one genus cannot be applied broadly to the entire group or even to other genera.

This cytological study of the pituitary in relation to sex activity is being extended into other groups of Amphibia. A more quantitative analysis of the work together with the results of castration and injection experiments will be published *in extenso* at a later date.

## 8247 C

## Effect of Iron on Hemoglobin Regeneration in Gastrectomized Dogs.

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We have previously shown[1] that the gastrectomized dog has a markedly reduced capacity to regenerate hemoglobin when maintained at anemic levels on various diets. The average production capacity is approximately 10% of that of normal dogs and is around 0.2 gm. of hemoglobin per day on a meat diet. It was also noted that liver feeding or the administration of liver extract 343 (Lilly) is comparatively ineffectual in increasing the level of hemoglobin production. Liver extract 55 (Lilly), however, caused a definite increase in hemoglobin production. As this preparation contains added iron, the present studies were directed to determining the effect of the oral administration of iron. Incidentally, the character of the blood findings during the period of anemia and of iron therapy were followed.

The same 4 dogs used in the previous study were used, the gastrectomy operation thus preceding the present experiments by from 2 to 3 years. The technique of study was similar to that used previously. The dogs were maintained at an anemic level (*e. g.*, hemoglobin levels of 6 to 9 gm. per 100 cc.) by intermittent bleeding, the hemoglobin production for a given period being determined as the total hemoglobin removed by the bleedings plus or minus the gain or deficit in total circulating hemoglobin during the same time. This is the method developed by Whipple and his coworkers. The hemoglobin determinations were made with a Sahli-Hellige Haemometer

[1] Mullenix, R. B., Dragstedt, C. A., and Bradley, J. D., *Am. J. Physiol.*, 1933, **105**, 443.

and the blood volume determinations by the method of Keith and Rowntree as modified by Whipple. One dog (No. 12) was spontaneously anemic and was not subjected to bleedings. After several consecutive periods of standardization on a meat diet alone, iron in the form of Blaud's pills (Pills of Ferrous Carbonate), ferric ammonium citrate, or saccharated iron oxide was administered orally and the hemoglobin production during the iron regime determined. The essential data are shown in Table I. It is interesting to note

TABLE I.
Effect of Iron on Hemoglobin Production in Gastrectomized Dogs.

| Dog No. | | Hemoglobin Production gm. per day | | Iron gm. Daily | Form of Iron Administration |
|---|---|---|---|---|---|
| | | Days | Hb. gm. per day | | |
| 10 | Meat diet—2 yr. prev. | 29 | 0.00 | | |
| | " " " " | 24 | 0.33 | | |
| | " " " " | 37 | 0.236 | | |
| | " " pres. exp. | 31 | 0.00 | | |
| | " " " " | 32 | 0.25 | | |
| | " " " " | 38 | 0.00 | | |
| | " + daily iron | 23 | 1.47 | 1.19 | Fe. Am. Citrate |
| | " " " | 46 | 0.91 | .221 | " " " |
| 11 | Meat diet—2 yr. prev. | 30 | 0.127 | | |
| | " " " " | 37 | 0.298 | | |
| | " " pres. exp. | 52 | 0.144 | | |
| | " " " " | 63 | 0.243 | | |
| | " + daily iron | 23 | 1.41 | .560 | Sacch. Iron Oxide |
| | " " " | 46 | 1.63 | .221 | Fe. Am. Citrate |
| 12 | Meat diet—2 yr. prev. | 54 | 0.00 | | |
| | " " " " | 37 | 0.373 | | |
| | " " pres. exp. | 30 | 0.00 | | |
| | (Spontaneously anemic) | | | | |
| | Meat + iron | 29 | 0.4 | .3 | Blaud's Pills |
| | " " | 25 | 0.74 | .560 | Sacch. Iron Oxide |
| | " " | 46 | 1.15 | .221 | Fe. Am. Citrate |
| 14 | Meat diet—2 yr. prev. | 112 | 0.371 | | |
| | " " pres. exp. | 111 | 0.444 | | |
| | " + iron | 46 | 0.9 | .221 | Fe. Am. Citrate |
| | " " | 27 | 2.13 | .85 | " " " |

that after a period of 2 years or more there is no compensatory improvement in hemoglobin production capacity on a meat diet. The data obtained previously are included in this table for this comparison. When iron is administered there is a definite and fairly marked increase in hemoglobin production. This is significantly less than that seen with normal dogs, however, as reported by Whipple, but shows that the gastrectomized dog, although definitely handicapped can nevertheless utilize added iron given orally. It is also

apparent that all of the increased hemoglobin production previously observed with liver extract 55 can be accounted for by the effect of the administration of iron.

Some of the data illustrating the changes in the blood picture of these dogs from the pre-anemic state to the anemia before and after iron administration are indicated in Table II. As previously re-

TABLE II.
Blood Findings—Gastrectomized Dogs During Induced Anemia With and Without Iron.

| | R.B.C. mil. per mm³ | Hb. gm. per 100 cc. | Cell Vol. % | Mean Corp. Vol. μ³ | Mean Corp. Hb. gg* | Mean Corp. Hb. conc. % | Color Index | Volume Index | Saturation Index |
|---|---|---|---|---|---|---|---|---|---|
| 10. | | | | | | | | | |
| Pre-anemic status | 7.15 | 15.0 | 48 | 67 | 21 | 31 | .95 | 1.03 | .92 |
| 90 days anemic | 7.2 | 8.9 | 29 | 40 | 12 | 30 | .55 | .61 | .90 |
| 23 " on iron | 7.23 | 11.7 | 29 | 40 | 16 | 40 | .73 | .61 | 1.19 |
| 11. | | | | | | | | | |
| Pre-anemic status | 7.15 | 13.6 | 50 | 70 | 19 | 27 | .86 | 1.07 | .80 |
| 115 days anemic | 5.8 | 8.1 | 18.5 | 32 | 14 | 43 | .62 | .49 | .96 |
| 23 " on iron | 6.91 | 10.7 | 25.6 | 36 | 15 | 41 | .70 | .56 | 1.26 |
| 12. | | | | | | | | | |
| Spontaneous anemia | 5.5 | 4.0 | 13 | 23.6 | 7 | 30 | .33 | .37 | .9 |
| 101 days on iron | 7.2 | 8.0 | 18 | 25 | 11 | 44 | .5 | .38 | 1.3 |
| 14. | | | | | | | | | |
| Pre-anemic status | 6.69 | 14 | 45.8 | 68 | 21 | 30 | .95 | 1.04 | .91 |
| 111 days anemic | 6.0 | 6.9 | 20 | 33 | 11.5 | 34 | .52 | .46 | 1.0 |
| 27 " on iron | 6.35 | 12.9 | 34 | 52 | 20 | 38 | .92 | .82 | 1.12 |

Note: Cell volume % determined—10 cc. blood with 2 cc. 1.6% sodium oxalate —centrifuged 30 min. 2500 R.P.M. For calculation of Indices. 16 gm. Hb. per 100 cc. = 100%, 7.2 R.B.C. per cu. mm. = 100%, cell volume 47 per cent = 100%.
*Micromicrograms.

ported, gastrectomized dogs even after periods of induced anemia do not develop a blood picture similar to that of pernicious anemia. The erythrocyte count remains practically normal with a marked microcytosis, low color index and low volume index. Upon the administration of iron, the color index increases, the volume index may increase slightly, and the saturation index increases. The spontaneous anemia occurring in one animal was also characterized by a marked microcytosis. Both the spontaneous and induced anemia in the gastrectomized dog is therefore a microcytic anemia, relatively refractory to liver, but responding well to iron therapy.