

MEDICINE

Aid to Stop Bleeding

New type specially treated cotton which the body can absorb can be used as pledgets soaked in thrombin. Need not be removed from wound.

► HELP in stopping bleeding during operations on the brain or elsewhere has been discovered in a new type of specially treated cotton, called oxidized cellulose. Dr. Virginia Frantz of the Department of Surgery, College of Physicians and Surgeons, Columbia University, has shown experimentally that this new material, unlike cotton, is absorbed when left implanted in the body.

Pledgets of the material soaked in thrombin have been used successfully to stop bleeding in 30 operations by Dr. Tracy J. Putnam, of the Neurological Institute and the College of Physicians and Surgeons, Columbia University. Surgeons will find details in a forthcoming issue of *Annals of Surgery*.

It is the thrombin, and not the oxidized cellulose, which stops the bleeding. Cellulose oxidized with nitrogen dioxide, however, gives the surgeon a better method than ever before for using the blood-clotting thrombin to check hemorrhage.

Developed about a year ago by Dr. W. O. Kenyon, C. C. Unruh and Edward C. Yackel, of the Eastman Kodak Research Laboratories, the new type oxidized cellulose has found its first publicly announced use in this life-saving application, though an earlier report suggests a possible future use in the fight against germ disease. Its birth in an industrial chemical laboratory and Dr. Putnam's report that it became available for surgical use "by a fortunate coincidence," suggests, however, that it may be finding other, as yet unannounced, uses in war industry.

Cellulose oxidized by nitrogen dioxide is a fluffy white material, looking like cotton wool. It has certain unique properties which make it especially useful to the surgeon. It dissolves slowly in slightly alkaline fluids such as blood. It is absorbed by the body from various tissues including the brain without causing inflammation of any consequence as was shown by Dr. Frantz. It can be sterilized by boiling for three minutes and can be kept in 70% alcohol until needed.

Further important medical and sur-

gical uses for it are foreseen by Dr. Putnam.

"Thin sheets of such treated cellulose," he states, "might be used to control bleeding from the cut surface of parenchymatous organs; for example, the bed of the gall bladder. A similar gauze might be used in skin grafting. For first aid use in the field, an anti-septic such as sulfapyridine, penicillin or gramicidin might be added to such tampons for packing deep wounds."

Dr. Putnam used this material by saturating it in a solution of the blood-clotting thrombin. Tiny pledgets were made by teasing out and folding the wet cotton.

The troublesome and often dangerous bleeding points during brain operations were first plugged with moist ordinary cotton and this was sucked dry. The pledget containing thrombin was then rapidly substituted for the cotton plug and covered with another piece of moist cotton which in turn was sucked dry by special surgical suction apparatus. Even with active bleeding from an artery, Dr. Putnam reports, this second tampon or plug could usually be removed within a minute leaving the treated cellulose solidly clotted.

The role of thrombin in the clotting of blood when it is shed has long been known and purified preparations have been available for some time to aid in checking hemorrhage. Its practical use in surgery, however, has been limited by difficulties of application.

When fluid preparations are used, Dr. Putnam explains, the clot which is formed in less than a second with flowing blood is apt to be washed away before it can stick to the cut, even though the blood flow is no more than an ooze. If the thrombin is applied on plugs or pledgets of ordinary cotton, the bleeding is checked even under adverse conditions but if the pledget is removed the hemorrhage usually begins again at once.

The new type cellulose, however, need not be removed, since the body can absorb it without injury. This means that the clot formed through the action



KATYDID — This unusual photograph of a familiar face was taken by George A. Smith of Quarryville, Pa., with a home-made spotlight and two-second exposure.

of the thrombin need not be disturbed and can remain in place to stop bleeding effectively.

This new kind of oxidized cotton is related chemically to the sugary outer coatings of certain pneumonia germs, technically known as their capsular polysaccharides. This and other findings about the two materials which may aid in the better understanding of immunity or resistance to pneumonia and perhaps other diseases were reported by Dr. Michael Heidelberger and Dr. Gladys L. Hobby, of Presbyterian Hospital, Columbia University, to the National Academy of Sciences.

The new oxidized cotton contains cellobiuronic acid units, separated by glucose, at intervals in the long cellulose chain and forms water-soluble salts. This type of structure is what gives virulence and type specificity to the sugary coating of Type III and Type VIII pneumonia germs.

The oxidized cotton, moreover, behaves immunologically like the pneumonia germ polysaccharides. It precipitates antiserum for these types of germs much in the way shown by the sugars isolated from the germs themselves.

These findings emphasize, the Columbia scientists state, the close correlation between the chemical composition of a germ's carbohydrate material and its specific behavior toward the antibodies developed by the body to fight germs.