other (Harry H.) was sugar-free for two weeks on 15, 30 and 50 gm. carbohydrate but had no pancreatic digestion. When given pancreatic digestion with lactopeptine[1] (New York Pharmacal Ass'n) or Merck's pancreatin he excreted about 60 out of 100 gm. carbohydrate fed. Proof that such digestive powders do survive the stomach was established by recovery of them from the intestine by means of the duodenal tube. The utilization of carbohydrate under these circumstances was apparently increased by giving 0.3 per cent. sodium carbonate by duodenal tube.

7 (1185)

The influence of radium emanation on the activity of vitamine.

By CASIMIR FUNK.

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The present investigation was undertaken with the view of finding out a method of differentiation between the vitamine which cures beriberi and the vitamine which stimulates growth of young rats. It was also of interest to ascertain whether an unstable substance of the vitamine class would undergo inactivation under the action of emanation. This latter point is of practical importance in view of the extensive use of radium in the treatment of cancer. In the light of modern knowledge of the subject the therapeutic use of radium for the above purpose can be explained by a stimulation of leucocytes or by a destructive action of a physiologically active chemical substance, the second view not being supported by actual experiments; so for instance the alleged action of radium on lecithin with the liberation of choline was not confirmed by modern investigators.

The experiments were performed in the following way. Autolyzed yeast was subjected to the action of radium emanation (the activity of which and the time of action has been determined by Dr. Bosworth from Memorial Hospital, the details of the work to be presented later) samples of the radiated and the non-radiated control autolyzed yeast being injected intramuscularly into pigeons

[1] 10 gm. Lactopeptine produced the same digestion, as measured by the output of sugar, as 5 gm. Merck's pancreatin.

of uniform weight of 300 gr. which developed beriberi on white rice. The dose of the administered solutions was gradually worked down to .1 c.c. which was found to be the minimum dose in both cases. The result therefore was that the radium emanation has no destroying action on beriberi-vitamine.

In a similar way it has been ascertained that radium emanation possesses no action on the vitamine which stimulates growth in young rats so that by the above method the differentiation of the two vitamines has not been accomplished. The method used was the same as that described by Funk and Macallum.[1] Here also the radium emanation was found to have as little action as on the beriberi-vitamine.

Finally the action of radium emanation was tested on Rous's spindle cell chicken sarcoma. An extract of the tumor was prepared under aseptic precautions, which was filtered through filter paper and divided into two portions. In one of the portions emanation tubes with a measured amount of emanation were directly inserted and left for forty-eight hours, the control liquid being kept the same length of time. Both solutions were then injected into the pectoral muscle of a number of small chickens. In both cases tumors have appeared after a delay of 3–5 weeks which shows that radium emanation has hardly any action at all on the agent of the chicken sarcoma even when used in doses exceeding those applied in cancer therapy.

8 (1186)

The mechanism of the diffusion of electrolytes through the membranes of living cells.

By JACQUES LOEB.

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When eggs of *Fundulus* are transferred from sea water directly into a solution of a potassium salt a number of embryos will be poisoned during the first hours so that their hearts stop beating. When the eggs are washed for twenty-four hours in H_2O (or any solution of a non-electrolyte) before being put into the same

[1] *J. of Biol. Ch.*, 27, 51, 1916.