

that this difference is due to the fact that we produced drug concentrations of 11-19 mg % in the blood of our animals whereas they produced concentrations of only 5-7 mg %.

Although the animals were given drug before inoculation, the experiments cannot be considered entirely from the standpoint of prophylaxis, because all the animals showed a generalized infection 6-18 hr after inoculation, some of them developed hematuria, and all of them stopped eating or ate very little food for a day or two. If they survived this period, they usually remained well throughout the following 2-week observation period.

Even though the animals survived, the

tissue at the site of inoculation became necrotic and sloughed off. It made very little difference whether the drug was continued 7 or 14 days after inoculation, the lesions though walled off, did not heal. Vegetative organisms could be observed in direct smear and *Cl. welchii* were isolated in culture.

Conclusions. 1. Mice inoculated intramuscularly with *Cl. welchii* and treated orally with sulfonamides responded best to sulfadiazine (sulfadiazine 93.4%, sulfathiazole 79.6%, sulfapyridine 46.4%, and sulfanilamide 13.8% survival).

13851

Comparison of the Activity and Distribution of Iodine, in Reptilian and Mammalian Thyroids.

EMIL J. BAUMANN, NANNETTE METZGER AND DAVID MARINE.

From the Laboratory Division, Montefiore Hospital, New York.

The interesting observation that turtle or alligator thyroid had practically no effect on the basal metabolic rate of man was made by Swingle and Martin.¹ The iodine content of the thyroid preparations fed was very high, over 4 mg per g, and so, by mammalian standards, these glands should have been fully iodized and resting, with alveoli filled with dense colloid. Such thyroids have always been found to have strong physiological activity. In contrast to the action of these preparations on man, when they were given to rabbits, the metabolic rate was raised to about the same extent as when cattle thyroid was fed. Swingle and Martin attribute the different behavior of reptilian thyroid in man and the rabbit to the fact that the dose used for rabbits was relatively large.

Since this work was reported, methods for the accurate estimation of thyroxine in thyroid have been developed and these were applied to various samples of reptile thyroid, including those used by Swingle and Martin, to determine whether the distribution of

iodine differed from that found in mammalian thyroid. As a check on the validity of the analyses, the metamorphosing action of these preparations on tadpoles was studied and compared with the action of several dogs' thyroids.

Methods. Thyroxin was measured by Blau's² modification of the Leland and Foster³ method. In addition to the dried alligator and turtle thyroids used by Swingle and Martin, samples of which had been in this laboratory since Marine determined their influence on rabbit metabolism in 1926, we obtained thyroids of 4 Caribbean Sea turtles. These animals weighed between 70 and 110 kg and had been kept in a warm room on their backs for about 10 days before they were killed. The thyroids seemed somewhat edematous, an observation that is supported by the high water content found on drying the tissue in vacuum desiccators over BaO. A small piece of each specimen was fixed in formalin for microscopic examination.

² Blau, N. F., *J. Biol. Chem.*, 1935, **110**, 351.

³ Leland, J. P., and Foster, G. L., *J. Biol. Chem.*, 1932, **95**, 165.

¹ Swingle, W. W., and Martin, K. A., *J. Exp. Zool.*, 1926-7, **46**, 277.

TABLE I.
I Distribution in Reptile Thyroid.

Specimen	Water, %	Thyroxine I, mg per g	Total I, mg per g	Thyroxine I	Thyroid epithelium
				Total I %	
Turtle 2	83.6	0.95	2.63	36.2	Low cuboidal
" 3	77.1	0.93	2.43	38.3	Cuboidal
" 4	81.0	0.90	2.40	37.5	Low cuboidal
" 5	79.2	1.34	3.84	34.9	Flat "
" S & W		1.48	4.62	31.9	" "
Alligator S & W		1.49	4.18	35.6	" "
Dog 6		0.67	2.32	28.9	Cuboidal
" 5		1.19	3.94	30.2	Flat cuboidal
" 2		1.38	4.08	33.8	" "

Results. The observations are recorded in Table I, together with those of a few dogs' thyroids of similar I and thyroxine content.

Thyroxine and total I values of all the reptile thyroids as shown in Table I are very high, turtle 5, S and W and the alligator specimens being among the highest that have been recorded in the literature. Corresponding to the high thyroxine and I, all the glands show, as one would expect, a very high degree of involution, *i.e.*, uniform dense colloid and flat cuboidal epithelium.

Influence on metamorphosis. To dishes containing 5 tadpoles, each, in 250 cc of tap water, single 1 mg and 2 mg doses of powdered reptilian thyroid were added. For comparison, other dishes, each containing 5 tadpoles in 250 cc of tap water, were set up and 1 and 2 mg doses of dog thyroids of high I and thyroxine content added. The dried thyroids were powdered, passed through fine silk bolting cloth and weighed on a microbalance. Control dishes with no thyroid

were also included. The tadpoles were fed on liver for 2-3 hr daily. The single 1 or 2 mg dose of thyroid was added after removing the liver and changing the water and was left for 24 hr. Thereafter the tadpoles were fed daily for 2 or 3 hr on liver only. In 5 days great shrinkage in size and almost complete metamorphosis had taken place with 2 mg of the preparations having the highest I and thyroxine values, as shown in Table II. The rate of metamorphosis varied directly with the I and thyroxine content of the glands. With 1 mg doses more than twice the period elapsed before the same stage was reached. But here, too, the rate of metamorphosis varied directly with the thyroxine content of the preparations.

From these observations on the thyroxine content and tadpole metamorphosis, no evidence was obtained that would indicate any difference in the activity of reptilian and mammalian thyroids that contain similar amounts of iodine and thyroxine.

TABLE II.
The Influence of Reptile Thyroid on Metamorphosis.

Specimen	1st day	2nd day	3rd day	4th day	5th day	Total I	Thyroxine I
Turtle 3	0	0	±	+	++	2.43	0.93
" 4	0	0	+	+	++	2.40	0.90
" 5	±	±	+	+	++	3.84	1.34
" S & W	0	±	+++	++++	++++	4.62	1.48
Alligator	0	±	+++	+++	++++	4.18	1.49
Dog 127	0	0	+	+++	++++	3.54	0.98
" 1	0	±	+	+	++	1.63	0.51
Control	0	0	0	0	0		

0 = no change or very slight shrinkage back of gills.

± = slight shrinkage back of gills.

+

+++ = moderate kite shape, marked shrinkage back of gills.

++++ = marked kite shape, nearly complete tail absorption.