phenomena *par excellence,* while curiosity or wonder, which Aristotle regarded as the very beginning of knowledge, is not discussed at all in terms.

It seems a bit strange that the book does not mention the recently published works ("The Principles of Natural Knowledge," and "The Concept of Nature") of Professor Whitehead, for these works are weighty contributions to the problem Mr. Russell is trying to solve.

I wish finally to say that as a model exhibition of the scientific spirit, this work would be highly valuable even if its conclusions were unsound. Mr. Russell's notably frequent public recantations of opinion, of which there are no fewer than five instances in the present work, are regarded by some as a token that he does not know his own mind or that he publishes prematurely. Such critics are no doubt mistaken. The frequency of recantation in Mr. Russell's writings is due partly to the exceeding difficulty of the fields in which his researches lie, partly to his ceaseless re-examination of seeming certitudes, and partly to an unsurpassed intellectual candor.

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TESTIMONIAL TO DEAN H. L. RUSSELL

(From a correspondent)

At the October meeting of the Wisconsin branch of the Society of American Bacteriologists, Dean H. L. Russell was presented by his former students with a volume entitled "Papers on Bacteriology and Allied Subjects." This memorial was given in commemoration of the twenty-fifth anniversary of his doctorate. The real anniversary day occurred several years ago but due to the war conditions immediately following, the publication of the volume was delayed.

It is a comprehensive volume containing contributions from thirteen of the leading bacteriologists who were among the early students of Dr. Russell. E. G. Hastings, of the University of Wisconsin, reviews the dean's scientific career and points out the strategic opportunities presented to pioneer bacteriologists. Dr. Russell was the first full-time agricultural bacteriologist in America. He was likewise one of the first men to be employed in this country to teach and do research work in bacteriology outside of the medical school. His scientific papers, books, and bulletins number well over 125 and are of fundamental importance.

A development of the city milk supply problems is the contribution of H. A. Harding, formerly of the University of Illinois. He states the problems past and present in an interesting way and concludes by saying of Dr. Russell,

> This pioneer bacteriologist in person and through his students has taken an honorable part in the solution of these problems.

That the greater prevalence of mold spores over bacteria in the air is due to the fact that most bacteria are readily killed by the sun's rays while mold spores are only slightly affected is the conclusion reached by John Weinzirl of Washington State University in his treatise on the resistance of mold spores to sunlight.

In a series of experiments carried on at the University of Minnesota, C. H. Eckles found that the percentage of fat in milk could be markedly increased for the first twenty to thirty days when it is followed by underfeeding during the period of lactation. Underfeeding of the cow must be taken into consideration in the interpretation of data involving variation in the composition of milk and butter fat.

L. A. Rogers, chief of the dairy division of the United States Department of Agriculture, summarizes the work done in his department on the characteristics of the *colon-aerogenes* group of bacteria. He regards *B. coli* and *B. aerogenes* as very distinct types. He discusses the taxonomic position of other members of this group in relation to these two varieties.

D. J. Davis, of the medical school of the University of Illinois, presents evidence and argues convincingly to show that the fungus which causes sporotrichosis disease affecting

both man and horses and common in France and occasionally in America, is identically the same species and should be called by the name first used by Hektoen in this country.

A butter having only a few yeasts and molds, when other conditions are favorable is a safer hazard for shipments and storage is the claim of F. W. Bouska and J. C. Brown of Chicago in their paper on "Yeasts and oidia in pasteurized butter." Creameries which have the best commercial reputation for their butter also have the lowest yeast and mold counts. These two men give methods for sampling and counting butter which they have recently devised.

The late Dr. Edw. Birge presented his study on the activities of certain bacteria in sewage. He believed that some bacterial forms can be found which will play an important rôle in the treatment of sewage, and that the time will come when septic tanks will be seeded as alfalfa fields and cream vats are seeded now.

A method for the detection of pasteurized milks is described in detail by Dr. W. D. Frost, of the University of Wisconsin. The addition of a special dye stains the blood cells, always present in pasteurized milks. In raw milks the cells will not be stained.

A strong plea for the thorough investigation of all waters whose potability is questioned, and for thoroughly trained investigators experienced in laboratory and field work, is put forth by H. A. Whittaker, of the University of Minnesota, in a paper on the "Investigation of drinking water supplies."

A. L. Amott, a commercial milk expert in Chicago, has given much time, energy and thought to "The milk supply of Chicago," and discusses the source of supply, amount, production, transportation, city distribution, prices, farmers' organizations, and milk inspection. He calls attention to the improvement of the milk supply and the lowered baby death rate in recent years in Chicago.

B. W. Hammer, of the Iowa Agricultural College, in a paper on "The bacteriology of ice cream," summarizes the knowledge of such points as number and kinds of bacteria, sources of materials, effect on the bacteria during freezing, hardening and holding, softening and rehardening. He also treats of the manufacture of ice cream with a low bacterial count, and the relation of ice cream to the public health, and bacterial standards.

SPECIAL ARTICLES

THE QUANTITATIVE BASIS OF THE POLAR CHARACTER OF REGENERATION IN BRYOPHYLLUM

WHEN the defoliated stem of a plant of *Bryophyllum calycinum* is cut into as many pieces as it possesses nodes, each piece will produce shoots from the two dormant buds of its node and roots at its basal end. When a long piece of stem possessing 6 or more nodes is cut out from such a plant only the most apical node will produce shoots from its two buds while the other nodes will show no or only inconsiderable growth. The question is, Why do all the nodes except the most apical fail to produce shoots when they are part of a long piece of stem, while they would each produce shoots when isolated? This is the problem of polarity in regeneration in its simplest form.

Earlier biologists, especially Sachs, have suggested that this polarity is due to the fact that the ascending sap carries the substances needed for shoot regeneration and that if a piece of stem is cut out from a plant the sap must collect at the apex and thus give rise to the shoots at the most apical node. This explanation is only satisfactory if the assumption is added that in the case of the stem of *Bryophyllum* practically none of these substances reach the dormant buds in the nodes below the most apical one. The problem is how to furnish a scientific proof for this suggestion. This can be done by treating this problem from the viewpoint of chemical mass action.

The formation of new shoots in an isolated node of a defoliated stem of *Bryophyllum* can only be the result of synthetical processes the velocity of which depends for a given temperature and degree of moisture upon the relative mass of the material reaching the dormant buds of the node in the unit of time. The material required for growth will be taken from the sap reaching the node. The disappearance of this