my method for the separate determination of lactoflavin and vitamin B_6.[4] I have also tested Karo (blue label), which contains a molasses preparation, and Syrugold, a refined cane molasses preparation (National Sugar Refining Co.), for potency of vitamin B_6 and lactoflavin. The results are recorded in Table I.

In addition to the sample of blackstrap molasses given in Table I, I tested 8 other samples of crude cane molasses for their vitamin B_6 content. In 7 samples, from Louisiana, the vitamin B_6 titer varied between 0.1 and 0.3 gm. per rat per day (in two it was 0.1 gm., in three 0.15 gm. and in two 0.3 gm.); in the eighth sample, of unknown provenience, the titer was 0.4 gm. per rat per day. In a specimen of commercial blackstrap treacle put up by Fowler (England), the rat-day dose of vitamin B_6 was found[2] in 0.25 gm. Beet molasses samples from Germany and from Michigan were both devoid of vitamin B_6 (see Table I).

The Karo sample recorded in Table I showed B_6 activity at the daily dose per rat of 2 to 2.5 gm., whereas in 2 other samples of blue label Karo I failed to detect any curative action for deficiency of vitamin B_6. The implications of this finding in connection with questions of infant feeding will be discussed elsewhere.[5]

Conclusions. Crude cane molasses is a good source of vitamin B_6, the B_6 titer varying from 0.1 to 0.4 gm. per rat per day, with an average of 0.15 gm. Crude cane molasses also contains small amounts of lactoflavin. Beet molasses is practically devoid of both vitamin B_6 and lactoflavin.

9157 P

Influence of Carbon Dioxide upon Blood Pressure Reaction to Oxygen Deficiency.

E. H. LAMBERT AND E. GELLHORN.

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

Gellhorn[1] showed recently that CO_2 either completely offsets or greatly diminishes the effects of oxygen deficiency on various sensory and psychic phenomena. This effect may be thought to be due to the effect of CO_2 on respiration whereby the acapnia associated

[4] György, P., *Biochem. J.*, 1935, **29**, 741.

[5] György, P., in preparation.

[1] Gellhorn, E., *Nature*, 1936, **137**, 700; *Am. J. Physiol.*, 1936, **117**, 75; *Proc. Am. Physiol. Soc.*, 1936, p. 59; Sigma Xi Quarterly, 1937 (June), in press.

with the increased breathing due to oxygen deficiency is eliminated.[2] The oxygen tension in the alveolar air is increased and the oxygenation of the tissues is improved due to the right shift in the oxygen and dissociation curve. It is, however, not improbable that in the very striking restoration of function due to the administration of small amounts of CO_2 circulatory adjustments may be involved also. This is shown by studies of Henderson and collaborators,[3] who found an increase in muscular tonus to occur after the administration of small amounts of CO_2 which by increasing the venous return to the heart improved circulation. Gellhorn[4] found, in his studies on humans, that when the subjects were in erect posture the systolic blood pressure fell considerably, whereas it was maintained at a normal level or remained slightly elevated during the experiment when 3% CO_2 was inhaled simultaneously with the oxygen deficient gas mixture.

A more quantitative study of the effect of CO_2 under the conditions of oxygen deficiency seemed desirable and blood pressure studies were undertaken on dogs anesthetized with sodium amytal or sodium barbital under conditions of normal respiration, and also after the chest was opened and artificial respiration was instituted. The gas mixtures were administered through Douglas bags for 60-90 seconds. Table I gives some typical results from which can be seen that, although the effect of 4% CO_2 is in most experiments negligible, it increases the rise in blood pressure due to the breathing of an oxygen deficient gas mixture more than corresponds to the algebraic sum of the effects of either of the two factors on the blood pressure. This effect could be thought to be due to the removal of

TABLE I.
Rise of blood pressure in dogs due to the inhalation of various O_2 and CO_2 mixtures.

O_2-deficiency		CO_2 in air		CO_2+O_2-deficiency		
O_2-concentration %	Blood pressure in mm. Hg.	CO_2-concentration %	Blood pressure in mm. Hg.	CO_2 concentration %	O_2 concentration %	Blood pressure in mm. Hg.
		I Respiration Intact				
3	+10	4	+2	4	3	+18
5.5	+ 3	4	+1	4	5.5	+ 7
5.5	+ 3	4	+2	4	5.5	+11
		II Artificial Respiration				
5.5	+17	4	+6	4	5.5	+32
5.5	+ 8	4	+2	4	5.5	+15
3.0	+15	4	±0	4	3.0	+27

[2] Childs, S. B., Hamlin, H., and Henderson, Y., *Nature*, 1935, **135**, 457.

[3] Henderson, Y., Oughterson, A. W., Greenberg, L. A., and Searle, C. F., *Am. J. Physiol.*, 1936, **114**, 261.

[4] Gellhorn, E., *An. Int. Med.*, 1937, **10**, 1267.

the acapnia resulting from the increased respiratory volume occurring under oxygen deficiency. If, however, artificial respiration is instituted, the CO_2 tension in the blood remains constant; and any changes in the efficiency of CO_2 must be attributed to its effect on the circulatory rather than the respiratory system. Under these conditions similar results were obtained. Here again the rise in blood pressure was greater in the oxygen deficient gas mixture containing 4%CO_2 than corresponded to the sum of the rises obtained when either one of the two factors was administered separately. This potentiation of the CO_2 and oxygen deficiency effect on the blood pressure must be considered to be of utmost value in maintaining an adequate circulation through the brain. The results indicate that the beneficial effect of CO_2 in offsetting oxygen deficiency is due not only to its influence on respiration but to augmenting greatly the rise in blood pressure which occurs under the conditions of oxygen deficiency.

Summary. The rise of blood pressure caused by oxygen deficiency is greatly augmented or potentiated by small amounts of CO_2 which in themselves have no effect upon blood pressure. This potentiation is present not only in the animal capable of respiratory adjustments, but also when the minute volume of ventilation is kept constant by means of artificial respiration. These conditions indicate that the circulatory system, *per se,* does play a major part in the adjustment to oxygen deficiency brought about by small amounts of CO_2.

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Multiplication of Yellow Fever Virus in the Developing Chick Embryo.

JOHN E. ELMENDORF, JR., AND HUGH H. SMITH. (Introduced by J. H. Bauer.)

From the Laboratories of the International Health Division, Rockefeller Foundation, New York.

Since Woodruff and Goodpasture[1] first discovered that fowl pox virus could be grown on the chorio-allantoic membranes of developing chick embryo in the egg, many workers have reported success in the propagation of other viruses by this method. It was shown[2, 3]

[1] Woodruff, A. M., and Goodpasture, E. W., *Am. J. Path.*, 1931, **7**, 209.

[2] Haagen, E., and Theiler, M., *Zentralbl. Bakter., Abt. I, Orig.*, 1932, **125**, 145.

[3] Lloyd, W., Theiler, M., and Ricci, N. I., *Trans. Roy. Soc. Trop. Med. and Hyg.*, 1936, **29**, 481.