According to our observations, we assume that more than one factor essential for the rat is present in animal proteins.

References

1. CARY, C. A., *et al. Federation Proc.*, **5**, 128 (1946).
2. HARTMAN, A. M., and CARY, C. A. *Federation Proc.*, **5**, 137 (1946).
3. ZUCKER, L. M., *et al. Arch. Biochem.*, **16**, 115 (1948).
4. RANDOIN, L., and CAUSERET, J. *Bull. soc. sci. hyg. aliment.*, **1–3**, 14 (1947).
5. PICCIONI, M. *Boll. soc. ital. biol. sper.*, **26**, 614 (1950).
6. OTT, W. H., RICKES, E. L., WOOD, T. R. *J. Biol. Chem.*, **174**, 1047 (1948).

A Micro Ball Mill for the Disintegration of Bacteria

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For grinding small quantities of bacteria a centrifuge tube with a ground-in glass rod can be quite satisfactory, but it is difficult to obtain the same mechanical effects if a number of specimens must be treated simultaneously. For this reason the vibrator equipment described below was designed.

The use of 50 cps vibrations for disintegrating biological materials has been described by E. Hammarsten (*1*). The present author found the method very useful and devised an extension of the technique, which may also prove of value for grinding other biological materials besides bacteria.

The grinding was effected in glass tubes made out of ordinary pyrex glass tubing (diam, 7 mm), which was cut about 15 cm long. The pieces were bent in the middle to resemble the tube in Fig. 1. A special holder made out of brass and containing Woods metal (Fig. 2) was heated to melt the alloy (mp 65.5° C), and the tubes were then inserted in a row. When the metal had solidified, the tubes were taken out of their setting and the material in question—mostly in the form of a freeze-dried powder—was added. Up to 42 specimens could be accommodated. Nine carefully chosen glass beads of a diameter slightly smaller than that of the tube were also added to each specimen, and the tubes were plugged with rubber stoppers. They were replaced in their settings, and a brass pole covered with a piece of rubber hose was placed in the angle of the tubes and screwed tightly down so as to keep them firmly in place. The holder was mounted on the stage of a 50 cps a.c. vibrator (Type EMR6, 70 w, 200 v, Vibroverken Ltd., Stockholm) in a freezing box at −15° C. The vibrations were mainly vertical and caused the glass beads to be thrown between the walls of the tube, but owing to the slope of the branches they also developed a rotating movement (arrows, Fig. 1), which counteracted the tendency of the material to accumulate at the bottom of the tube and effected a continuous mixing of the material. Treatment for 4 hr was not accompanied by any perceptible rise in temperature and was as a rule sufficient to break up the bacteria. The treatment could be shortened by adding weighted amounts of glass powder to the specimens or by etching the glass beads and the inside of the tubes with fluorine.

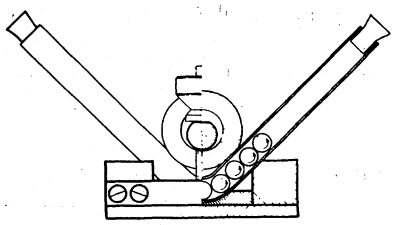

FIG. 1.

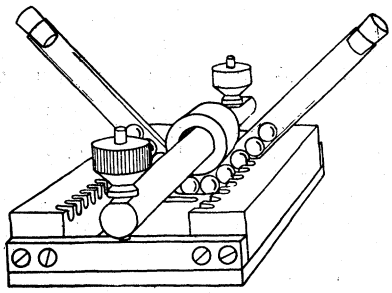

FIG. 2.

Reference

1. HAMMARSTEN, E. *Acta Med. Scand.* Suppl. 196, 634 (1947).

The Purine and Pyrimidine Content of Three Strains of *Escherichia coli*[1]

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Witkin isolated a spontaneous mutant, B/r, of *E. coli* strain B which proved to be more resistant than the parent to both x-rays and ultraviolet light (*1*). These two strains, together with strain K_{12} which was found by Lederberger to show genetic recombination unusual in *E. coli* (*2*), have been analyzed for purine and pyrimidine content.

The organisms were grown in a synthetic medium, with ammonium chloride as source of nitrogen and with succinate and glutamate as source of carbon. In each case 24-hr cultures were harvested by centrifugation, and the organisms extracted with cold 7% trichloracetic acid, ethanol, and boiling ethanol-ether. The residue after being dried *in vacuo* was rendered to a powder. Approximately 10 mg of the powder was digested with $HClO_4$, the digest subjected to chromatography, and the yield of nitrogenous bases

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