dose of 0.001 mg. per gm. tetanus came on at 40° after ¼ to 4 hours; at 55° after ¾ to 1¼ hours; at 70° after ¼ to ¾ hours.

These results show that tetanus may be induced by strychnin at low and at high temperatures by doses which will not cause tetanus at temperatures between. They also show that the interval between injection and the onset of tetanus grows less with higher temperatures, although there is no constant ratio.

65 (761)

On the difference in the effect of Gréhant's[1] anesthetic and of morphine-ether on the total output of urine and the composition of the urine in normal dogs.

By WM. DEB. MACNIDER.

[*From the Laboratory of Pharmacology, University of North Carolina.*]

In a recent study of the action of various diuretics in uranium nephritis,[2] it was shown that the anesthetic employed in the experiments not only influenced the output of urine, but that following the anesthetic, diuretic substances such as caffeine, theobromine, and 0.9 per cent. sodium chloride lost their diuretic value.

The following experiments are being conducted to ascertain if the previously mentioned anesthetics have any effect in reducing the output and in changing the composition of the urine in the normal dog and if the anesthetics differ from one another in their action.

When full grown dogs are given Gréhant's anesthetic in the strength usually employed there is a marked reduction in the output of urine and the animal becomes glycosuric, the percentage of glucose varying between 0.165–3.33 per cent. Acetone has so far been constantly present in the urine of these full-grown animals.

An albuminuria is induced and is accompanied by the appearance of casts, hyaline, or hyaline and granular. In one of the

[1] Gréhant's anesthetic. The animal is given ¼ c.c. per kilogram of a 4 per cent. solution of morphine. This is followed in half an hour by 10 c.c. per kilogram of the following mixture: chloroform, 50 c.c.; alcohol and water, each 500 c.c.

[2] *The Journal of Pharmacology and Experimental Therapeutics*, Vol. III, No. 4, March, 1912.

animals bile appeared in the urine on the second day after recovery from the anesthetic and persisted for two days.

The anesthesia is complete for from ten to eighteen hours. Three animals have failed to recover.

When Gréhant's anesthetic is given to full-grown dogs in half the strength usually employed the output of urine is usually but slightly diminished, the animals however become glycosuric, the percentage of glucose having varied between .101–.301 per cent. The urine does not contain acetone.

Albumen is present with hyaline or hyaline and granular casts.

The anesthesia is imperfect. Recovery is usually complete within twelve hours.

In a final series of animals, puppies were used. The age of these animals ranged from six weeks to four and a half months. Gréhant's anesthetic was given in full strength. The animals were completely anesthetized for two and a half to nine hours. The output of urine was decidedly decreased and showed both glucose and albumen. The percentage of glucose varied from .0701–.202 per cent. Acetone was present in the urine of the animal four and a half months old. All of the animals recovered.

In the experiments conducted with morphine-ether, only full-grown animals have so far been employed. The anesthetic was given in sufficient quantity to keep the animal completely anesthetized for three hours. All of the animals recovered. The recovery has been usually complete within six to eight hours.

The output of urine in the twenty-four hours following the anesthetic has been but slightly reduced, excepting in one animal that was very old. In this animal the urine was reduced from 515 c.c. on the day prior to the anesthetic to 320 c.c. in the twenty-four hour period following the anesthetic. The urine of this dog showed a fairly heavy precipitate of albumen and .104 per cent. of glucose. Acetone was not present.

The remaining animals of this series have not developed a glycosuria, and the urine has been free from acetone, albumen, and casts.

Experiments will be continued to ascertain if there exists any relation between the age of the animal and the duration of the anesthesia, and between the duration of the anesthesia and the appearance of various abnormal constituents in the urine.