gram level was reached. The variations in nitrogen balance for the period of observation are presented in the following table. A low protein diet was followed for a period of 106 days without any evident ill-effect upon the patient.

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Early cirrhosis of the liver produced in dogs by carbon tetrachloride.*

PAUL D. LAMSON and RAYMOND WING.

[*From the Department of Pharmacology, Vanderbilt University School of Medicine, Nashville, Tenn.*]

In studying the toxicity of carbon tetrachloride it was found that this drug in pure form causes very severe central necrosis of the liver which heals with scar formation.[1, 2] The toxicity of a large dose of carbon tetrachloride (4 cc. per kilo) is greatly increased by the addition of alcohol.[3] Experiments were carried out to determine the effect of repeated doses of carbon tetrachloride alone and carbon tetrachloride given with alcohol in order to study the toxicity of such repeated doses and the effect on the liver. Ten dogs were used; some were given the therapeutic dose of carbon tetrachloride (3 cc.), others 4 cc. per kilo, and others the same doses of carbon tetrachloride but with the addition of approximately 25 cc. of 50 per cent alcohol, and finally a control series was given the same dose of alcohol alone. The dogs were given these doses of the drug over a period of approximately sixteen weeks. No signs of intoxication in any of the dogs were seen. They maintained or gained weight and were killed for autopsy in apparently perfect condition. (One or

* The funds for carrying out this work were given by the International Health Board.

1 Pessoa, S. B., and Meyer, J. R., *Boletin da Sociadade de Medecina e Cirurgia de São Paulo*, Brazil, 1922.

2 Gardner, George H., Grove, R. C., Gustafson, R. K., Maire, E. D., Thompson, M. J., Wells, H. S., and Lamson, Paul D., *Bull. Johns Hopkins Hospital* 1925, xxxvi, No. 2.

3 Lamson, Paul D., Gardner, George H., Gustafson, R. K., Maire, E. D., McLean, A. J., and Wells, H. S., *J. Pharm. and Exp. Therap.*, 1925, xxii, 215.

two dogs died from unknown causes within the first day or two.) The livers of the dogs receiving alcohol showed nothing macroscopically or microscopically. All the other dogs showed definite signs of an early cirrhosis of the liver. Macroscopically the liver showed a uniformly granular scarred surface in which there were numerous larger nodules and hyperplastic hepatic cells. Microscopically there was extensive scarring of the liver and distortion of lobulation by fibrous tissue. There was also abundant cellular infiltration and some regeneration of bile ducts. There was no apparent difference in the livers of the dogs receiving carbon tetrachloride alone or both carbon tetrachloride and alcohol.

It is hoped that the continuance of such administration of carbon tetrachloride will produce a true Laennec cirrhosis with circulatory obstruction.

These experiments will be reported more fully in *The Journal of Pharmacology and Experimental Therapeutics.*