ical result of intergrowth of tumors and any kind of mesenchymal tissue, for intergrowth takes place between the cells of the Ehrlich sarcoma and mesenchyme of a hatching chick with no injurious effect upon the tumor. The process depends, therefore, upon a property which the mesenchyme acquires after birth. There is a biological functional difference between the embryonic and adult splenic mesenchyme in the chick, apparent in its different response to the living tumor cell of the mouse sarcoma employed in these experiments. The functional capacity of the adult splenic mesenchyme—new in its power to injure a living tumor cell—might in my opinion be induced by factors closely connected with the great changes which take place after birth in all organs of digestion and assimilation.

40 (1415)

Further proof of the antagonism existing between the thymus and parathyroid.[1]

By EDUARD UHLENHUTH.

[*From the Rockefeller Institute for Medical Research, New York City.*]

Larvæ of the salamander *Amblystoma opacum* when fed on thymus soon after hatching develop tetanic convulsions at an age of from 35 to 40 days. Since at this time the larvæ develop, in their own thymus glands, the structures characteristic for the secretory stage of the glands, it was concluded that the amphibian thymus like that of the mammalian thymus excretes a toxic substance producing tetanic convulsions, and that tetany results if the animal's own secretion is added to that introduced by the thymus diet.

This is confirmed by further experiments (Table I., first four horizontal rows), which show that the interval between the beginning of the thymus feeding and the outbreak of tetanic convulsions becomes shorter, the later the thymus feeding is started, while the age at which tetany develops, remains constant.

If thymus feeding is started after the development of the functional stage of the animal's own thymus glands has taken

[1] *Jour. Gen. Physiol.*, 1918, i., p. 23 and 33.

place, tetany develops as soon as a certain amount of the tetany toxin has been accumulated in the organism (Table I, Series XXV, 1918). The time required for accumulation of that amount is far shorter than the intervals in the first two series. It is, however, longer than in the fourth series, because the animals of series XXV. had been fed twice as long on normal diet and besides had almost twice as much time to grow before the thymus diet was started, and larger animals need more of the tetany toxin than small ones to develop tetany.

Hence, it is evident that the amphibian thymus gland manufactures a secretion similar to that of the mammalian thymus, and that the amphibian organism even in the absence of parathyroid glands can antagonize a certain amount of the toxin, be it excreted from its own thymus glands or introduced by thymus feeding before the animal's own thymus glands have developed; but excretion of their own thymus glands and thymus feeding at the same time lead finally to the accumulation of an excess amount of the tetany toxin, of which the parathyroidless organism of the salamander larva cannot dispose, and consequently tetany results.

But when the thymus-fed larvæ metamorphose, the tetanic convulsions stop and never recur after metamorphosis has taken place, even if the animals are continued on an exclusive thymus diet. Since during metamorphosis the animals develop their parathyroids, it was concluded that the parathyroid glands now serve to antagonize the tetany toxin and that the parathyroidal mechanism is more efficient than the one existing in the larvæ since the parathryoids are able to antagonize not only the tetany toxin excreted by the animal's own thymus glands but also the toxin introduced by the thymus died.

But it might be that after the tetany toxin has acted for a certain length of time upon the central nervous system and all the motor nerve cells have been destroyed, no further muscular contraction would be possible, and that possibly the time of complete destruction of the motor nerve cells coincides with the period of metamorphosis.

If this were true, one would expect that when a normal salamander is fed on thymus shortly after metamorphosis, tetanic convulsions would be produced after about four weeks of thymus

feeding, this being the time required to produce tetany in the larvæ, and that the tetany would cease, as in the larvæ, about 8 to 10 weeks after its commencement.

RELATION BETWEEN TETANY IN THYMUS-FED LARVÆ OF *Amblystoma opacum* AND THE DEVELOPMENT OF THE LARVAL THYMUS-GLANDS.

Series.	Age at the Beginning of Thymus Feeding.	Age at the Beginning of Tetany.	Time Required to Produce Tetany.
XVI., 1918.....	9 days.	35 days.	26 days.
B., 1916.....	16 "	39 "	23 "
B., 1917.....	22 "	35 "	13 "
T., 1917.....	26 "	35.5 "	9.5 "
XXV., 1918.....	45 "	57 "	12 "

In order to decide this point, larvæ of the salamander *A. opacum* were fed on a normal diet which was continued for some time after metamorphosis had occurred. Finally three of these animals were put on an exclusive thymus diet. They have been fed now for seven months on a diet consisting only of thymus, but none of the animals has shown any signs of tetany, either of convulsions or paralysis of the muscles, while in the larvæ, tetany develops after several weeks of thymus feeding. Two of these animals together with a worm-fed control specimen are shown.

This finding appears to offer further proof that the ending of the tetany in thymus-fed larvæ at the time of metamorphosis is actually due to the development of the parathyroids at that time, and that the parathyroids are capable of antagonizing the tetany toxin contained in the thymus. Consequently tetany resulting from thymus feeding in the salamander larvæ is a true parathyreoiprival tetany.

41 (1416)

The behavior of certain digitalis principles in the body.

By ROBERT A. HATCHER and CARY EGGLESTON.

[*From the Laboratory of Pharmacology of Cornell University Medical College, New York.*]

The authors presented an outline of their method of estimating the absorption, destruction and elimination of several of the digitalis principles in the rat, and that of ouabain in the cat, with the results of some of their experiments.