XII. *Experiments to ascertain the coagulating Power of the Secretion of the gastric Glands. By Sir* Everard Home, *Bart. F. R. S. Communicated by the Society for promoting the Knowledge of Animal Chemistry.*

Read January 21, 1813.

In attempts to investigate the process of digestion in quadrupeds, the difficulties are almost insurmountable; the gastric glands are scarcely perceptible, and occupy a small portion of the stomach, every other part of the inner membrane is throwing out secretions of a different kind, and these are all mixed together with the food in the general cavity. Under such circumstances, the properties of the secretion of the gastric glands can never be ascertained, since it cannot be procured in a pure state. It is generally allowed, that the first process the food undergoes in the stomachs of animals is being converted into a jelly; but whether this is produced by the gastric liquor as the previous change to dissolution, or whether it takes place before that liquor is applied, has not been ascertained.

Mr. Hunter made many experiments upon the coagulating power of the secretions of the stomach, which establish the fact of coagulation taking place in the stomachs of animals of different classes.

An infusion of the dried inner membrane of the fourth cavity of the stomach of the calf, being in common use for

the purpose of coagulating milk, proves, that every part of that membrane possesses such a power.

Mr. HUNTER ascertained, that the mucus found in the first, second, and third cavity of the calf's stomach, dissolved in water, had no power of coagulating milk, while a solution of the mucus of the fourth cavity possessed that property, and retained it even after it had been so long kept, as to begin to become putrid.

When the calf has left off sucking, and is old enough to be killed for veal, the inner membrane of the fourth cavity of the stomach readily coagulates milk.

If different portions of the inner membrane of the hog's stomach are prepared as rennet, no part coagulates milk but that near the pylorus, and I have shewn, in a former paper, that the gastric glands are situated there.

The crop and gizzard of a cock were prepared as rennet, milk was coagulated in half an hour by that of the gizzard, in two hours by that of the crop.

The contents of a shark's stomach coagulated milk immediately; portions of the stomach washed and steeped sixteen hours in water, formed a solution which produced the same effect.

Rennet made from the stomach of a salmon coagulated milk in four or five hours; when made from the stomach of the thornback, it produced the same effect.

These experiments shew, that the secretions of the stomach have a power of coagulating milk; they do not, however, explain whether this power belongs to any one secretion in particular, or to a mixture of them all.

With a view to ascertain to what particular secretions this

property belongs, I instituted the following experiments, which were made by my fellow labourers in animal chemistry, Mr. HATCHETT and Mr. W. BRANDE.

On the 9th of June, 1812, Mr. HATCHETT took the cardiac portion of a chicken's stomach with the gastric glands that open into it, and put it into a glass vessel; the horny lining of the gizzard was put into another, milk was added to each, and was converted into a curd; but the curd in the vessel containing the lining of the gizzard was the firmest.

Mr. BRANDE, on the 12th of June, 1812, made a similar experiment with the cardiac portion of the stomach of the hawk, as a carnivorous bird, in one vessel; and the cardiac portion of the fowl, as a granivorous one, in another. The coagulating power of the hawk's stomach was found to be the most powerful.

To ascertain whether the coagulating power belongs to the secretion of the gastric glands, and is only communicated to the other parts, I instituted the following experiment, which was made by Mr. BRANDE on the 13th of July, 1812. I selected the turkey for the subject of it, as the gastric glands of that bird are larger than in most others. The turkey had been kept one day without food before it was killed, and immediately after death the gastric glands were very carefully dissected from each other, on the outside of the membrane which lines the cardiac cavity without opening into it, each gland was then separately removed by cutting through the excretory duct, leaving the cardiac cavity entire and unopened.

Of these glands slit open 40 grains were put into a vessel, and two ounces of new milk added.

40 grains of rennet were put into a second vessel, to which the same quantity of milk was added.

40 grains of the lining of the cardiac cavity of the turkey, and the same quantity of milk were put into a third vessel.

40 grains of the fourth cavity of a calf's stomach in a recent state, with the same quantity of milk, were put into a fourth vessel.

The experiment commenced at ten o'clock in the morning, at half past ten the milk with the rennet became thick, at twelve curd was formed, at two whey separated, at four the formation of curds and whey appeared complete.

At half past eleven the milk with the glands became thick, at one curd was formed, at three whey separated, at six the formation of curds and whey was complete.

The milk with the portion of the recent calf's stomach underwent the same changes at the same periods.

The milk with the cardiac membrane of the turkey at four became thick, at eight curd was formed, the separation into curds and whey was not complete till next morning.

A portion of the same milk in twenty-four hours had undergone no change, except that cream had separated.

The rennet in a dried state consisted of four times the quantity of membrane employed in the experiment with the recent calf's stomach, which accounts for its more readily producing coagulation.

From these experiments, it is clear that the secretion of the gastric glands possesses the power of coagulating milk, and gives that power to all the parts by which it is imbibed, whether composed of living parts or not, since the horny lining

of the gizzard, the mucus in the stomach, and the inner membrane of that cavity appear equally to have acquired it.

This coagulation appears to be the first change the food undergoes in the process of digestion, and where the digestion is rapid, the coagulated parts are very quickly dissolved.

Mr. BULLOCK was led, by his love of natural history, to spend some time on the Bass Rocks, and has frequently seen a Solan goose swallow a herring, and come immediately to feed its young, and although the time the herring remained in its stomach could not have been more than a few minutes, when it was brought up again, to be given to the young bird, the external covering was entirely dissolved.