0.5 per cent., and a preservative is used. The strength of the filtered product is ascertained. It is tested bacteriologically, injected into animals and finally actually administered in the Department of Health hospitals before distributing.

By this method almost all the ammonium sulfate is removed before dialysis, and the additional acid precipitation gives a purer product. Dialysis is quicker under these circumstances than when the sulfate alone is employed to effect precipitation. The antitoxin is practically all recovered, and a concentration of several times the original potency is easily and constantly obtained. The sodium chlorid separation is sharp, the two groups of proteins showing essentially different physical characters as precipitates. The final product is somewhat viscous, faintly opalescent and colorless or slightly tinged with hemoglobin. Dried at low temperatures, a beautifully transparent and entirely soluble scale antitoxin is obtained. Large quantities of serum can easily be worked over in this way at comparatively small expense.

Tests show that the artificially concentrated antitoxin, kept in small vials in an icebox, preserves its potency as well as or even better than the ordinary antitoxic serum. Therapeutically, the comparative results obtained are identical. Local irritation, rashes, etc., seem to be less frequent and severe when the refined antitoxin is administered.

9 (101). **"On the effect of magnesium salts upon the excitability and conductivity of nerves": S. J. MELTZER and JOHN AUER.**

In their communication to this society on the anesthetic effect of magnesium salts after subcutaneous injections,[1] the authors stated that they made several series of experiments on the physiological and pharmacological effects of these salts and that all their experiments had demonstrated a common result, namely, that magnesium salts produce a profound effect upon the nervous system and that this effect is invariably of an inhibitory character.

In their recent experiments the authors applied solutions of magnesium salts to the sciatic, pneumogastric, depressor, and sympathetic nerves of rabbits. Numerous applications of the magne-

[1] *Proceedings* of this Society, 1904–'05, ii, p. 81.

sium salts to the various nerves failed to produce, in any instance, a phenomenon which could be interpreted as an excitation, but in all cases there was produced, sooner or later, a profound inhibitory effect upon the conductivity of the nerve under experimentation. After application to the sciatic nerve, the conduction of motor and sensory impulses was manifestly inhibited; a strong stimulus applied below the block caused strong contractions of the muscles of the thigh, but no pain; when applied above, pain but no contraction was caused. In experiments on the depressor, stimulation on the distal side of the block failed to produce a fall of blood-pressure. Applications to the sympathetic blocked the conductivity, so that strong electric stimulations applied to the section of the nerve exposed to the influence of the solution, or distal to that section, failed to cause a constriction of the ear vessels or a dilation of the pupil.

Instructive results were obtained in the experiments upon the vagi. As is well known stimulation of the central cut end of the vagus produces an unmistakable effect upon respiration, while stimulation of the peripheral cut end causes a standstill of the heart, and a contraction of the esophagus and the cardia. When a section of about 2 cm. to 3 cm. of an intact vagus was exposed for some time to the influence of a solution of a magnesium salt, stimulation above the block affected the respiration but not the heart or the esophagus, and stimulation below affected the function of the last named organs but not that of respiration.

Applications to the vagus nerves enabled the authors to study the blocking of *normal* impulses. When applied to one nerve, after the other had been cut, or when applied to both intact nerves, the respirations slowed up perceptibly after a while, as happens after cutting both vagi; besides, after spontaneous or induced acts of deglutition, no contractions of the esophagus or cardia followed.

These effects were obtained with hypertonic as well as with isotonic, and even with strongly hypotonic solutions. The weaker the solution the longer it took to establish a complete block; 10 to 30 minutes was about the average time. After a block was established, conductivity could be completely restored by thorough irrigation of the nerve with Ringer solution. When hypotonic solutions of magnesium salts were used, conductivity was often

restored spontaneously without washing with Ringer solution, if the application of the magnesium solution was not renewed. After the application for two or three hours of strongly hypertonic solutions, the conductivity did not return usually for 24 hours or longer, sometimes not even after washing with Ringer solution, as was observed in experiments on the sciatic and on the superior cervical ganglion. Thus far the experiences of the authors in this connection indicate, however, that conductivity is finally restored in all cases.

Fourteenth meeting.[1]

Rockefeller Institute for Medical Research. December 20, 1905. President Wilson in the chair.

10 (102). **"The action of eosin upon tetanus-toxin and tetanus": SIMON FLEXNER** and **HIDEYO NOGUCHI.**

Eosin and certain other anilin dyes have the power of destroying in vitro the hemolytic property of tetanus-toxin.

Eosin, when used in sufficient quantity, destroys tetanospasmin in vitro.

Simultaneous injection of tetanus-toxin and eosin into rats delays or prevents the appearance of the symptoms of tetanus. When the symptoms appear they progress more slowly than in control animals.

Spores of tetanus-bacilli when introduced on threads into rats, and followed immediately by an injection of eosin into the same locality, do not produce tetanus. The treatment of animals with eosin, after the first appearance of the tetanic symptoms following spore-infection, may prevent the further development of the symptoms of tetanus. Eosin injections into the same locality as the spore inoculations are the most effective, but injections into other parts of the body delay or modify the tetanic process.

Rats are more resistant to tetanus poison than guinea-pigs, and hence are more easily protected by eosin from tetanus; but in guinea-pigs the fatal issue can be delayed by eosin.

[1] *Science*, 1906, xxiii, p. 109; *American Medicine*, 1906, xi, p. 105.