ment. However, when the results with guinea pigs are considered, an increased physiological need for Vitamin C during fever is indicated.

Studies on blood were interesting but did not aid in judging Vitamin C utilization. It seemed that the blood Vitamin C concentration should be reduced during fever if an excessive amount was lost in sweat, or tissues required more than normal. However, a decrease was not observed in any of 6 patients studied. In all of them, values after treatment were equal to or greater than the values before treatment which indicates that Vitamin C, like blood chlorides and blood sugar,[10] concentrates with the concentration of blood during fever.

Summary. Studies of Vitamin C excretion before and after periods of artificial fever show that fever increases the Vitamin C requirement of man. Studies of Vitamin C stores in adrenals and kidneys of guinea pigs show that artificial fever increases the requirement or accelerates the destruction of Vitamin C. Since guinea pigs cannot lose Vitamin C in sweat, an increase in the physiological need for Vitamin C during fever is indicated.

10159

Localization of the Neural Inductor and Tail Mesoderm in a Frog Egg (*Hyla regilla*)*

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The Neural Inductor. In the urodeles the dorsal and lateral blastoporal lips of the early gastrula induce a secondary neural plate when implanted under presumptive epidermis.[1, 2] Although in *both* urodeles and anurans the anlagen of chorda and somites occupy the dorsal and lateral lips,[3] it has been reported that in anurans the neural plate inductor is limited to the dorsal lip.[4] Is this a general characteristic which distinguishes the anuran from

10 Krusen, Frank H., *Am. J. Med. Sciences,* 1937, **193**, 470.

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1 Bautzmann, H., *Arch. f. Entw.-mech.,* 1926, **108**, 283.

2 Schechtman, A. M., *Univ. Calif. Publ. Zool.,* 1934, **39**, 277.

3 Vogt, W., *Arch. f. Entw.-mech.,* 1929, **120**, 384.

4 Schmidt, G. A., *Zool. Anzeiger,* 1936, **116**, 323.

the urodele egg? Towards the solution of this problem a study was made of the neural inductor in the anuran *Hyla regilla.*

The jelly and egg membranes were removed from early gastrulæ with steel needles. After washing the eggs in 3-4 changes of Holtfreter solution, the distorted eggs were discarded. The remaining more or less spheroidal eggs were then operated upon, using glass needles drawn out at the end into fine filaments so as to permit cutting with a minimum of cell destruction. Various portions of the mesodermal girdle (and some of the adjacent ectoderm since it is quite impossible to ascertain the exact boundary between ectoderm and mesoderm) were removed and immediately placed into the blastocœles of early gastrulæ. In the discussion below the portions of mesoderm used are designated by degrees. The dorsal mid-line (running through the center of the dorsal lip) is 0°, the center of the ventral lip is 180°, and the center of each lateral lip is 90. Dorsal lip implants, which include the mesoderm as far as 45° on either side of the dorsal mid-line, induced in almost 100% of the cases. Mesoderm in the region between 45° and 80° induced in only 17-20% of the cases. Mesoderm located 55° or more from the dorsal mid-line showed no inductive capacity whatsoever.

These results show that the neural inductor is limited to the dorsal mesoderm extending about 45° on either side of the mid-line, as Schmidt reported,[4] which is about half the meridional extent of the neural inductor in the urodeles, *Triton* and *Triturus.*

The Tail Mesoderm. In the course of the above work it was noted that in some eggs cultured for 72 hours (most were kept only 24-30 hours) the induced structures never included a tail or tail-like structure. This was unexpected since in both the anurans and the urodeles the tail-forming material is considered to extend completely around the equatorial region of the egg.[3] In agreement with this concept the dorsal blastoporal lip of the *urodeles* induces not only a neural tube but in many instances a secondary tail as well.[5, 6, 7] However, in the anurans *Rana* and *Pelobates* Schmidt[4] found tail-like projections were produced only by lateral parts of the mesoderm.

In the present experiments on *Hyla* the operative method was the same as that described above, but the eggs were cultured at least 72 hours, many for twice this period, in order to allow ample time for tail development.

The dorsal lip mesoderm, extending as far as 45° from the dor-

[5] Lehmann, F. E., *Arch. f. Entw.-mech.*, 1932, **125**, 566.

[6] Holtfreter, J., *Arch. f. Entw.-mech.*, 1936, **134**, 466.

[7] Reith, F., *Z. f. wiss. Zool.*, 1937, **150**, 179.

sal mid-line, did not produce a tail in a total of 23 cases tested. Horn-like extensions were numerous and resembled those already described for urodeles (*e. g.*, Lehmann[5] and Reith[7]). As pointed out by Lehmann[5] they are not to be confused with true tails. They are simply chorda-like elongations of the implanted dorsal lip and are readily obtained by culturing dorsal lips *in vitro*.

True tails, corresponding to the tails in Harrison's stages 33-36, were obtained after implanting portions of the lateral and ventro-lateral mesodermal regions (the mesoderm between 45° and 155°). The portions of this mesodermal region closer to the mid-dorsal line were clearly less effective than the more distant region in forming secondary tails. Thus the lateral lip mesoderm (located between 45° and 115°) developed into tails in 8 out of a total of 17 cases, while the ventro-lateral mesoderm (90°-155°) yielded tails in 5 out of 6 cases. These tails resembled the normal tail in their tapering shape, the slight lateral flattening, and the presence of one or two fin rudiments in some but not all of the specimens.

Mesoderm from the region of the ventral lip (160°-200°) yielded no tails in a total of 13 specimens. The implants at first formed low hillocks which suggested possible early tail buds but these hillocks remained low or regressed to irregular masses. When some ventro-lateral mesoderm was included with the ventral mesoderm (135°-225°) tails were formed in 18 out of a total of 25 cases.

The above results with implants were checked with extirpation experiments, in which specific regions of the mesoderm were removed from early gastrulæ. Tails were formed in the absence of any one of the following regions: dorsal lip, lateral lips, ventro-lateral lips, ventral lip, dorsal plus lateral lips, ventral plus ventro-lateral lips. Tailless embryos resulted only when both the lateral and the ventro-lateral lips were removed from the same egg. In a total of 8 eggs all the mesoderm except the dorsal lip was removed. These eggs developed only a head in most cases although 2 specimens also formed the upper part of the trunk. The heads were quite normal in size with two suckers and a stomodeal pit.

These results show that the potency for tail formation is more restricted in the anuran *Hyla* than in the urodeles. We could get no evidence that the dorsal and the ventral lip mesoderms had any tail potency at all. Furthermore the potency for tail formation is greater in the ventro-lateral mesoderm than in the lateral mesoderm. We may interpret the results as indicating the existence of two separate anlagen for the tail, separated from one another by the

dorsal and the ventral lips. It is, however, also possible that the tail-mesoderm forms a continuous girdle around the equator of the egg as in the urodeles but that the portions in the dorsal and ventral lips are so attenuated as to be unable to assert their normal developmental traits. In either case the conclusion must remain that tail-potencies are largely concentrated in two bilaterally located regions of the mesoderm.

Conclusions. 1. In the early gastrula of the anuran *Hyla regilla* the inductor of the neural plate is localized approximately in the dorsal lip region of the mesodermal band, that is, it extends about 45° on either side of the dorsal mid-line. 2. The tail-forming potencies are localized in the lateral and ventro-lateral regions of the mesoderm, with the higher percentage of tails developing from the ventro-lateral regions after implantation. The dorsal and the ventral lip mesoderm do not form tails after implantation. 3. The present results show that the anuran *Hyla* has distinct differences in the localization of certain developmental capacities as compared to the eggs of urodeles. Both the neural inductor and the tail mesoderm have a more limited meridional extent in *Hyla.*

10160

Effect of Fat on Rate of Availability of Orally Ingested Carbohydrate.

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In a recent publication[1] it was shown that the ingestion of rapidly available carbohydrates by diabetic patients using protamine zinc insulin, resulted in rapid rises and precipitous drops in blood sugar concentration. Such marked fluctuations in blood sugar concentration are no doubt responsible for many of the difficulties encountered in the clinical management of diabetes with protamine zinc insulin. A solution of this problem presents itself in the well-known property of fats in delaying gastro-intestinal activity. To test this hypothesis, 25 patients were given a standard amount of carbohydrate with and without fat. The banana was chosen because

1 Pollack, H., and Dolger, H., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 577.