

water, 100 gallons. The tobacco is steeped for an hour and a-half, the leaves are strained off and the sulphur added, and again boiled for an hour. Keep well stirred and use while warm.—*A. W. Bitting, D. V. S., Indiana Experiment Station.*

Science.

PAPER I.

PLAIN TALKS ON BACTERIA AS APPLIED TO FARM PROBLEMS

(For Hoard's Dairyman, by H. L. Russell, Professor of Bacteriology, Wisconsin College of Agriculture.)

General Outline of Subjects to be Treated

INTRODUCTORY

- I. What are bacteria, how they live and grow.
- II. Effect of external conditions on growth.

BACTERIA AND DAIRYING

- III. Bacterial life in milk.
- IV. Quality of milk as affected by germ life.
- V. Sources of bacteria in milk.
- VI. Exclusion of bacteria from milk and effect of chilling.
- VII. Souring of milk.
- VIII. Detection of bacterial taints.
- IX. Direct absorption of taints (danger from the same is stable).
- X. Pasteurized milk.
- XI. Milk as related to public health.
- XII. Ropy or slimy milk.
- XIII. Sweet curdling of milk.
- XIV. Ripening of cream.
- XV. Pure culture of butter, including pasteurization as applied to same.
- XVI. Pinhole curds. How caused.
- XVII. Detection of bad or tainted milks. (Curd tests, etc.)
- XVIII. What ripens cheese.

GLOSSARY

Bacteria.—single celled plants that are characterized particularly by the fermentations, decompositions and diseases they produce.

Cell.—the simplest unit of structure of living things. All animals and plants are made up of one or more cells.

Bacillus, (plural bacilli),—a form of bacteria that is rod-like, or elongated, in appearance. The majority of bacteria belong to this group.

Spirillum, (plural, spirilla),—a spiral or twisted form of bacterial cells.

Cilia, (singular, cilium),—the tiny thread-like appendages on the surface of the cell, by the movement of which the organism is able to move.

Protoplasm,—the life-stuff of which the animal or vegetable is composed.

Spore,—a latent structure, formed within the cell, capable of resisting many unfavorable conditions and of producing, by germination, another similar cell. Spores are analogous in function to the seeds of the higher plants.

Aerobic,—organisms that require the free oxygen of the air for their development.

Anaerobic,—organisms that can grow without air. The bacteria and the yeasts are the main groups that possess this property.

Mammalian life,—animals that belong to the group mammalia—those that suckle their young.

Cholera Infantum,—an intestinal disease affecting infants.

Saprophyte,—an organism that lives on dead organic matter.

Sterile,—free from all living germs.

INTRODUCTORY

The necessity for accurate information on the subject of bacteria is apparent. The relation of germ action to agricultural processes is becoming more and more apparent day by day. Hence, a plain exposition of what bacteria are and what they do, will be of direct value to the farmer, not only as a matter of education, but for the aid which it frequently offers in the solution of practical agricultural problems.

To make this series of discussions of most service to all the readers of the DAIRYMAN, it will be presented in as non-technical language as possible. It is, however, frequently impracticable to use common language terms exclusively without becoming diffuse in style. To obviate this difficulty, and at the same time to encourage the correct use of certain scientific terms that are coming into frequent use, the following plan will be adopted. To each article a glossary will be prefixed, defining those terms that are used for the first time in the body of the text.

The general scope of this series is to treat the various questions that arise concerning the action of bacteria in relation to different phases of agriculture, as dairying, diseases of animals and plants, soil processes, etc. The purpose of these papers