complex, in addition to considerable decrease in efficiency of pancreatic lipase and esterase, a pronounced increase in concentration of blood serum phosphatase was observed. In vitamin A deficiency the most outstanding feature is the large decrease in concentration of blood serum esterase and the increase in hepatic lipase.

In so far as the relation of vitamins to digestion is concerned, the only influence found to date is the marked decrease in efficiency of digestion of fats in vitamin B_1 deficiency. We found no disturbance in digestion of proteins or starches in either vitamin A or vitamin B deficiency.

8258 P

Experimental Formation of Accessory Organs in Mid Body Lateral-Line of Amphibians.*

L. S. STONE.

From the Department of Anatomy, Yale University School of Medicine.

The ability of primary lateral-line organs in amphibians to form accessory ones by budding,[1, 2] the time at which these bud organs are developed, and the pattern of organ groups gave a method for measuring the effects of the present experiments in amphibians.

When the placodes of the mid-body lateral-line primordia of young and older tail-bud stages of *Amblystoma punctatum* (Harrison stages 23-24 and 28-29) are exchanged, the age difference between graft and host organ-forming tissue can be clearly followed through the young larval stages by observing the time at which accessory organs are laid down by the budding of primary ones.

In *A. punctatum* the dorsal and ventral poles of primary organs give rise to accessory organs forming lineal groups of 2 or 3.[1] In *A. tigrinum* by a similar process groups of from 4 to even 8 are formed, usually in irregular clusters, as in *Rana palustris* and *Hyla crucifer*. There is multiple budding of both primary and accessory organs. When the mid-body lateral-line primordia are exchanged in the tail-bud stages of *punctatum* and *tigrinum* the formation and grouping of organs from the graft follow only that of the donor species.

* These studies were supported by financial aid from the Fluid Research Funds of the Yale University School of Medicine.

1 Stone, L. S., *J. Comp. Neur.*, 1933, **57**, 507.

2 Stone, L. S., PROC. SOC. EXP. BIOL. AND MED., 1934, **31**, 1082.

When the lateral-line primordium of *A. punctatum* is placed on the body of *A. tigrinum* in the future pathway of the primordium of the host, the one of the graft will migrate and form organs only when the primordium of the host touches and fuses with similar material of the graft. The phenomenon is similar to that previously reported.[3] At the appropriate times accessory organs are developed, which in size and group formation are identical with those of the donor species. The organs are innervated by the host lateral-line nerve and never were observed to degenerate up to late larval life.

When a portion of the tail in larvae is amputated the terminal organ on the stump gives rise to a chain of organ-forming cells extending posteriorly into the regenerating tail. The number of new organs slightly exceeds the number removed. In older larvae either a primary or one of its accessory organs gives rise to the regenerating chain, but no more than one organ in such a group has been seen to participate at one time. This holds true for both the anurans and urodeles studied.

When skin on the side of the tail in young *A. punctatum* larvae is excised, including from 1 to 3 organs, the primary organ just anterior to the wound area often gives off at its posterior pole a chain of cells which form 1 to 2 organs in the wound-healed region. This is the same general effect as that following amputation of the end of the tail. In no case did the anterior pole of the organ just posterior to the wound give rise to a bud organ.

To demonstrate whether or not the anterior pole of a primary organ contains supporting cells which are potential for new organ-formation, another experiment was devised. The technique will be described in a later publication. Two to 3 mm. of the end of the tail were excised in each of a pair of young *punctatum* larvae. The wound areas were healed to each other in the manner of parabiosis. In about 2 days the animals were cut apart so that about 1.5 mm. of the stump of the tail of one larva was left attached to that of the other. In this manner, then, a graft was made of a segment of the tail reversed 180° anteroposteriorly. The former anterior pole of the terminal organ of the graft was then directed posteriorly toward the cut edge from which a regenerating tail could develop.

From this terminal organ in the graft a chain of many bud-organs was produced which extended into the regenerating tip of the tail graft. The original anterior pole of the primary organ is, as all other poles, potential for organ formation, the test for which the experiment was devised.

[3] Stone, L. S., *Anat. Rec.*, 1928, **38**, 30.

The former posterior pole of the terminal organ of the graft, now anteriorly directed, may at the same time give rise to a chain of organs extending anteriorly in the rapidly growing graft. From the 2 poles in such a terminal organ the line of new organs may equal in number that of the primary organs found in the entire tail on one side of a normal young larva of *A. punctatum.*

The terminal organ of the host may give rise to a chain of organs extending posteriorly into the region of the graft, a reaction similar to simple amputation of the tail tip. The organ of the graft nearest the host tissue may also give off bud-organs anteriorly (from former posterior pole) to meet such a chain from the host. This seems to depend upon the direction and extent of the early regeneration in host and graft tissue.

8259 C

Caseation and Softening in Tuberculosis of Vaccinated and Unvaccinated Guinea Pigs.

JOSEPH D. ARONSON.

From Phipps Institute, University of Pennsylvania.

There is much evidence that vaccination with the BCG strain of the tubercle bacillus produces a certain degree of resistance to reinfection with virulent tubercle bacilli. The question has been raised, however, as to whether the allergy resulting from such vaccination might be a factor in producing a more extensive and more destructive type of tuberculosis. In an experiment to ascertain if any relationship exists between allergy and the character of the tuberculous lesions, one series of guinea pigs was injected subcutaneously in the left inguinal region with 5 mg. of the BCG culture, a second series was injected in a similar manner with 30 mg. of the virulent Ravenel strain of bovine tubercle bacillus killed by heating for 1 hour at 70°C., and a third group of unvaccinated guinea pigs were used as controls.

Six weeks after vaccination the sensitivity of these animals to old tuberculin was determined by injecting into the skin of each animal, at widely separated points, 1, 5 and 10 mg. of old tuberculin, and reading the results 48 hours later. It was found that among the 14 guinea pigs of the first series, injected with BCG, 9 reacted to 1.0 mg. of tuberculin and 5 to 5.0 mg. Of the 15 guinea pigs of the