

tests for chitin bring up the question of the specificity of the reactions employed. According to Campbell³ the chitosan methods are very specific. Koch,⁸ however, claims that the method of Schulze is more specific than those recommended by Campbell, and he cites the tracheae of *Apis mellifera* and *Musca domestica* which gave negative chitosan but positive diaphanol-zinc-chlor-iodide reactions. The white layer of the cuticle of the grasshopper egg gives the reverse of these results. This indicates that there are probably 3 substances or chemical groupings which may be detected by either one or the other of these tests (or only 2 if they are both present in cases where both reactions are positive).

8291 C

Behavior of the Spindle Fibers in Centrifuged Cells.

BASILE J. LUYET.

From the Department of Biology, St. Louis University.

As I described in a previous paper,¹ by centrifuging the cells in mitosis, in the onion root tip, for one hour with a force equivalent to 30,000 times the force of gravity, I obtained a displacement of the chromosomes in the centrifugal direction, a concentration of the cytoplasm in 2 layers at the lower portion of the cell, and a separation of the cell sap to the upper region. What happens to the mitotic spindle when the cells are treated under the same conditions is the subject of this communication. The method used is, in all its details, the same as that already described.²

In the spindles and spindle fibers so treated I observed the following facts: 1. Only the upper cone of the spindle is present (Fig. 1, A-E), the lower one not appearing. 2. The height of the cone often exceeds one-half, and can be as much as three-fourths, of the height of the cell (Fig. 1, B). However, all the intermediate heights between this maximum and the short cones of the prophase stage are present. 3. I never observed fibers broken or badly distorted or folded on themselves, and rarely were they entangled. They are often slightly bent, but in a smooth curve. 4. The fibers stay together as the hair of a moist tapering brush; they are never scattered in different directions. 5. The half spindle bores its way cen-

¹ Luyet, B. J., and Ernst, R. A., *Biodyn.*, 1934, **2**, 8.

² Luyet, B. J., *PROC. SOC. EXP. BIOL. AND MED.*, 1934, **31**, 1225.

tripetally through the heavier cytoplasm. It sometimes bends under the weight of the latter and seems to turn around cytoplasmic masses in its centripetal path (Fig. 1, D).

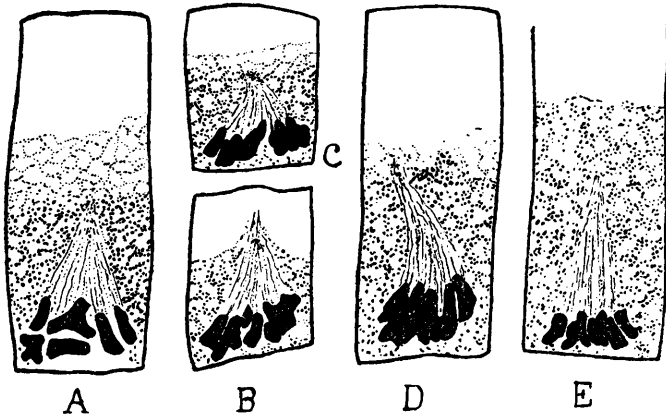


FIG. 1.

A-E camera lucida drawings of cells in mitosis, centrifuged for one hour with a force of 30,000 g. magnification : 1000 diam.

I venture the following tentative interpretation on these observations: The fact that only the upper part of the spindle appears in the picture should probably not be attributed to a crushing and destruction of the lower part, since there is usually no trace of it left; it is due rather to the centripetal displacement of the fibers of the lower cone when the heavy chromosomes to which they are attached move centrifugally.

The excess of height of the spindle might be due to a stretching of the fibers. It might be due also to the fact that the fibers located within the cone, not attached to any chromosome and not held back by any resistance, slip up under the action of the centripetal force, so that their tips protrude at the top of the cone. It is possible, as well, that during centrifugation the chromosomes slide down along the fibers to which they are attached, thus making the upper portion of the fibers longer than the lower one (suggested by Dr. G. H. Bishop).

The behavior of the spindle-fibers as described under the last 3 numbers above, seems to fit fairly well with the assumption that the fibers are structures comparable to light threads attached to the heavy chromosomes, and capable of being lifted up through the cytoplasm under the action of the centripetal force, as would threads attached by one end to stones at the bottom of a mass of water. They are held together by the unknown force which, in the un-

treated condition, holds them in a bundle at the pole of the mitotic spindle.

8292 P

Rate of Disappearance of Red Cells in Polythemic Rats.

DAVID B. TYLER AND FRANCIS M. BALDWIN. (Introduced by L. T. Samuels.)

From the Department of Zoology, University of Southern California.

Rats made polycythemic by prolonged exposure to oxygen lack lose a large percentage of the "excess" red cells within 48 hours following the exposure.¹

In this experiment, rats were made polycythemic by either of 2 methods. (1) By exposure in glass chambers at an absolute atmospheric pressure of 400 mm. Hg. (2) By exposure in a large size incubator in which a suitable absorbent for CO₂ was placed, the oxygen lack being brought about by the animals themselves. In both methods, the exposure periods ranged from 2 to 15 days. The animals were supplied with sufficient food and water for the duration of the experiment.

The normal blood picture of each rat was determined before exposure. Numbered pipettes were assigned to each rat, and the usual precautions in making the blood counts were taken. Hemoglobin determinations were made after Heine and Bing.² Blood was obtained from the tail, excess bleeding being prevented by temporary ligation. Immediately following the exposure and at stated intervals thereafter the blood picture was again determined.

In order to ascertain the effect of more than one determination in one day, 3 blood counts were made on 11 unexposed rats. The first counts were made at 9 a. m. and considering these as normal, or 100%, the average of the second counts made 6 hours later was 96.2%. The average of the third counts one hour later was 95.5%. These rats served as "bleeding" controls.

Within a 6-hour period after the exposure almost 50% of the excess erythrocytes disappeared from circulation. Considering the count at "zero" hour as 100%, the average of the counts made 6 hours later was 88.7%. This is a significant difference as com-

¹ Tyler, D. B., and Baldwin, F. M., *PROC. SOC. EXP. BIOL. AND MED.*, 1934, **31**, 823.

² Heine, R. W., and Bing, F. C., *J. Biol. Chem.*, 1933, **101**, 369.