3 and 15 minutes the values obtained were constant. Long periods of heating—30 minutes to 1 hour—gave lower values. The reduced copper is therefore oxidized more rapidly in spinal fluid preparations than when reduction is brought about by pure glucose in water. Benedict has stated that similar changes are observed in blood filtrates. The more rapid reduction during short periods of heating may be due to a similar cause, or may be brought about by the presence of a small amount of a very readily oxidized material in the fluid.

Although there seems to be a small amount—about 5 mg. %—of reducing material in the spinal fluid which is not fermentable by yeast, the amount which is not destroyed by the colon bacillus, and which is therefore almost certainly not a carbohydrate, is very small. It seems to be present in concentrations of about 1 mg. % expressed as glucose.

4146

Action of Pilocarpine on Pupil of Guinea Pig.

THEODORE KOPPÁNYI.

From the Department of Pharmacology, Syracuse University.

It has been shown that pilocarpine dilates the normal and constricts the denervated pupil of the rat. The mode of its action has also been discussed in a previous paper.[1] The normal pupil of the rat is constricted, due to the powerful sphincter tone of the iris. The purpose of this investigation is to determine how a naturally dilated pupil (weak sphincter tone) would react to pilocarpine.

Solutions of pilocarpine hydrochloride (2-10%) were instilled into the conjunctival sac of pigmented and albino guinea pigs. Pilocarpine caused in every instance dilation of the pupil and abolished the light reflex. The result was even more striking if the pupil was first reduced in size by sectioning the cervical sympathetic. The same solutions of pilocarpine invariably produced pupillary constriction in rabbits. The pupil dilated by pilocarpine did not react to usual quantities of arecoline, muscarine and physostigmine (0.5-1% solution), the latter drugs acting orthodoxly in normal guinea pigs. Atropine and "sympathomimetic" drugs increased the size of the pupil dilated by pilocarpine.

[1] Koppányi, T., *J. Pharm. and Exp. Ther.*, 1928, xxxiv, 73.

The section of the short ciliary nerves reverses the pilocarpine action in guinea pigs, its effect being constriction of the pupil. Atropine abolishes the miotic action of pilocarpine in denervated eyes.

Pilocarpine thus produces pupillary dilatation due to paralysis of parasympathetic myoneural junctions in the normal eyes; and constriction due to stimulation of the same junctions in the denervated eye of the guinea pig.

4147

Action of Sympathomimetic Drugs on Pupil of Guinea Pig.

THEODORE KOPPANYI.

From the Department of Pharmacology, Syracuse University.

Meltzer and Auer[1] showed that subcutaneous injections or instillations of epinephrin have no effect upon the normal pupil of the cat and rabbit. Ephedrine and cocaine, however, produce mydriasis even in normal animals. Ergotoxin, or ergotamine, are said to cause miosis in dogs and cats and mydriasis in rabbits.

In guinea pigs the instillation of a few drops of epinephrin hydrochloride, 1:1000, causes a maximal dilatation of pupils of normal animals and of animals whose cervical sympathetic has been cut below the superior cervical ganglion. Ordinary doses of arecoline and physostigmine do not constrict the pupil dilated by epinephrin. There is a complete loss of light reflex. Ephedrine and cocaine behave exactly like epinephrin.

Ergotamine tartrate administered by instillation into the conjunctival sac produces mydriasis. But injection of the drug into the anterior eye chamber causes, after an initial dilatation, constriction of the pupil, which lasts for at least 12 hours. The pupils constricted by ergotamine do not react to other sympathomimetic drugs, but do respond to atropine.

[1] Meltzer, S. J., and Auer, C. M., *Am. J. Physiol.*, 1904, xi, 28, 37, 40.