

## Thirst for Bile in Rats with Bile Fistulae

SEVERAL of the trace metals are primarily excreted via the bile<sup>1</sup>. The kinetics of excretion and reabsorption of bile-bound isotopes have been the subject of a study at this Center<sup>2,3</sup>.

Bile fistulae were made in two operations, 24 hr. apart. In the first the common bile duct was ligated and in the second the dilated bile duct was entered with a No. 50 polyethylene catheter. The catheter was anchored *in situ*, and the bile was collected outside the cage. The effluent bile varied in amount. It was highest in some rats which weighed 250 gm. and produced about 35 ml. the first day. These animals drank all their bile with avidity within the first few minutes of their being offered the bile. Various degrees of pronounced thirst for bile have been encountered in all the bile-fistula animals so tested.

We then differentiated bile-thirst from ordinary thirst either by offering the animals water *ad libitum* or by giving them the choice between bile and water. A similar experiment was done with desiccated and reconstituted ox bile on one hand and the animals' own bile on the other; marked preference for the autogenous bile was shown by the rats. The rough impression was gained that these rats preferred their personal bile to that of another donor rat; but statistical evaluation is lacking.

A simpler operation which permitted the elimination of the second stage of this procedure caused identical thirst for bile in the operated animals. The normal animals did not care for bile.

This work was supported by the U.S. Atomic Energy Commission.

ALBERT J. BERTINCHAMPS\*  
JAMES J. GREENOUGH  
GEORGE C. COTZIAS

Medical Research Center,  
Brookhaven National Laboratory,  
Upton, Long Island, N.Y.  
July 13.

\* Fulbright Scholar from the Institut Interuniversitaire des Sciences Nucleaires, Brussels, Belgium.

<sup>1</sup> Greenberg, D. M., Copp, C. H., and Cuthbertson, E. M., *J. Biol. Chem.*, **147**, 749 (1943).

<sup>2</sup> Maynard, L. S., and Fink, S., *J. Clin. Invest.*, **35**, 831 (1956).

<sup>3</sup> Bertinchamps, A. J., and Cotzias, G. C., *Fed. Proc.*, **17**, 428 (1948).

## Effect of the Potassium Salt of Gibberellic Acid on the Growth and Reproduction Rate of *Paramecium multimicro-nucleatum*

THIS investigation was prompted by the fact that though the effects of gibberellic acid and its salts in stimulating growth of plant cells have been studied widely<sup>1,2,3</sup>, very little is known of their effects on bacteria and other micro-organisms<sup>4,5</sup>. The first micro-organism chosen for this study was yeast (*Saccharomyces cerevisiae*), but its growth was found to be unchanged by potassium gibberellate ('Gibrel', supplied through the courtesy of Merck and Co., Inc.). It was then decided to study a unicellular animal, and the ciliate infusorian, *Paramecium multimicro-nucleatum*, was selected as being a simple, easily measured organism.

A culture medium consisting of 4 gm. dried foxtail in 1,000 c.c. of distilled water was prepared. This was allowed to stand uncovered for 3 days and then inoculated with *Paramecia*. After 15 days at room temperature, 10 c.c. portions of this culture were placed in test tubes containing equivalent amounts of foxtail from the original culture. To four of these tubes, 'Gibrel' was added in the proportions of 1, 10, 100 and 1,000 parts per million respectively. A fifth tube was retained as a control. Sterile cotton

plugs were placed in the mouth of each tube and all were incubated at room temperature for 15 days. Slides were then prepared from each of the cultures by introducing one drop of the culture and one drop of 2 per cent formaldehyde under the cover slip. The length and width of 100 *Paramecia* from each culture were measured with the aid of a calibrated bifocal microscope.

It was found that a significant change in the size of the *Paramecia* occurred when they were treated with 100 p.p.m. of 'Gibrel' (Table I). The other concentrations of 'Gibrel' employed caused no significant change in size.

Table I. COMPARISON BETWEEN UNTREATED *Paramecia* AND THOSE TREATED WITH 'GIBREL' 100 PPM.

	No. Measured	Av. Length (μ)		Av. Width (μ)		Critical Ratio Length Width	Significance Level of the Increase
		128.0	125.0	59.0	59.0		
Untreated	100	128.0	125.0	59.0	59.0	14.29	9.96
Treated	100	176.6	176.6	82.9	82.9		0.1%

It was noted with 100 p.p.m. of 'Gibrel' that in addition to the increased size of the *Paramecia* there appeared to be an increase in number. The experiment was therefore repeated and ten 0.5-c.c. aliquot portions of the treated and untreated cultures in clear glass dishes 1 cm. in diameter examined under low power on a bifocal microscope at 5, 10, 15, and 20 days. The number of *Paramecia* in 5 c.c. of the treated culture were found to be some 25-30 per cent higher than in the untreated culture.

It therefore appears that 100 p.p.m. of 'Gibrel' added to cultures of *Paramecia* causes a marked increase in both growth and reproduction of this unicellular animal. However, it is possible that this apparent increase in growth and reproduction is due to an increase in food supply. Work is now proceeding on the effects of 'Gibrel' on bacteria in the cultures which might act as a food source for *Paramecia*.

A. A. ORAVEC  
N. G. STROVILAS  
J. L. BEAL  
ARTHUR TYE

College of Pharmacy,  
Ohio State University.

<sup>1</sup> Brian, P. W., Elson, G. W., Hemming, H. G., and Radley, M., *J. Sci. Food Agr.*, **5**, 602 (1954).

<sup>2</sup> Leben, C., and Barton, L. V., *Science*, **125**, 494 (1957).

<sup>3</sup> Stowe, B. B., and Yamaki, T., "Ann. Rev. Plant Physiol.", **8**, 181 (1957).

<sup>4</sup> Barton, L. V., and Fine, J. M., *Contrib. Boyce Thompson Inst.*, **19**, 291 (1958).

<sup>5</sup> Lu, K. C., Gilmour, C. M., Zagallo, A. C., and Bollen, W. B., *Nature*, **181**, 189 (1958).

## A Possible Explanation for Part of the Difference in Heat Tolerance Exhibited by *Bos taurus* and *Bos indicus* Beef Cattle

USING methods based on those described by Callow<sup>1</sup> the carcasses of 27 head of mature boran (*Bos indicus*) cattle were analysed. When the results of these analyses are compared with those of Callow<sup>2</sup> for *Bos taurus* (Fig. 1) it is evident that there is a marked and progressive difference in the way in which the two species lay down fat during the fattening period, as represented by a change of from 18 to 40 per cent total separable fat in the carcass. In Fig. 1, the percentage deposition of subcutaneous and intermuscular fat of *Bos taurus* and *Bos indicus* has been plotted against the percentage total separable fat in the carcass. In the case of *Bos taurus* the difference between the levels of subcutaneous and intermuscular fat tends to decrease as fattening proceeds whilst this difference for *Bos indicus* clearly increases over the same period.