was enormously stimulated and became even tumultuous; this was seen in marked degree in old individuals which were decrepit and motionless. Such a moth, for example, injected in the morning, immediately was thrown into a state of intense activity which continued during the rest of the day, followed by death a few hours later.

In conclusion Bataillon says:

> The entire life of *Bombyx* from the spinning to death presents constant physiological characteristics: lowering of internal pressure; respiratory and circulatory disturbances, and histolysis. . . . The circulatory disturbances . . . are merely the permanent index of more profound disruptive changes.

Both Bataillon in his earlier paper (1893)[4] and Fischer (1918)[5] suggested that periodic reversal may be due to increased acidity of the blood accompanying metamorphosis. This idea is supported by a recent paper in Japanese by Yokoyama[6] who has succeeded in bringing about periodic reversal prematurely in the larva by blocking the abdominal spiracles with enamel paint or by injecting into the hemolymph of the abdomen (at the eighth abdominal segment) weak solutions of lactic or acetic acid.

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THE CHEMICAL CONSTITUTION OF PECTINATELLA

IN searching for material in order to study the synthesis of protein, Pectinatella was examined. The thought was that here was a source of rapidly formed gelatin, or its precursor collagen. A mass weighing from 2 to 5 kilos is formed within a few weeks, comparable to the growth of certain tumors. The fact that investigation reveals that the jelly-like secretion is not of the nature of collagen but of true protein of a fairly high order does not rob the study of its interest or importance, for the organism stands as a readily available source of study of extremely rapid synthesis of protein.

The material was supplied by Professor Raymond C. Osburn, director of the Stone Laboratory, Put-in-Bay, Ohio. Pectinatella is available in large quantities during the summer and autumn. It may be preserved in fresh water, and sampling is possible from the growth, the remainder proceeding with its growth without detriment.

The water content is high. A specimen weighing 1,200 grams gave, on drying, 5.0 grams dry weight. Protein, etc., therefore make up about 0.5 per cent. of the normal body.

The protein reactions were typical of such proteins as ovalbumin, serum albumin, etc. The biuret reaction was positive and typical, that is, like that of white of egg and not like that of gelatin or peptone.

The following amino-acids were demonstrated: tyrosin, tryptophane, cystin. In a cold extract of the dried material all three were positive, but the reactions were intensified after acid hydrolysis. This was especially true of cystin. The protein was heat coagulable.

Of the inorganic substances, sodium chloride was demonstrable. Phosphorus was negative before hydrolysis, and after boiling with equal volumes of sulphuric and nitric acids, none was demonstrable. Calcium is present in copious amounts, as one would suspect from the calcareous nature of the body and statoblasts.

Characteristic of these organisms is the supporting structure composed of chitin. In the specimens examined chemically, glucosamine (galactosamine?) was readily demonstrable after hydrolysis. This amino-sugar has extensive distribution through the animal kingdom and in man occurs in cartilage.

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JANUARY 3, 1930

REPORTS

THE TEACHING OF HYDROBIOLOGY AND AQUICULTURE IN AMERICAN UNIVERSITIES

THE committee on aquiculture of the Division of Biology of the National Research Council has had a subcommittee engaged in gathering data on the teaching of hydrobiology and aquiculture in American universities. This committee has consisted of James G. Needham, A. G. Huntsman, Chancey Juday and E. N. Transeau. A report has recently been submitted, embodying the following data.

Sixteen institutions in the United States and Canada give courses in these subjects. These institutions and their undergraduate courses are listed in the accompanying table. These courses are called by various names, as indicated in the footnotes to the table.

[4] E. Bataillon, *Bull. Sci. France et Belgique,* 25: 18–55, 1893.

[5] E. Fischer, "Eine bei Raupen und Puppen beobachtete Umkehrung der peristaltischen Herzbewegung," *Entom. Rundschau. Stuttgart,* 35: 9–10, 1918.

[6] T. Yokoyama, "Notes on the Periodic Reversal of Heart-beat in the Silkworm *Bombyx mori* L.," *Dobutsugaku Zachi* (*Zool. Mag.*), 39, No. 459, Suppl.: 45–51, 1927.