

pig; if so it is slight and occurs rarely. In the rabbit, however, some dilation does occur, the average percent increase in diameter of the common duct being less than 30% (body weight taken into consideration). In view of the facts that the common duct of the rabbit is relatively less motile than that of the guinea pig and that the sphincteric resistance is about the same in both, the absence of dilation in the guinea pig is best accounted for by the greater motility of its duct. Thus, in the guinea pig the gall bladder is unimportant either as a reservoir for storage of bile or as a pressure regulatory mechanism. In the rabbit it apparently serves to a slight extent as a pressure regulatory mechanism.

A study of the comparative anatomy of the gall bladder, to be reported elsewhere, shows that the gall bladder is a variable anatomic character in rodents. Some, like the mouse, have apparently retained the organ for purposes of pressure regulation and storage, as in primates and carnivours; others, like the rat, have completely lost the organ; and others, like the guinea pig, have retained the organ. In the latter, however, it can be of no real physiologic significance, since anatomic changes do not result in the extra-hepatic ducts after cholecystectomy.

*Conclusions.* Cholecystectomy in the guinea pig results in no dilation of the common bile duct. Cholecystectomy in the rabbit results in a slight but variable dilation of the common duct.

## 9128 P

### On the Relation Between Hypoglycemia and Anoxemia.

L. F. MOLDAVSKY AND E. GELLHORN.

*From the Department of Physiology, College of Medicine, University of Illinois, Chicago.*

Studies on the O<sub>2</sub> uptake by excised brain tissue and the O<sub>2</sub> consumption of the brain in man indicate that the utilization of oxygen by the brain is dependent on the sugar concentration in the blood. Brain tissue obtained from insulinized animals shows a lesser oxygen consumption than controls (Holmes<sup>1</sup>) and the arterio-venous oxygen difference is diminished after the administration of insulin in man (Dameshek and Myerson<sup>2</sup>). The anoxemia theory of in-

<sup>1</sup> Holmes, E. G., *Biochem. J.*, 1930, **24**, 914.

<sup>2</sup> Dameshek, W., and Myerson, A., *Arch. Neurol. Psychiat.*, 1935, **33**, 1.

ulin convulsions is further strengthened by experiments of Glickman,<sup>3</sup> who found, in this laboratory, that the interval between the injection of insulin and the occurrence of convulsions in rats was considerably shortened if the rats were exposed to a lower barometric pressure which in itself did not have any material effects on rats under control conditions. It was attempted to clarify the relationship between anoxemia and hypoglycemia by blood pressure studies in which the blood pressure response of the anesthetized dog to oxygen deficiency was determined at various blood sugar levels. The experiments were carried out on 18 dogs narcotized with sodium barbital or sodium amytal. Air with 6.2% oxygen was inhaled from Douglas bags for 3 minutes. This concentration produced ordinarily either no rise in blood pressure or only a very slight one. If, however, insulin was administered the blood pressure response was augmented considerably and the rise increased with decreasing blood sugar concentration as is indicated in the examples given in Table I. The phenomenon is reversible, as is shown by

TABLE I.  
Effect of Inhalation of 6.2% Oxygen on Blood Pressure in Dogs.

Time	Blood sugar mg. %	Effect of 6.2% O <sub>2</sub> on blood pressure in mm. Hg.		Remarks
		Before 6.2% O <sub>2</sub>	Max. rise During 6.2% O <sub>2</sub>	
12:03 P.M.	90	95	95	10 kilo dog injected with .60 gm. sod. amytal intraperitoneally 8:30 A. M. 11:39—72 units of insulin injected intravenously.
12:55 "	60	98	148	
1:25 "	45	96	160	
12:25 "	90	135	146	12 kilo dog injected with .72 gm. sod. amytal, 9:00 A.M. 80 units of insulin injected intravenously 12:47 P.M. At 3:47 P.M. 7 cc. glucose given intravenously. (30%.)
2:44 "	76	110	145	
3:28 "	70	112	158	
3:50 "	86	110	138	

the fact that the injection of 30% glucose reduced the blood pressure response approximately to normality corresponding to the elevation of the blood sugar. The typical reaction was found to be independent of blood pressure changes which may have occurred in the experiment. It will be the objective of further studies to determine whether other sugars than glucose are able to restore the normality the blood pressure response to oxygen deficiency and whether any changes in the concentrations of ions, etc., in the blood, which may

<sup>3</sup> Glickman, N., *Proc. Am. Physiol. Soc.*, 1936, p. 61.

occur after administration of large doses of insulin, have any causal relationship to the phenomenon observed.

*Conclusion.* The rise in blood pressure occurring during the inhalation of 6.2% oxygen for 3 minutes increases in proportion to the fall of blood sugar obtained after intravenous injection of large doses of insulin in dogs. Intravenous injection of glucose which offsets to a certain extent the hypoglycemia induced by insulin diminishes the blood pressure response to oxygen deficiency.

### 9129 P

#### Production of Small-Colony Variants of *Staphylococcus aureus*.

GUY P. YOUMANS. (Introduced by A. A. Day.)

*From the Department of Bacteriology, Northwestern University Medical School.*

We have previously reported the production of small-colony variants, or G forms, after prolonged serial transfer of *S. aureus* in lithium chloride broth or plain broth media.<sup>1, 2</sup> Swingle<sup>3</sup> subsequently confirmed these results and also obtained these forms after extended growth in nutrient broth or casein-digest medium. Under these conditions the variants occur only rarely and in small numbers, seldom exceeding 1.0% of the colonies on a plate. Chinn<sup>4</sup> in a study of the metabolic activity of the small colony variants of *S. paradysenteriae* Sonne and *S. aureus* found them to be metabolically far less active than the normal forms, having a reduced generation-time, reduced fermentative powers, lessened ability to reduce methylene blue and a slower cataphoretic velocity. This lowered metabolic activity and the ability to revert to forms identical with the parent culture furnishes some evidence that small-colony variants may be forms whose metabolism has been greatly reduced by some unknown factor.

Quastel and Woolridge<sup>5</sup> studying the enzymes of *B. coli* found that among many inorganic salts barium chloride was the most effective in inhibiting the metabolic activity of washed suspensions of these organisms. These results, and the known lowered metabolic

---

<sup>1</sup> Hoffstadt, R. E., and Youmans, G. P., *J. Infect. Dis.*, 1932, **51**, 216.

<sup>2</sup> Hoffstadt, R. E., and Youmans, G. P., *J. Bact.*, 1934, **27**, 551.

<sup>3</sup> Swingle, E. L., *J. Bact.*, 1935, **29**, 467.

<sup>4</sup> Chinn, B. D., *J. Infect. Dis.*, 1936, **59**, 137.

<sup>5</sup> Quastel, J. H., and Woolridge, W. R., *Biochem. J.*, 1927, **21**, 1224.