chemistry, physics, and biology of such enclosed waters, and faced with the need for discussion of mutual problems, the group organized the Atlantic Estuarine Research Society. Enthusiasm, informality, and active participation by all members are keynotes of the organization. Its growth has been rapid, partly because research activities have been expanded in the area, and also because others outside the states of Maryland, Virginia, and North Carolina have become interested.

The stated purpose of the society is to exchange ideas and knowledge, and to stimulate free and informal discussion on estuarine ecology. Membership is restricted to scientists, whatever their field of interest, who are carrying on active research on estuarine problems. Meetings are held twice yearly, in spring and fall, and are restricted to Maryland, Virginia, and North Carolina.

The informal atmosphere is fostered by meeting at the various research laboratories. The membership believes that the strength of the organization lies in its local character, relatively small membership, and frequent meetings. Evidence that these restrictions do not impose a lack of breadth on the society is revealed by the biographies of the 73 active and 8 honorary members, who hold degrees from many different colleges and universities in North America, from the Pacific to the Atlantic coast, and from Canada to the Deep South.

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Use of Sodium Metabisulfite as a Preservative for Grass Silage[1]

SULFUR dioxide has been used extensively as a preservative for grass silages during the past few years, apparently with considerable success. Satisfactory preservation of the nutrients of the grass is obtained by addition of 5 lbs of gaseous SO_2/ton of fresh material, producing highly palatable, good quality silage at a considerably lower cost than that resulting from the use of other preservatives.

When sulfur dioxide is used in the preservation of foods, it is generally applied as an acid sulfite of calcium or sodium, in powder or crystalline form, which is more convenient to work with than gaseous or liquid SO_2.

With this in mind, preliminary experiments were conducted during the summer of 1951 to investigate the use of a concentrated water solution of sodium metabisulfite as a preservative for grass silage. This material is available in large quantities, at approximately half the cost of liquid SO_2 (per unit of SO_2). A variety of grasses and legumes were ensiled in 1-gal glass jars fitted with rubber stoppers and water traps arranged to allow seepage and escape of gases and to exclude air. In every case the silages preserved with $Na_2S_2O_5$ kept at least as well as comparable materials treated with SO_2 gas at equivalent levels, and much better than untreated control samples.

In addition, a small experimental silo ($3' \times 8'$) was filled with third-cutting alfalfa (pure stand), to which sodium metabisulfite was applied in water solution at a rate of 8 lbs/ton of fresh material. The product removed from the silo at the end of 3 months was an apparently excellent quality silage, of a color similar to that of the fresh alfalfa, possessing a clean, acid odor. This silage was eaten with considerable relish by a group of sheep over a period of more than a month, at a rate of about 8 lbs/day/100 lbs live weight.

It is recognized, of course, that these results are too meager to warrant recommendation of this product for use by farmers as a general practice. However, the experiment resulted in adequate preservation of the forage crops treated. Further work is planned to investigate the use of sodium metabisulfite in powder form under different conditions.

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The Evidence for Mitotic Spindles in Bacteria

IN a recent report in this journal, of a meeting of the National Academy of Sciences, DeLamater (*1*) puts forward a claim to describe typical mitotic spindles in bacteria. This work was published simultaneously in a variety of journals, for the most part with identical photomicrographs (*1–5*). It is particularly worthy of notice, in view of the positive nature of DeLamater's claims, that all of these papers are illustrated by the same photomicrograph of what is alleged to be a metaphase spindle, and that in nearly all of them it is the only example shown. This figure is compared with others, published by other workers, of the same genus (*Bacillus*) in Fig. 1: 1–5, showing clearly that DeLamater's interpretation is fallacious. The supposed "centrioles" are merely the strongly stained granules at the junction of the cell wall and cross-walls of the bacillus; these cross-walls and septa, with which bacilli of this type are liberally provided, are clearly described in three standard monographs upon bacterial cytology (*6–8*). It is remarkable to be obliged to record that DeLamater, despite repeated quotation of these studies in his list of references, makes the elementary mistake of regarding *Bacillus megatherium* as a single, multinucleate cell. The present writer has repeatedly drawn attention to the misconceptions that have arisen from failure to recognize this multicellularity in bacteria (*6, 9, 10*).

DeLamater's failure to recognize the true nature of the structures he describes is due to his exclusive employment of a technique of dehydration in freezing alcohol which, he claims, preserves the material unaltered. He provides no controls of undehydrated

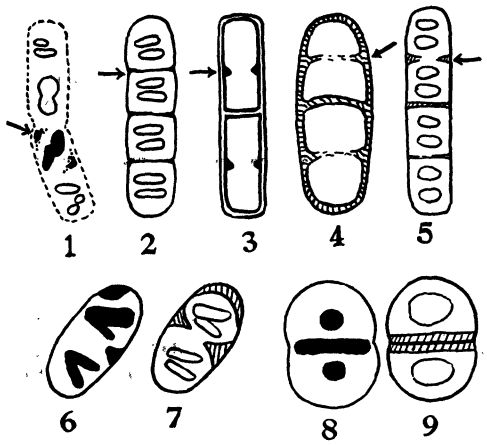

FIG. 1. 1: "Metaphase spindle" in *Bacillus*, according to DeLamater. Drawn after the photomicrograph. This figure is the sole illustration of what is claimed to be the metaphase in the majority of the papers quoted (*1–5*). The "centriole," indicated by the arrow, is seen to be identical with the granules at the junction of the cell wall and cross-walls in 2–5. 2: *Bacillus*, according to Bisset (*6*). 3: *Bacillus*, cell walls according to Knaysi (7). 4, 5: *Bacillus*, according to Robinow (*8*). 4, cell walls; 5, septa and nuclei. 6, 7: *Bacterium coli*, claimed by DeLamater to show mitotic spindle; 6, as seen; 7, showing nuclei, growing tip, and points of division. 8, 9: *Coccus*, showing appearances claimed as mitotic spindle by DeLamater; 9 shows that the "centrioles" are the shrunken nuclei; the "chromosomes" are a cytoplasmic septum.

preparations in support of this contention, however, and it is the experience of the present writer that this method, in common with all dehydration techniques, is very liable to produce shrinkage and distortion in bacteria (*11*).

Of the appearances in other bacteria described by DeLamater, those in *Caryophanon*, which is a very strongly septate organism, are susceptible to the same explanation as in *B. megatherium*. In *Bacterium coli*, the "centrioles" are provided by the material which, in a nonseptate bacterium, corresponds to the septa in *B. megatherium*—i.e. the basophilic areas at the points of division and growing tips of the cell (Fig. 1: 6, 7). In cocci, which frequently possess a central, transverse septum, the shrunken nuclei are apparently seen as "centrioles," the basophilic elements of the septa as chromosomes (Fig. 1: 8, 9).

The facts thus show, fairly conclusively, that DeLamater's claim of having demonstrated mitotic spindles in bacteria is entirely invalid because (*a*) the fundamental fact that most of the bacteria described are multicellular is ignored; (*b*) proper controls for experimental methods are not submitted; (*c*) the evidence utilized to support the contention is exceptionally flimsy and rests very largely upon the repeated publication of a single photomicrograph, claimed to represent a "metaphase spindle," the true explanation of which is shown in the diagrams of Fig. 1.

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Book Reviews

Cold Injury. Transactions of the First Conference, June 4–5, 1951, New York. M. Irené Ferrer, Ed. New York: Josiah Macy, Jr. Fdn., 1952. 248 pp. $3.25.

This volume presents a well-balanced résumé of experimental studies and creative thoughts on cold injury and should be of interest to investigator administrator, and physician. The aim of these conferences is not only to further knowledge about cold injury, but also to promote communication between scientific disciplines. The integration of scientific knowledge, using the multiprofessional approach, is the objective of the Macy Foundation.

Shumacker and Crismon summarize their animal studies in the first two papers. The physiological and biochemical changes occurring in frozen tissue are defined, and the rationale of rapid rewarming is critically discussed. Lewis (R. B.) summarizes his observation on muscle necrosis caused by frostbite and presents his concept of cold injury—namely, that it is due to a lethal effect of cold on tissue and that the vascular system plays little or no part in the process. Behnke, Burch, Blair, and Shumacker defend the role of the blood vessels vigorously. Burton very properly emphasizes the importance that physical factors, such as viscosity of blood, play in the chilled extremity. There is a discussion of the physics and kinetics of water crystallization.

Homeokinesis is discussed by Horvath, and Talbott (the conference chairman) draws on his extensive clinical experience to define the renal and cardiovascular physiology of hypothermia. Dangers during the rewarming period are analyzed.

Kark summarizes the present knowledge on ac-