New York Section

New York Academy of Medicine, January 15, 1936.

8465 P

Detoxication of Phenylacetic Acid by the Chimpanzee.

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The chemical defense mechanism of the lower animals, including the monkey,[1] with respect to phenylacetic acid results in a conjugation with glycine; that of man, however, results in the formation of the glutamine conjugate.

Some time ago an opportunity was afforded me at the New York Zoological Park of ascertaining what this detoxication mechanism might be in the anthropoid ape. A young chimpanzee ("Buddy"), at that time about 2½ years old and weighing about 10 kilos was placed in a metabolism cage and two 24-hour samples of urine collected. Then four 1.5 gm. portions of phenylacetic acid (mixed with bone meal) were fed to the animal at successive 12-hour intervals and the urine collected 12 hours after each feeding. He received his regular diet of milk, bananas and eggs during the whole experiment.

The bulk of the urine was evaporated to dryness, the residue made acid to congo red with H_2SO_4, mixed with dry sand and extracted exhaustively in a Soxhlet apparatus with absolute ethyl acetate. The crystals which appeared were freed from urea and purified[2] and were found to possess all the properties of phenylacetylglutamine. The melting point was the same, 106°-109°; a 50-50 mixture of the pure substance and the crystals from this experiment melted at 102°-105°; the total nitrogen (Kjeldahl) was 10.05% as against 10.61% calculated; and on alkali hydrolysis 96.4% theoretical ammonia was evolved as compared with a 98.9% recovery from the pure substance run in the same apparatus.

1 Sherwin, C. P., *J. Biol. Chem.*, 1917, **31**, 307.

2 Hawk, P. B., *Practical Physiological Chemistry* (1926), 9th edition, p. 304.

The fact that all these figures run a little low suggests a slight admixture with phenaceturic acid, but I did not attempt an exact estimation of its proportion, if any.

The extent of the detoxication was determined as follows: duplicate 50 cc. portions of the urine were made about 6 normal with respect to H_2SO_4, boiled 2 hours under a long spiral condenser, the latter washed down into the flask with a little water and the mixture shaken out with one 50 cc. and three 25 cc. portions of chloroform. The combined chloroform extracts were filtered through cotton and titrated with 0.0718 normal sodium ethylate (metallic sodium dissolved in absolute alcohol) using phenolphthalein as indicator. I have found this process to be adequate for complete hydrolysis of phenylacetylglutamine in urine, a recovery of 99.5% being obtained as an average of 6 determinations on human urine after making allowance for the titratable acidity arising from the urine itself after putting it through the identical process. The recovery of phenylacetic acid as determined by this method is shown in Table I.

TABLE I.

12-hour Urine Samples	Volume	Phenylacetic acid recovered from the respective 12-hour samples
	cc.	gm.
After 1st feeding	880	1.03
" 2nd "	760	1.19
" 3rd "	790	1.31
" 4th "	440	1.47

Thus 5 out of 6 gm. fed were recovered. The above figures have been corrected for the titratable acidity of the chloroform extract of the control urines which were hydrolyzed in the same way; this blank amounted to 0.12 gm. per 12-hour period, calculated to phenylacetic acid. Reduction tests were made on all the urines by Somogyi's method; calculated to glycuronic acid; the reduction corresponded to 0.16 gm. per 12-hour control period, but only after the last of the four 1.5 gm. doses did the reducing power of the urine exceed that of the controls, and then only by an insignificant amount.

The incomplete recovery may best be ascribed to a retention of phenylacetic acid; this has been observed before in human subjects fed rather large doses.[3] This chimpanzee was receiving about 160 mg. per kilo of body weight every 12 hours, which is about twice as much as would be considered a fairly heavy dose for a human subject. The animal showed no untoward symptoms, however,

[3] Ambrose, A. M., Power, F. W., and Sherwin, *J. Biol. Chem.*, 1933, **101**, 669.

and the urine was always negative for albumen. The 24-hour urine volumes of the control period averaged only 590 cc., as compared with 1435 cc. for the experimental period, an effect which we notice with human subjects also.

Owing to the obvious impossibility of proving descent from similarity I do not propose these data in relation to any theory on human descent; however, I do think that they reveal an interesting point in intermediary metabolism which I hope to investigate further.

I wish to acknowledge with gratitude the very generous cooperation of the authorities at the Bronx Zoo, especially that of Dr. Charles V. Noback and his assistant.

8466 C

Effect of Iodine on Absorption of Cholesterol.*

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It is now an established and unequivocal fact that cholesterol is readily absorbed from the gastro-intestinal tract and that an increase may be demonstrated in the thoracic duct chyle after feeding. Relatively little is known, however, about the factors influencing this absorption. Thus, when a rise in the blood cholesterol of rabbits was prevented for several months by feeding potassium iodide with the cholesterol,[1] it was considered possible that the iodide in some way prevented the absorption of the sterol, but no information bearing on this point was available.

It seemed possible to approach the problem by feeding cholesterol to normal and iodized animals and determining the level of the cholesterol in the chyle. Unfortunately the small size of the thoracic duct in rabbits made it infeasible to use them for this purpose although it would have been desirable to carry out the work on the same species of animal used in the previous experiments. Dogs seemed to offer the least technical difficulty and accordingly were used with the realization that, while results obtained in omnivores could not be applied directly to herbivorous animals such as rab-

*Aided by a grant from the Josiah Macy, Jr., Foundation.

[1] Turner, K. B., and Khayat, G. B., *J. Exp. Med.*, 1933, **58**, 127.