fusion fluid of muscle is converted to glycogen (Meyerhof *et al.*[1]) and indeed an increased oxygen consumption occurs in the tissues of the hepatectomized frog after epinephrine injection, an effect which is ascribed to the reconversion of lactic acid. In mammals a large part of the lactic acid formed in muscle under the influence of epinephrine is reconverted to glycogen in the liver.[2] Whether or not a calorigenic effect of epinephrine can still be obtained in mammals after removal of the liver has not been decided with certainty; some of the negative results recorded in the literature may have been due to the rapidly approaching end of the animal and not to the removal of the liver. Nor is there definite evidence available as to whether or not blood lactic acid can be converted to glycogen in mammalian muscle.

In frogs kept anaerobically more lactic acid is formed under the influence of epinephrine than in frogs under aerobic conditions.[3] This may be interpreted in the sense that the Pasteur reaction (*i. e.*, the effect of respiration on lactic acid formation) is not particularly disturbed during epinephrine action but a definite conclusion is withheld until the efficiency of the reconversion process has actually been determined.

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Low Power Ultraviolet Lamps and the Control of Rickets.

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In experiments commenced in April, 1929, and recently completed, tests have been made of the antirachitic value of the ultraviolet emitted by tungsten filaments similar to those used in ordinary electric light bulbs. To secure any appreciable amount of therapeutic rays from such sources, bulbs made of the very best ultraviolet transmitting glass must be used. The Corex D bulbs in the lamps employed in these experiments transmit about three-fourths of the vital ultraviolet given off from the filament. Such lamps, at present provided only for experimental purposes, are designated by their producers, the General Electric Company, as CX lamps.

[1] Meyerhof, O., Lohman, K., and Meyer, R., *Biochem. Z.*, 1925, **157**, 459.

[2] Cori, C. F., and Cori, G. T., *J. Biol. Chem.*, 1928, **79**, 309.

[3] Cori, C. F., and Buchwald, K. W., *J. Biol. Chem.*, 1930, **87**, *Proc.* **38**.

Six experiments included 255 chickens divided into 23 groups. In 2 of the experiments rats were run in parallel series with the chickens.

We first made use of a 500 watt bulb (vitalux glass) on a 110-volt electric circuit at a distance of 5 feet from the floor. Without reflector and at this distance this source was not adequate for satisfactory cure. Some improvement was noticeable but only to the extent of 10 or 15% in 28 days. Control animals were almost cured in this period with 4 exposures of less than 10 minutes each (37½ minutes in all), from a quartz mercury arc.

We have always heated our small brooders by means of electric light bulbs. When exposed to the rays of 60 watt carbon filament lamps, the chickens invariably develop severe rickets. This has also been the case in 2 earlier experiments where ordinary Mazda bulbs were used.

In the second test no sign of rickets appeared in the pen where a 330-hour CX lamp was kept in the brooder. The controls, having a 60-watt carbon filament lamp in the brooder, all developed severe rickets.

In the third and fourth experiments chickens were completely protected against rickets by exposures to CX lamps during the time of feeding. The lamps were placed in aluminum reflectors at such a level and so adjusted as to throw the rays upon the legs of the birds. The distance was in some groups 13 inches and in others 15 inches from the feed pan to the bulb. Table I gives the growth records of

TABLE I.

Growth Records—Irradiation While Feeding.
Experiment: Prevention of rickets with CX lamp.

Treatment	Weight in gm. at end of weeks									
	1	2	3	4	5	6	7	8	9	10
1000 hr. lamp 110 volts	50	84	140	193	260					
30-volt lamp	53	85	120	190	256	333	428	532	628	754
Quartz Arc 5 min. per day	48	79	126	171	236	308	391	476	577	689
No irradiation	49	81	128	164	203	222	251	291	304	317
Sunshine	47	78	129	171						661

these pens and their controls; also a pen where rickets was prevented by exposure to a quartz arc; and also another reared in the sunshine. These growth records are comparable with the data given in x-ray photographs, blood Ca, post mortem examinations, etc.

The 110 volt 1,000 hours bulb, was used in a test to determine whether sufficient ultraviolet was present to *cure* rickets. It re-

quires perhaps 4 times as much irradiation for a satisfactory rapid cure as for prevention. Results showed that where the animals were strong enough so that they stood up while eating, this lamp was effective in curing the disease with our set-up. This lamp gives perhaps 2 times the irradiation necessary for prevention. Animals too weak to stand while eating were not much benefited in this experiment. We therefore believe that the irradiation of the food (a mash composed of 57 parts yellow corn meal, 20 parts wheat middlings, 20 parts dried skim milk, 2½ parts ground bone, and ½ part NaCl), did not make it antirachitic. Neither did the rays have much power to penetrate the feathers of the squatting chickens. The 30 volt lamp has about twice as much ultraviolet as the 1,000 hour lamp.

Chickens were so placed beneath a 60 watt 330 hour CX lamp and reflector that their legs only were exposed to the perpendicular rays at 3 inches distance for 20 minutes per day. These animals were cured of the severest type of rickets in 28 days. Recovery was about as rapid as that of animals irradiated 2 minutes daily by the quartz arc at 30 inches distance.

It is probable that the total length of exposure necessary to cure rickets in children is less than in laboratory animals. A reason for this is found in the fact that the animal's body is to a large extent covered by hair or feathers, while that of the child is not. From the results of these experiments we believe that lamps having an intensity equal to those here used have a value in the control of rickets in young infants. Carefully constructed reflectors would perhaps be necessary in order to utilize the radiations emitted to best advantage.