A SINGING TUBE

DR. ROBESON has recently reported the construction of simple forms of singing tubes.[1] I had the following experience in the spring of 1919, while an undergraduate at Middlebury. Pieces of soft glass tubing of about 10 cm length and 6 to 7 mm diameter were being formed into combustion tubes by sealing and slightly expanding one end. Chancing to blow a bulb of about 20 cm diameter on one of the tubes, I was startled by the immediate production of a singing note of considerable intensity which continued for well over a minute. Moderate heating of the bulb in a Bunsen flame was enough to repeat the phenomenon, but with a lesser intensity because of care exercised to avoid softening of the glass. The tube lay on my desk for several weeks and could be made to sing merely by heating in the flame of a match until its usefulness was ended by accidental dropping. I made several attempts to reproduce it but with no success.

My tube differed from those of Dr. Robeson in these respects: the bore was larger, heating of the bulb rather than of the junction of bulb with tube started the singing, the starting temperature was low, and to the best of my recollection there was no noticeable variation of pitch with change of temperature.

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PURE SMOOTH AND ROUGH COLONY TYPES AT WILL

ANIMAL bacteriologists since 1890 and plant bacteriologists in more recent years have been much interested in the study of two colony types, smooth and rough, produced by many bacterial organisms.

The usual procedure for obtaining the separate colony types for study has been to pick a smooth or rough colony from a poured agar plate produced by the usual bacteriological technique; *i.e.,* a needle transfer of the culture (broth, agar slant or diseased material) to a tube of liquid (broth or water) and sometimes from the first tube to a second tube. A transfer is then made from each dilution tube to melted agar for poured plate examination. When beef infusion broth or agar is used it is usually adjusted to pH 7.0 or neutrality.

From this form of technique the plates may or may not be pure cultures of S or R colonies.

The production, at will, of pure plate cultures of the S and R colony forms of three bacterial organisms has been made possible by a modification of the usual bacteriological technique and it is believed that the purity of types and an abundance of material can be assured for the further study of the two forms.

MODIFIED TECHNIQUE

Make a needle transfer of the culture (broth, agar slant or diseased material) to a pH 6.0 and a pH 7.0 beef infusion broth tube. Then make a second dilution tube from each pH grade of the (1) seeded broth tube. Hold the (2) dilution broth tubes in both pH grades for 18 or 24 hours at room temperature.

After this growth period again make (1) and (2) dilutions from each pH grade of the young culture to a corresponding pH grade of broth. From the last (2) dilution broth tube transfer to a melted pH 6.0 and pH 7.0 beef infusion agar tube for poured plate examination.

This modified technique produces on the plates pure culture of the S or R colonies.

This technique involves three factors necessary to assure the pure S and R colonies. They are as follows:

(a) dilution before and after the young growth period of the organism.

(b) young culture.

(c) pH of the culture medium.

For the smooth colony use only pH 7.0 medium. For the rough colony use only pH 6.0 medium.

The S colony is virulent; the R colony is avirulent.

Attention is called to the fact that an interchange of pH grade from broth to agar plate may result in intermediate types with a corresponding interference in demonstration of virulence and nonvirulence on the host plant.

Reversion of the R type back to the S type will be discussed in the complete manuscript soon to be published.

Virulence was demonstrated by inoculation on the host plants with the pure S colonies and nonvirulence by inoculation with the pure R colonies of *Bacterium tumefaciens,* hop strain, and *Bacillus phytophthorus* organisms.

Later tests with single cell isolations from the S and R types produced in the first *B. phytophthorus* culture study corroborated the evidence produced in the earlier study in every particular.

The single cell progenies were kindly furnished by Dr. A. J. Riker.

The third organism studied was a corn borer parasite as yet unnamed and unpublished.

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[1] SCIENCE, March 6, 1931, p. 265.