive, we decided to test the Lee and Elder (1980) method using baker's yeast in *Drosophila*. The results obtained and reported here demonstrate that yeast can also be used effectively for this organism.

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MATERIALS AND METHODS

Drosophila prosaltans (strain P₄, Trinidad) and *D. saltans* (strain S₆, Chilpancingo, Mexico) were used in these experiments.

Yeast treatments were as follows: late third instar larvae were placed on a carved slide in a few drops of fresh yeast suspension (1 g in 10 ml of distilled water) for 15 or 30 minutes before squash preparation of brains.

The procedure for the preparations was as follows: larvae were dissected in Demerec solution (Demerec and Kaufmann, 1945), their brains were first transferred to a drop of lacto-acetic orcein for 3 minutes and then to 50% lactic acid for 10 minutes and squashed.

C-banding was also performed by the method of Sumner *et al.*, (1971), modified by Linda Wheeler (personal communication). In this case, the procedure for squash preparations was as described above, except that staining with lacto-acetic orcein was omitted and the brains were transferred to a drop of 45% acetic acid after lactic acid treatment and immediately squashed. Coverslips were removed with liquid nitrogen and paper varnish was used as a mounting medium.

RESULTS

The results are given in Table I. Because most of the larvae treated with yeast for 30 minutes died, the Table only presents data for flies submitted to 15 minutes of treatment and for the controls.

Table I - Total numbers, means and standard errors of metaphases in brain preparations of treated and control larvae.

Strain	Treatment	Number of brains analyzed	Number of metaphases	
			Total	$\bar{X} \pm SE$
P ₄	none	30	33	1.10 $\pm$ 0.30
	15 min. yeast	37	372	10.05 $\pm$ 1.43
S ₆	none	16	35	2.19 $\pm$ 0.60
	15 min. yeast	15	174	11.60 $\pm$ 1.42

A total of 98 flies were tested: of these, 67 were *D. prosaltans* (30 treated larvae and 37 controls), and 31 were *D. saltans* (16 treated larvae and 15 controls). The number of metaphases in treated larvae was 9.14 times that in the controls in *D. prosaltans*, and 5.30 times that in the controls in *D. saltans*. Considering the treated larvae individually, the greatest increase was 30.90 times (34 metaphases) the mean for the controls in *D. prosaltans* (1.10) and 9.60 times (21 metaphases) the mean for the controls in *D. saltans* (2.19).

In addition to increased metaphase frequency, the preparations of larvae treated with yeast also showed very good chromosome spreading, and clearly visible heterochromatic regions after C-banding (Figure 1).

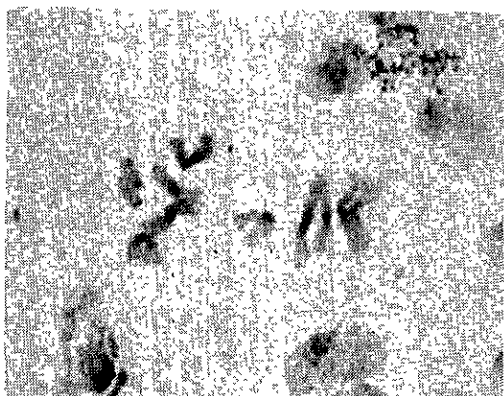


Figure 1- C-banded chromosomes of two neighboring metaphases.

DISCUSSION

According to Lee and Elder (1980), Cole and Leavens (1971) were the first to suggest the use of yeast as a possible stimulator of mitosis in the hematopoietic tissues of reptiles and amphibians. The efficacy of yeast treatment was shown for mammals (Lee and Elder, 1980) and is now reported for *Drosophila*. The number of cells in division increased in *Drosophila* brain as well as in mammalian bone marrow. The increase was even greater in the two *Drosophila* strains tested (9.14 and 5.30-fold when compared to the respective controls) than in mammals (2.2-fold when compared to the controls).

In addition, with this technique the *Drosophila* chromosomes showed much better spreading properties without adherence of cytoplasm, suggesting that the cell membrane is affected by the treatment in a way that makes

it more easily disrupted. This aspect was also observed in mammals (Lee and Elder, 1980). The yeast technique is also adequate for additional procedures such as C-banding (Lee and Elder, 1980, and our data) or G-banding and NOR-staining with silver nitrate (Lee and Elder, 1980).

The mechanism of action of baker's yeast is still unknown. Clarification of several aspects, such as which yeast component is active in the process, requires additional research. The importance of the present results is the demonstration of the applicability of the method in cytogenetic studies of *Drosophila*, which may probably be extended to several other, or perhaps to all other eukaryotic organisms.

ACKNOWLEDGMENTS

Thanks are due to Dr. James R. Coleman for reading the manuscript and to CNPq for partial support of this research through "Programa Integrado de Genética".

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(Received October 31, 1981)