versity of Idaho, Moscow, Idaho; S. E. Lambert, Spokane, Washington; A. A. Cleveland, State College of Washington, Pullman, Washington.

Additional trustees: L. K. Armstrong, Spokane, Washington; Alfred Atkinson, State College, Bozeman, Montana; C. L. Von Ende, University of Idaho, Moscow, Idaho; R. H. Weidman, U. S. Forest Service, Missoula, Montana; Francis A. Thomson, School of Mines, Butte, Montana; E. O. Holland, State College, Pullman, Washington.

E. E. Hubert, editor of *Northwest Science,* the official publication of the association, was reappointed for the year 1933. Alfred L. Anderson, of the University of Idaho, will continue to serve as assistant editor.

The following were elected as chairmen of the various sections:

Botany-Zoology, A. L. Hafenrichter, State College, Pullman, Washington.

Chemistry-Physics-Mathematics, R. W. Gelbach, State College, Pullman, Washington.

Education, F. T. Hardwick, Whitworth College, Spokane, Washington.

Engineering, G. E. Thornton, State College, Pullman, Washington.

Forestry, F. G. Miller, University of Idaho, Moscow, Idaho.

Geology-Geography, E. T. Hodge, University of Oregon, Corvallis, Oregon.

Medicine-Surgery, R. E. T. Stier, Spokane, Washington.

Social Science, Claudius O. Johnson, State College, Pullman, Washington.

J. W. HUNGATE
Retiring Secretary-Treasurer

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SIMPLIFIED METHOD OF STAINING ENDOSPORES

IN our search for simple and efficient stains for routine bacteriological work, the Wirtz[1] method of spore staining proved far superior to others. Hansen's[2] and Möller's[3] techniques make use of steaming carbol fuchsin and an acid decolorizer. Dorner's[4] method, as recommended by the Committee on Bacteriological Technic of the Society of American Bacteriologists, involves the use of nigrosin. Muzzarelli's[5] and Abbott's[6] methods are each good, but even these resort to an acid decolorizer. Wirtz's method proved less complicated than these. Wirtz fixed air-dried smears in osmic acid, stained with malachite green, and used dilute carbol fuchsin as both decolorizer and counterstain. Spores were stained green, cells red. There was no blending of colors such as is often encountered with red and blue dyes.

We have eliminated fixing in osmic acid, shortened the time of staining and substituted aqueous safranin for the dilute carbol fuchsin. The malachite green is made up as a 5 per cent. aqueous solution, allowed to stand one half hour and filtered. This solution seems to be stable. The technique then is: Make films in the usual manner and fix by flaming three times. Flood with malachite green solution and heat to steaming three or four times within one half minute. Wash off the excess stain under the tap for about one half minute. Apply a 0.5 per cent. aqueous safranin solution one half minute. Wash, blot dry and examine. This procedure is evidently more simple than the original method. The whole staining time involved is less than two minutes, and a minimum of steaming is required. Within wide limits it is impossible to overstain or to wash too long.

Application of this method to thirty strains of sporeformers at different ages showed that agar slant cultures incubated at 37° C. for 24 to 36 hours always contain vegetative cells, sporangia and free spores. Thus a complete morphological description can be obtained at this time. Films from week-old cultures, recommended by the Committee on Bacteriological Technique,[7] tend to show excess of free spores and few vegetative cells or sporangia. The search for these structures in such films is time-consuming.

The part of a slant culture from which growth is taken affects the results of the spore stain. Films made from the butt end of a slant show more vegetative cells and fewer sporulated cells than films from the dried upper end of the slant.

The simplicity of the technique and the beautiful differentiation obtained with it should make this method useful for the identification of sporeforming bacteria.

ALICE B. SCHAEFFER
MAC DONALD FULTON

DEPARTMENT OF BIOLOGY
MIDDLEBURY COLLEGE

[1] R. Wirtz, *Zentralblatt für Bakteriologie,* I Abt., Orig., 46: 727, 1908.

[2] Hansen, cited by Buchanan, "Bacteriology," 3d ed., p. 153, 1930.

[3] Möller, cited by Stitt, "Practical Bacteriology, Blood Work, and Animal Parasitology," 8th ed., p. 64, 1927.

[4] W. C. Dorner, cited by Committee on Bacteriological Technic, "Manual of Methods," Leaflet IV, p. 11, 1932.

[5] G. Muzzarelli, *Zentralblatt für Bakteriologie,* I Abt., Ref., 104: 484, 1932.

[6] Abbott, cited by Stitt, "Practical Bacteriology, Blood Work, and Animal Parasitology," 8th ed., p. 64, 1927.

[7] Committee on Bacteriological Technic, "Manual of Methods," Leaflet V, p. 5, 1930.