

THE INFLUENCE OF FEEDING THE ANTERIOR LOBE OF  
THE HYPOPHYSIS ON THE SIZE OF *AMBYSTOMA*  
*TIGRINUM*.

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In a previous article<sup>1</sup> I have shown that feeding the anterior lobe of the hypophysis of cattle to metamorphosed salamanders not only produces a far higher rate of growth than does the feeding of earthworms, but causes the animals to grow beyond the known maximum size of the species. The purpose of the present paper is to report on the results of a continuation of the experiments on *Ambystoma tigrinum*.

*Hypophysis-Fed Animals Compared with Normal (Worm-Fed)  
Animals.*

Figs. 1 and 2 show the animals of Experiment 1 at an age of 88 weeks. In Fig. 1 are shown the three worm-fed controls, in Fig. 2 the two hypophysis-fed animals. Total length, weight, and sex are indicated in the figure legends. In comparing the controls with the experimental animals it will be noticed that hypophysis-feeding resulted in a larger size than the feeding of normal food. Figs. 3 and 4 show that a similar relation between the controls and the hypophysis-fed animals has persisted up to the day that the animals reached an age of 132 weeks. Fig. 3 shows the worm-fed controls of Experiment 1 at an age of 132 weeks, Fig. 4 the hypophysis-fed male (the female died) at the same age. Comparison of the photographs as well as of the figures for size and weight demonstrates that the hypophysis-fed animal is still by far the largest one.

A second experiment gave the same result. Fig. 5 shows the controls of Experiment 2; Fig. 6, the hypophysis-fed animals of the same experiment at an age of 88 weeks. Again the hypophysis-fed animals

<sup>1</sup> Uhlenhuth, E., *J. Gen. Physiol.*, 1920-21, iii, 347.

are much larger and heavier than the worm-fed controls. The hypophysis-fed animals were continued on a diet of anterior lobe and increased at the same rate as the hypophysis-fed animals of Experi-

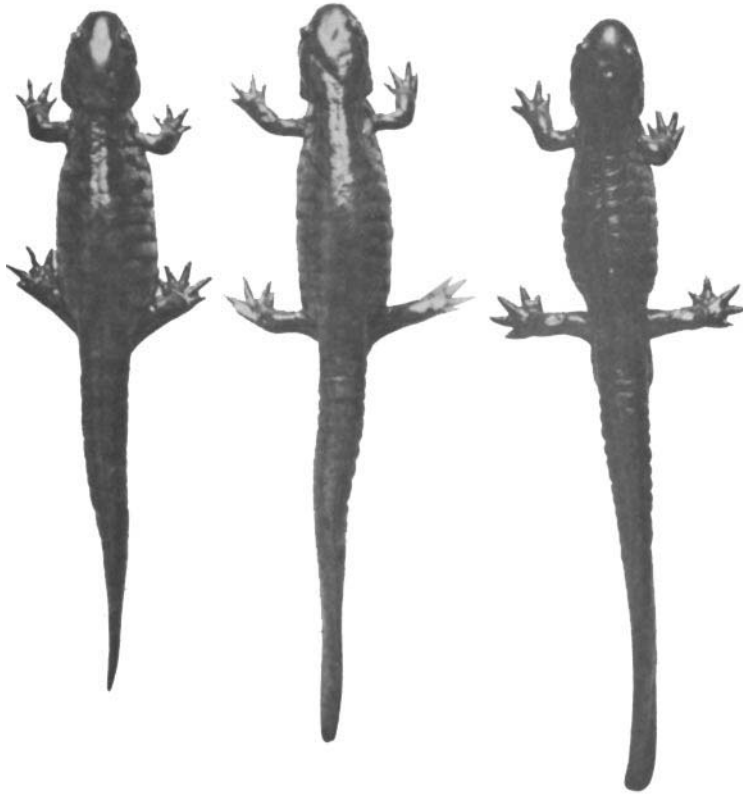


FIG. 1. Experiment 1. Worm-fed control animals at an age of 88 weeks. No. 1, female (total length, 177.5 mm.; weight, 34.8 gm.); No. 2, female (total length, 194.5 mm.; weight, 40.0 gm); No. 3, male (total length, 200.5 mm.; weight, 35.0 gm.).

ment 1; they are shown in Fig. 7. All hypophysis-fed animals exceed the size of the largest known animal (235 mm.), the largest one being 25.1 per cent larger than the largest known animal. None of the worm-fed control animals has reached as yet the size of the largest known animal.

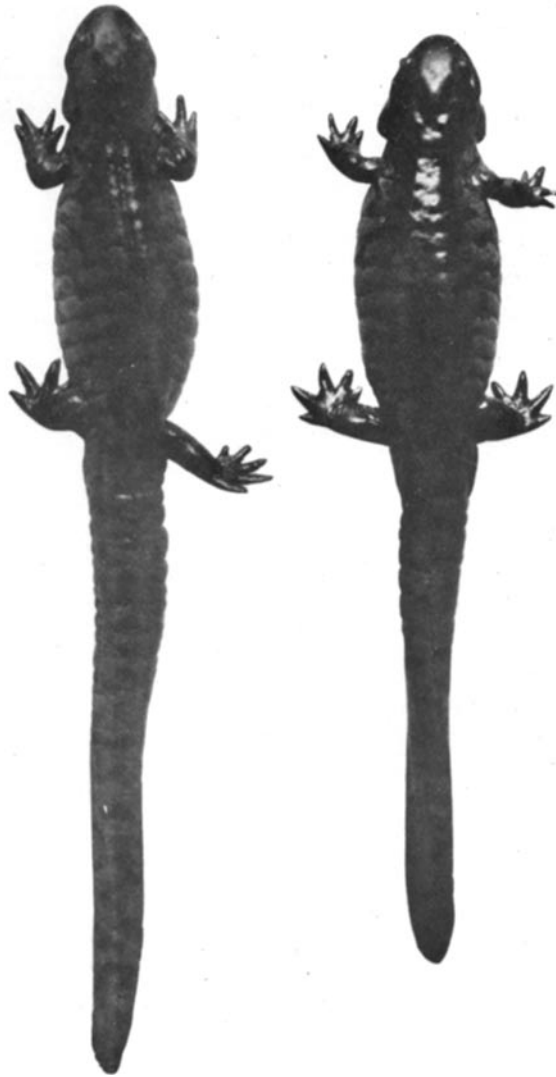


FIG. 2. Experiment 1. Anterior lobe-fed animals, at an age of 88 weeks. No. 4, male (total length, 273.5 mm.; weight, 72.3 gm.); No. 5, female (total length, 235.5 mm.; weight, 78.0 gm.).

*Hypophysis-Fed Animals Compared with Liver-Fed Animals.*

Several food substances besides earthworms had been tried out, but none of them gave higher rates of growth or produced larger animals

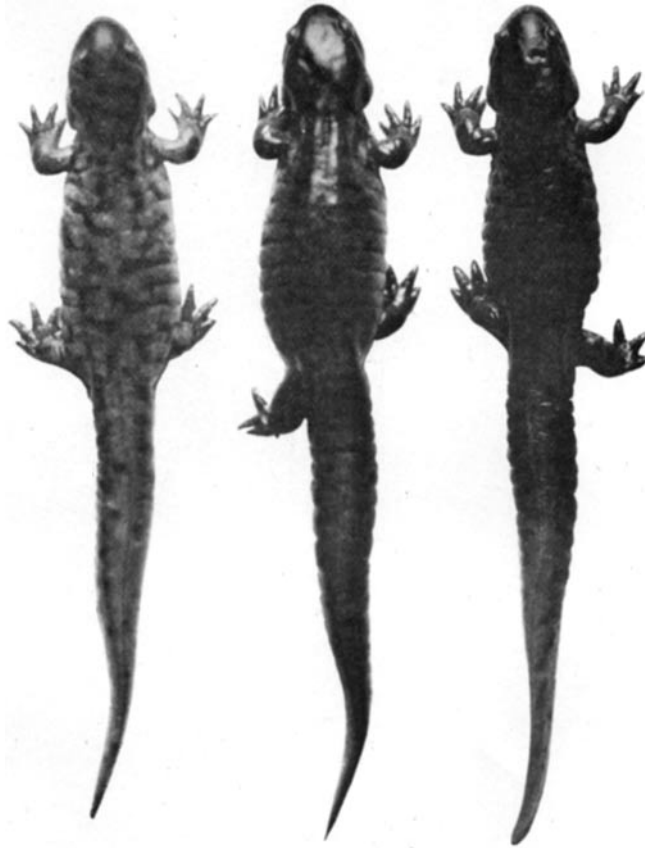


FIG. 3. Experiment 1. Worm-fed controls, at an age of 132 weeks. No. 1, female (total length, 200.8 mm.; weight, 57.0 gm.); No. 2, female (total length, 215.1 mm.; weight, 65.0 gm.); No. 3, male (total length, 212.0 mm.; weight, 55.0 gm.).

than did earthworms. Finally it was decided to use beef liver as food. The three worm-fed animals (Fig. 5) of Experiment 2 were used for this experiment. The two larger animals, male No. 1 and female No. 2, were fed liver, the smallest animal, male No. 3, was fed



FIG. 4. Experiment 1. Anterior lobe-fed animal, at an age of 132 weeks No. 4, male (total length, 294.0 mm.; weight, 108.0 gm.). No. 5 died; it measured 250.0 mm. when measured the last time (at an age of 126 weeks).

anterior lobe. The result is shown in Fig. 8. The hypophysis-fed male (to the right in Fig. 7), although it was by far the smallest animal before anterior lobe was fed (see Fig. 5), is now, after a period of ante-

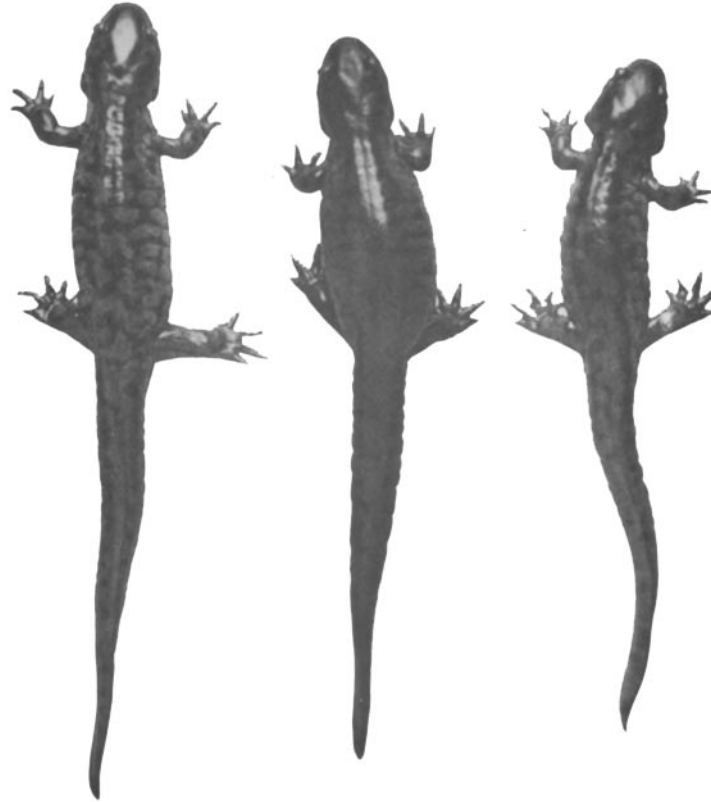


FIG. 5. Experiment 2. Worm-fed controls, at an age of 88 weeks. No. 1, male (total length, 204.1 mm.; weight, 38.5 gm.); No. 2, female (total length, 186.6 mm.; weight, 40.2 gm.); No. 3, male (total length, 181.5 mm.; weight, 31.1 gm.).

rior lobe-feeding of only 37 weeks, nearly just as large as, and heavier than the liver-fed control, male No. 1 (the difference in weight was less pronounced a week before but has increased during a period of starvation to which the animals were subjected in preparation for an operation). Moreover the liver-fed animals, although they were

growing in the beginning at the same rate as the hypophysis-fed animals, have stopped growing during the last 26 weeks, while the

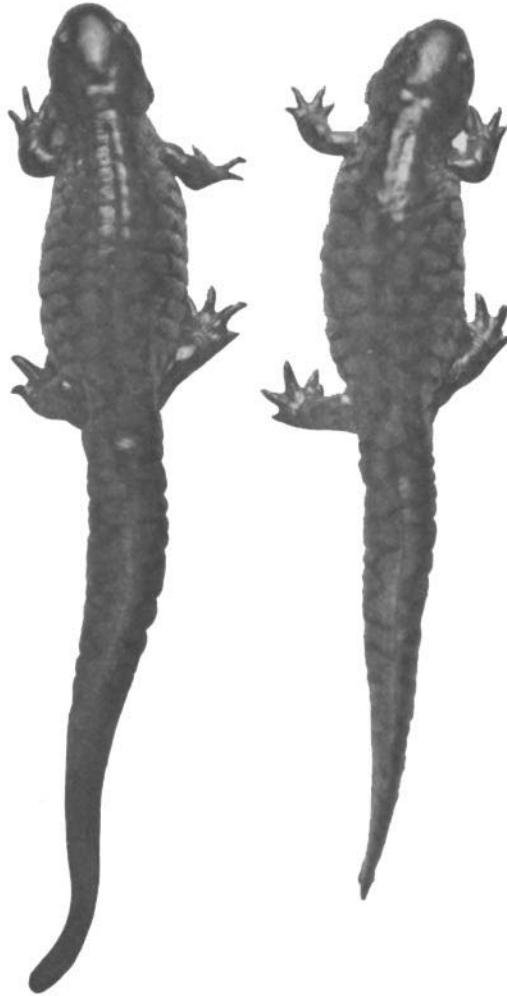


FIG. 6. Experiment 2. Anterior lobe-fed animals, at an age of 88 weeks; No. 4, male (total length, 257.1 mm.; weight, 95.0 gm.); No. 5, female (total length, 226.2 mm.; weight 84.3 gm.).

hypophysis-fed male, although it is of the same age and nearly of the same size as the liver-fed control, male No. 1, is still growing with

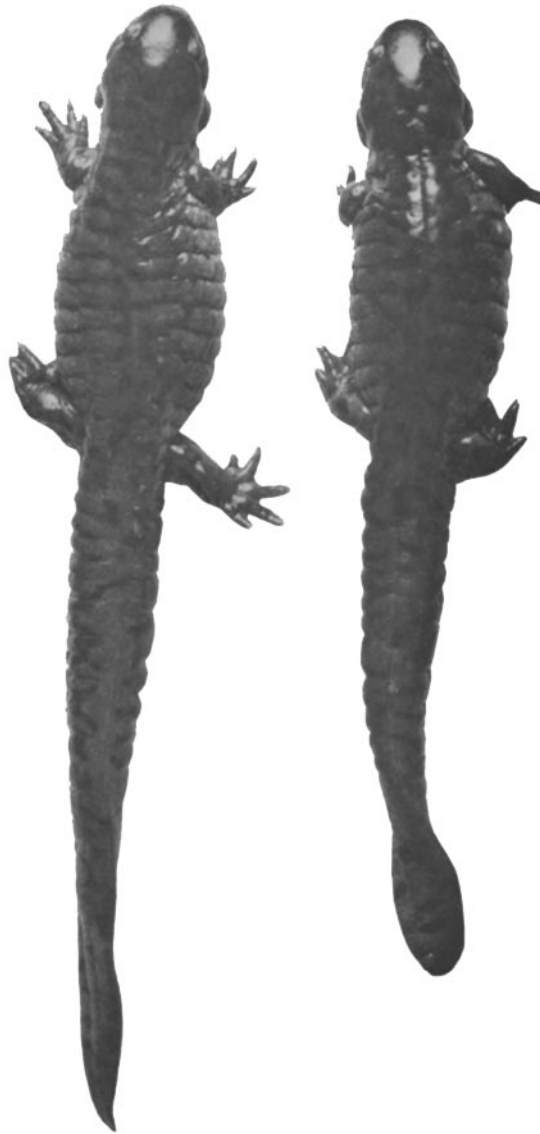


FIG. 7. Experiment 2. Anterior lobe-fed animals, at an age of 132 weeks; No. 4, male (total length, 285.0 mm.; weight, 108.0 gm.); No. 5, female (total length, 245.0 mm.; weight, 108.0 gm.).



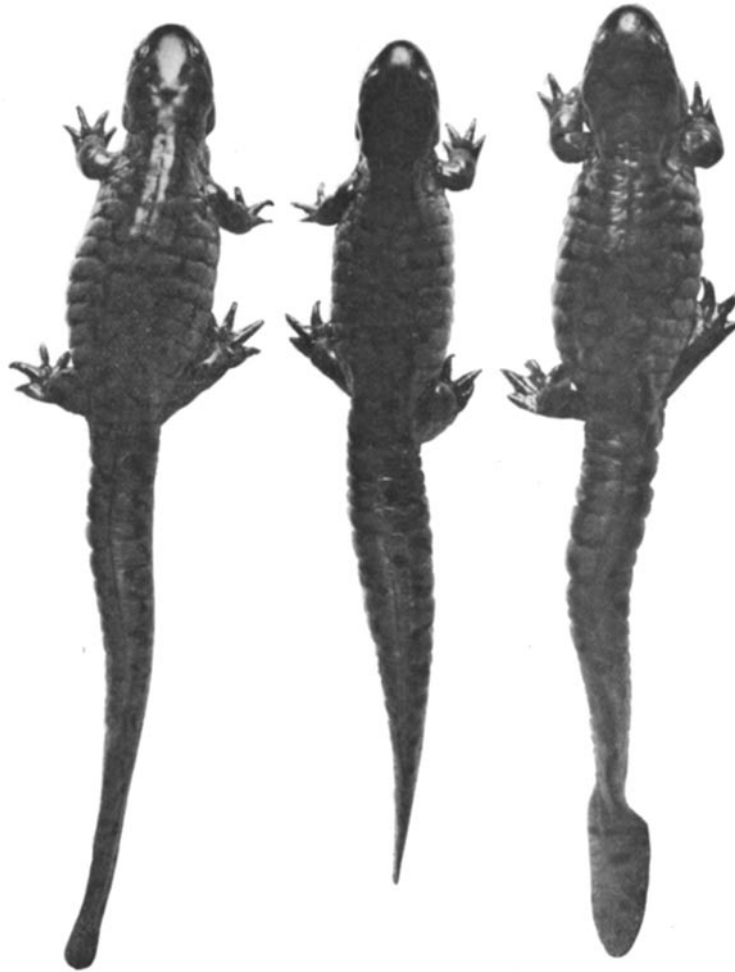


FIG. 8. Experiment 2. Two of the controls fed liver and one fed anterior lobe for 37 weeks. No. 1, male (total length, 247.0 mm.; weight, 65.5 gm.); No. 2, female (total length, 212.0 mm.; weight, 61.0 gm.); No. 3, male (total length, 244.0 mm.; weight, 78.0 gm.; this animal was the smallest of the three before hypophysis-feeding started, as seen in Fig. 5).

considerable vigor. This condition may be taken as an indication that the hypophysis-fed animal will finally reach a size much in excess of the size of the liver-fed animals. The same result was obtained in two other experiments.

The liver diet not only permits a higher rate of growth than that resulting from an earthworm diet, but produces as high a rate of growth as that caused by anterior lobe-feeding. There is, however, an important difference between the effects of liver and hypophysis. The liver-fed animals stop growing a short while after liver-feeding begins, while the hypophysis-fed animals continue to grow at a high rate. That age and size have nothing to do with this difference, is clearly demonstrated by the fact that the hypophysis-fed male No. 3 of Experiment 2 is nearly as large (see Fig. 8) and just as old as the liver-fed male of the same experiment. The same result was obtained in two other experiments.

An inspection of the photographs shows that the liver-fed animals not only grow larger than the worm-fed animals, but exceed the known maximum size of normal animals of the species. This is the case with the liver-fed male, No. 1, of Experiment 2 (Fig. 8), which is 4.7 per cent larger than the largest known normal animal. It seems, however, that liver does not permit growth beyond a certain size far below that which hypophysis-fed animals attain.

#### SUMMARY.

1. Animals of the species *Ambystoma tigrinum* when fed anterior lobe can reach a size far in excess of that of animals fed earthworms and presumably also of that of liver-fed animals.
2. Liver produces a rate of growth as high as that resulting from anterior lobe-feeding, but maintains growth only, until the animals reach a definite size far below that of anterior lobe-fed animals.