

quent and curious lack of parallelism between antibody contents and protective functions generally. The obvious direction indicated to us for further experimentation by these results is to include attempts to produce inflammatory foci in the processes of active immunization for the production of protective sera.

17 (2540)

Estimations of blood sugar in decerebrate animals.

By H. C. BAZETT, W. Z. TYCHOWSKI, and C. CROWELL.

[*From The University of Pennsylvania Medical School,
Philadelphia, Pa.*]

Figures for blood sugar following decerebration have been given by J. Mellanby,¹ but he used an injection of starch for decerebration and the actual area of brain damage remained very uncertain. He found a hyperglycemia lasting as long as six and a half hours and supposed that this high sugar level might be maintained indefinitely. On the other hand, Bazett and Penfield found a disappearance of sugar from the urine in decerebrate cats within two days.

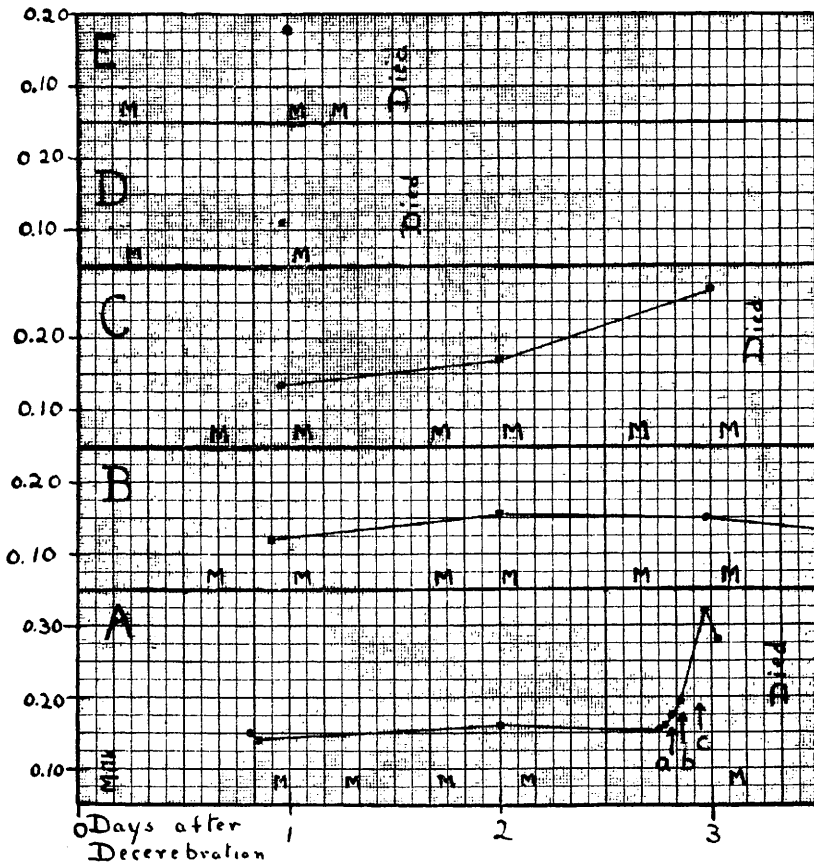
A few observations on blood sugar have been made on cats decerebrated aseptically by a scooping out method under chloroform anesthesia. The blood has been obtained from a cut in the ear and the sugar estimated by Maclean's method. In one such animal a blood sugar of 0.256 per cent was obtained 24 hours after operation, and the urine secreted during the night contained sugar. In another animal the blood sugar 24 hours after operation was found to be 0.19 per cent. In both of the above animals the pituitary was left intact. In an animal decerebrated acutely with the Sherrington guillotine and chloroform anesthesia in which the whole of the hypophysis was removed and also any accessory pituitary tissue in the pharynx a blood sugar of 0.37 per cent was obtained one half hour after decerebration and the level gradually fell until 7 hours after operation it was 0.20 per cent and finally reached 0.165 eleven and a half hours after the operation. At this time the animal began to have difficulty in

¹ Mellanby, J., *J. Physiol.*, 1919, liii, 1.

breathing from tracheal mucus, and his general condition became much worse and with this change the blood sugar rose again reaching a level of 0.38 per cent just before death, 21 hours after operation. The initial fall of blood sugar could not therefore, have been due to a lack of available glycogen. These few figures confirm the data obtained by Mellanby, but indicate that if he had carried on his experiments for a longer time the blood sugar might have fallen, and that the high blood sugar cannot be considered as maintained at a constant high level.

In further experiments animals have been decerebrated aseptically by a scoop method under anesthesia induced by chloretone given in alcohol and water by stomach tube in a dosage of 0.17 gm. per kilo, the resultant anesthesia being occasionally supplemented by a little chloroform. In these animals the hemorrhage at time of operation has been much less than with chloroform anesthesia. The chloretone has maintained its effects for 24 to 48 hours or even longer, although some rigidity has usually developed within 6 to 8 hours. In some animals the pituitary has been left intact, in others it has been removed at the time of operation and in some experiments an attempt has been made to remove pituitary, but at autopsy it has been found to have been only partially removed. The experiments have been complicated by a large number of respiratory infections probably dependent on a distemper epidemic and consequently these figures merit only a brief report. The blood sugar has been estimated after operation on 16 animals, and no difference has been noted according to the treatment of the pituitary; a normal blood sugar being usually obtained 24 hours after the operation whether the pituitary was or was not removed. The blood sugar level has not been raised in these animals by fall of body temperature, but it has been fairly constant in spite of temperature changes, and, if anything, has been lower rather than higher when the body temperature has been low.

The animals have mostly died in from 36 hours to six days, the cause of death being usually a lung or wound infection. In two cases in which the pituitary was removed the animals died in less than 48 hours with fast respiration just before death, but no obvious infection at autopsy. None of the animals in which the pituitary was left died except with very definite evidence of infection at autopsy.



DESCRIPTION OF CHART.

All decerebrated by scoop method with chloretone anesthesia. In all cases M indicates milk given by stomach tube and the time of death indicated is approximate.

A. Pituitary left intact at original operation; complete section at level of tentorium. On third day wound reopened without anesthesia and sample (a) taken after this. Then pituitary damaged with some hemorrhage after which sample (b) taken. Lastly pituitary with disconnected piece of brain lying above it removed with further hemorrhage and wound closed. Sample (c) taken 2 hours later. Death during following night probably from septiemia following second operation.

B. Attempt at pituitary removal at original operation; stalk divided and all brain above removed. Pituitary found present at autopsy. Blood sugar remained at similar level for six days. Animal died on 7th day. No definite cause of death discovered.

C. Operation same as B. Pituitary found damaged but not completely removed at autopsy. No definite cause of death found.

D. Brain removed to level of tentorium and pituitary removed. Respirations 36 twenty-four hours after operation. No definite cause of death discovered.

E. Operation and findings similar to those of D.

Our results demonstrate that the blood sugar is maintained at a normal level in cats following decerebration and that this level is not affected by removal or damage to the pituitary and that such animals are still able to raise their blood sugar when the circulation is failing just before death.

The degree and duration of the hyperglycemia appeared to be more correlated with the amount of blood clot found at autopsy below the tentorium than with any other factor. Blood sugar estimations were made also following decerebration in two animals with sodium veronal anesthesia (0.46 gm. per kilo) by stomach tube with similar results. A chart is given showing the blood sugar level in several animals following decerebration to demonstrate the stability of the blood sugar level. Experiments by one of us (W. Z. T.), included in another paper, demonstrate that the blood sugar level in normal cats is similar to that found in these decerebrate preparations and it is not normally as high as 0.2 per cent as Mellanby stated.

18 (2541)

Food accessory substances in bacterial growth. II. The variations of hydrogen ion concentration occurring in bacterial cultures containing tomato extract.

By GREGORY SHWARTZMAN, M. D. (Introduced by I. S. Kleiner).

[From the Laboratory of Bacteriology, New York Homeopathic Medical College and Flower Hospital, New York City.]

The previous observations, 5 (2528), have demonstrated that the tomato extract is not able to promote the growth of *B. Shiga* in broth of initial pH 5.2-6.2, that it has a moderate growth accelerating effect on this microorganism at initial pH 6.6-7.8 and that it has the best effect when added to broth having a pH 8.2-8.6. However, upon studying the end reaction of cultures containing tomato extract, it was observed that the final pH of these cultures, while always markedly acid, showed considerable difference, this difference depending upon the initial pH of the medium. Thus, for example, initial pH 8.2 of the tomato extract broth gives a final reading of 5.8, whereas initial pH 7.0 gives a reading of 5.2.