ferent titles in the entire series, including some books published as late as June, 1931.

The Committee on Booklists consists of Dean Edward W. Berry, paleontologist, Johns Hopkins University; Dr. Paul R. Heyl, physicist, U. S. Bureau of Standards; Dr. Burton E. Livingston, professor of plant physiology and forest ecology, Johns Hopkins University, and General Secretary, A. A. A. S., and Joseph L. Wheeler, public librarian, Baltimore, chairman.

This project has made it clear that more carefully and interestingly written American books for the public are needed in many fields of science. On such subjects as general and special biology, ethnology, light, atomic and quantum physics and relativity, geology, microscopy and many other subjects, there is serious need for systematic, illustrated works, not necessarily brief "appetizers" at one extreme, nor at the other, the conventional text-book. As to good, attractive text-books, great progress has been made in the last five years. We do, however, need books that have more of the broad outlook, imaginative power and literary background and style which characterize some of the work of our English brethren, such as the recent volumes on biology by Wells and Huxley and by Thomson and Geddes, Gregory's "Discovery," or Singer's "Short History of Biology," and Seward's "Plant Life Through the Ages," not to mention the well-known works of Jeans and Eddington. We have already such worth-while examples as Fairchild's "Exploring for Plants," Allen's "Book of Bird Life," Slosson's books, Cushing's "Osler," Shapley's "Flights from Chaos." These books combine through knowledge and accuracy with some literary style and a sustained vigor; they make a presentation suitable to interest the great army of prospective readers beyond the A-B-C stage. Two 1931 American books which set a high mark are Johnson's "Taxonomy of the Flowering Plants" and Crowder's "Between the Tides."

One definite lack is that of an adequate, interesting history of American science, emphasizing the biographical side. A letter from J. Porter, of Vancouver, well worth reading, appears in the *Literary Supplement* to the London *Times* of August 6, on the lack of American scientific biography. One paragraph says:

> . . . America has not been so fortunate. A generation of the giant workers in geology has passed almost unmarked. Even such interesting characters as Powell and Clarence King and Grove Karl Gilbert have failed to receive adequate notice from writers of biography. In the field of physics a small library has grown up around Franklin, but Joseph Henry and H. A. Rowland have little chance of stimulating future generations.

JOSEPH L. WHEELER

ENOCH PRATT FREE LIBRARY,
BALTIMORE

SCIENTIFIC APPARATUS AND LABORATORY METHODS

CULTURAL AND INOCULATION METHODS WITH TILLETIA SPECIES

IN SCIENCE for October 2, p. 341, E. W. Bodine describes a "Double Plate Method used for Culturing *Tilletia levis*," in which I was much interested and to which I might add some further observations.

A similar inverted-plate method was used by Kluyver and van Niel[1] in making cultures of species of *Sporobolomyces* in 1924–1925. This procedure was possible because the basidiospores of this basidiomycetous yeast are shot away from their sterigmata.

The discovery by Buller and Vanterpool,[2] in 1925, that the so-called secondary conidia of *Tilletia tritici* are violently discharged from their sterigmata revealed a phenomenon which finds application in both cultural and inoculation technique with species of *Tilletia*. Since 1925, I have used the double-plate or inverted-plate method as described by E. W. Bodine, or modifications thereof, in culturing species of *Tilletia* other than *tritici* and *levis*. *Tilletia horrida, T. holci,* and *T. asperifolia* were found to discharge their secondary conidia in a manner similar to that described for *T. tritici* and *T. levis,* and therefore could be readily cultured by the inverted-plate method. Some investigators have experienced difficulty in germinating the chlamydospores of *T. horrida* and obtaining cultures free from contamination; but by using the inverted-plate method pure cultures of *T. horrida* can be obtained quite readily.

By this method monosporous cultures of secondary conidia can be secured and crossing or hybridization experiments conducted with a fair amount of facility.

Further, the method has also found application in the multisporous inoculation of germinating wheat seedlings by inverting a vigorously growing culture of *T. tritici* or *T. levis* and allowing secondary conidia to "rain down" on the seedlings during the first two or three days of germination. A temperature of 10° to 14°C., and probably darkness also, favored infection. After inoculation, the seedlings were carefully potted and brought to maturity, when a large per-

[1] A. J. Kluyver and C. B. van Niel, "Über Spiegelbilder erzeugende Hefenarten und die neue Hefengattung Sporobolomyces." *Centralb. f. Bakteriologie,* Abt. 2, Bd. 63, pp. 1–20, 1924–1925.

[2] A. H. R. Buller and T. C. Vanterpool, "Violent Sporedischarge in *Tilletia tritici.*" *Nature* 116: 934–935, 1925.

centage were found to have developed bunted heads. Doubtless, other species of *Tilletia* discharge their secondary conidia violently and will therefore yield to the methods described above.

T. C. VANTERPOOL

LABORATORY OF PLANT PATHOLOGY,
UNIVERSITY OF SASKATCHEWAN,
SASKATOON, CANADA

A THERMOPHIL NITRITE FORMER

AN investigation of the thermophil bacteria of pine woods soils in North Carolina was undertaken as a part of the requirements of the Ph.D. degree at Ohio State University. A thermophil nitrite former was among the organisms studied. Enrichment cultures in inorganic salt solution were made. From these, single cells were isolated with a Barber pipette. In all experimental work done with this organism cultures grown from single cells were used. A brief description of the organism follows.

The organism was found to be an obligate thermophil with an optimum temperature at 55°–60° C. and a minimum at 40° C. It was not killed after eight hours at 100° C. nor after forty-five minutes under sixteen pounds pressure at a temperature of 120° C. in the autoclave but was killed after sixty minutes. It was found also to be an obligate aerobe.

Morphologically, it was a large, motile, spore-bearing rod found singly and in chains. The spores were terminal and exceeded the vegetative rod in diameter. The flagella were peritrichic in arrangement. When it was stained with Gram's stain, three forms were noted, a large Gram positive rod, both sporulating and vegetative, which varied in size from 3.8 to 8 micra in length and 1 to 2 micra in width; a more slender Gram negative form, also sporulating and vegetative, which varied from 3.5 to 7 micra in length and .5 to 1 micron in width; also a transitional form having a Gram negative core on which were Gram positive fragments in the form of bars and granules. From experimental evidence these were found to be different ages of the same organism. The Gram positive were young, the negative old, and the granular middle aged.

The colonies appeared as minute white dots with dense centers, when grown on mineral salt agar plates.

When incubated at 55° C., as all cultures were, the organism could oxidize ammonium salts to nitrite in amounts ranging from one to five parts of nitrite nitrogen per million. This oxidation was most active in a pH of 9.4, very slight at pH 6.3 and ceased at pH 4.8.

It grew on all ordinary organic media, but as a result its oxidizing power was retarded upon reinoculation into mineral salt media, except in the case of potato.

When dextrose was added to the mineral salt medium, concentrations of 2 per cent. and 1 per cent. completely inhibited nitrite formation, .5 per cent. and .25 per cent. retarded and 0.1 per cent. had no detrimental effect.

Peptone, 1 per cent., in mineral salt medium temporarily checked nitrite formation, then active oxidation followed.

Free CO_2 from the air was necessary as the source of carbon. However that from the carbonate in the medium was sufficient to support a very slight oxidation.

Ammonium salts were used as a source of energy by the organism whenever available, except in one instance, when starch was added to the mineral salt medium.

Since this organism was in all the surface layers of soil tested in both North Carolina and Florida and formed nitrites between 55°–60° C., which is contrary to all findings reported, it is evidently a *new genus* and a *new species*. Considering this fact it seemed advisable to suggest a name. The name is *Nitrosobacillus thermophilus* Campbell (*Gen. et. sp. nov.*).

EVA GALBREATH CAMPBELL

GUILFORD COLLEGE

MUSEUM TAGS OF CHEMICAL PROOF PAPER

A RECURRING problem in museum technique is offered by the necessity of numbering specimens preserved in alcohol, formalin, or other liquid. The use of metal tags for this purpose has been general, pure tin being by far the best material available. Metal tags are, however, subject to corrosion in formalin solutions or even in alcohol to which formalin specimens have been transferred. There is some difficulty in securing tin of uniformly pure composition, and even a slight impurity may greatly activate the process of corrosion.

The paper known as Dennison's fiber-proof paper, manufactured by the Dennison Manufacturing Company, Framingham, Massachusetts, was devised especially as a chemical-proof paper for laundry tags. I assume it to be a paper impregnated with albumin, which is subsequently hardened by treatment with formaldehyde. This paper comes in 20″ x 24″ sheets, somewhat variable in thickness. The lot now in use at Field Museum of Natural History is .346 mm thick. This paper does not soften in water, alcohol or formalin solution.

The 20″ x 24″ sheets, in our practice, are cut into ⅞″ strips. These are printed with rules set ¼″ apart on one side and the initials F.M.N.H. set exactly between the rules, on the other. Numbers are then stamped *into* the paper, to a depth of about half the thickness of the stock, by means of an automatic