Bacillus subtilis grows luxuriantly in this medium, there being approximately 200,000,000 cells present per cubic centimeter of the culture after 48 hours' incubation at 37 degrees Centigrade. Sixty to 70 per cent. spores are regularly present within five days (100 per cent. in the pellicle). With Parke-Davis peptone in a 1 per cent. solution as a control, there were 370,000,000 cells, but less than 30 per cent. of these were as spores.

The simplicity of the medium and its capacity for supporting good growth and the rapid production of a high percentage of spores by *B. subtilis* justifies its use in future spore studies with this organism.

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A SIMPLIFIED TECHNIQUE FOR MOUNTING GROUND BONE SECTIONS TO SHOW AIR-INJECTED LACUNAE AND CANALICULI

THE usual method for such sections is to place a small lump of solid balsam or solidified 10 per cent. gelatine on both slide and cover-glass. Apply enough heat to dissolve the mounting medium, place bone section in liquefied balsam or gelatine, cover and cool rapidly.

Better results are obtained by mounting the dry bone section in either thin or medium thick damar balsam and permitting the balsam to dry in air. No cover-glass should be used. The specimen may be examined while the balsam is drying, for the canaliculi and lacunae become evident immediately and are much more outstanding than specimens in which the bone spaces are filled with débris.

Bone sections so prepared keep indefinitely and are much more satisfactory than those in which heat and cover-glass are necessary. By employing the technique for grinding bone already described in SCIENCE, Vol. 75, No. 1945, "Aloxite as an Abrasive for Grinding Bone Sections for Histology," in conjunction with this simplified mounting technique, an ideal method for preparation of bone sections for classroom use is achieved.

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SPECIAL ARTICLES

X-RAY DIFFRACTION STUDIES OF THE BUREAU OF STANDARDS RUBBER FRACTIONS

AT the request of Dr. Washburn, a careful preliminary x-ray diffraction study has been completed on various samples of rubber fractions prepared at the Bureau of Standards by the methods already described.[1] The results are so interesting, especially in structural differentiation between the ether-soluble (sol-rubber) and the ether-insoluble (gel-rubber) hydrocarbons, and in producing new data bearing upon the several theories of the structure of whole rubber, that it has seemed desirable to record very briefly some of the more important observations. It will be recalled that native rubber, raw, purified or vulcanized, gives a typical liquid halo or "amorphous" type of diffraction pattern in the unstretched condition, which changes to the characteristic crystal fiber pattern when the rubber specimen is stretched. Upon the basis of these facts several theories of the structure of the rubber hydrocarbon have been proposed: the folded or spiral molecules model; the fringe model (bundles of molecular chains with frayed ends); the flexible chain model and the very familiar two-phase model.

The important new observations on the fractions are as follows: (1) The purified total hydrocarbon behaves on stretching exactly as previously found for rubber.

(2) *The sol-rubber fraction produces no evidence whatever of the characteristic crystal fiber pattern upon stretching even up to 1000 per cent.* The liquid halo is retained under all conditions, but it becomes *broader* in proportion as the percentage of stretch increases (which may be due to decreasing particle size). The same results are observed in the presence or absence of antioxidants.

(3) The gel-rubber fraction produces easily, above 100 per cent. elongation, the crystal fiber pattern, which is quite sharp and intense for 200 per cent. stretch. The liquid halo remains unchanged in width and decreases in intensity as the crystal interferences increase in intensity. When, however, antioxidants are removed and the sheet allowed to stand without vulcanization, it is difficult to find crystal interferences even at 400 per cent. elongation.

(4) The sol-rubber *when vulcanized* begins to show faint evidence of crystal interferences when stretched above 400 per cent., showing that sulfur has produced a profound structural effect. Vulcanization was accomplished by the Peachey (vapor cure) method.

(5) The gel-rubber, vulcanized, gives a fiber pattern at 250 per cent. elongation.

In a detailed paper there will be presented:

Quantitative measurements on 50 or more diffraction films, correlation of these structural observations

[1] Washburn, *Phys. Rev.*, 38, 1790 (1931); Smith, Saylor and Wing, *Bureau of Standards Journal of Research*, 10, 479 (1933).