failure completely to empty the bladder at either the beginning or end of the period. Such errors may be reduced by basing the output calculations on the creatinine content of the sample, rather than the time over which it is collected, since Shaffer has shown the hourly creatinine output to be constant throughout the 24 hours, *e.g.*, if the creatinine content of the sample analyzed is 1/20 of the individual's known daily creatinine output, the urea and volume output are calculated to a 24-hour basis by multiplying by 20.

35 (1495)

Enzymes of pollen.

By JULIA BAYLES PATON (by invitation).

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Pollen enzymes must be very important in rendering stored food available when pollen germinates, in facilitating the passage of the pollen-tube through the pistil, and in stimulating the development of the embryo and maturing of the ovary.

Moreover pollen anaphylaxis is now regarded as the cause of socalled hay-fever and other forms of pollen poisoning. Pollen enzymes may be concerned in these reactions, and the proteolytic enzymes may affect the stability of the pollen-protein solutions used in pollen vaccination.

Yet in spite of the significance of these enzymes few experiments in regard to their nature have been reported, and none recently. Erlenmeyer (1874) found amylase in pine pollen. Van Tieghem (1886) reported invertase in hyacinth, narcissus, wallflower, and violet. Rittinghaus (1886) made observations which indicate the presence of the cytase. J. R. Green cites amylase in pollen tubes. Strasburger (1905) mentions diastase and invertin in grains prior to germination. Kammann (1912) found proteases, diastases, catalases, and lipases in rye pollen.

Although it has been assumed that pollen tubes digest their way through the style there seems to be no experimental evidence as to the exact nature of this enzyme action. Histological exami-

nation shows that pollen tubes make their tortuous way between the walls of adjacent cells rather than traversing or penetrating the cell. We should expect, therefore, to find not a cytase or cellose-digesting enzyme, but rather a pectinase, capable of digesting the pectin of the inner lamella. This has been proved in the writer's experiments to be the case.

Twelve kinds of pollen have already been tested, namely, Easter lily, *Lilium rubrum*, red maple, Norway maple, Siberian crab apple, Austrian pine, magnolia, dandelion, goldenrod, ragweed, and corn. Rye, daisy, dock and timothy are now being examined.

The enzymes tested for, both qualitatively and quantitatively, were as follows: amylase, zymase, invertase, erepsin, trypsin, pepsin, lipase, catalase, reductase, cytase, tryosinase, and pectinase.

So far amylase, invertase, catalase, reductase, and pectinase have been found in all. Several of these reactions are so rapid and striking that they make excellent laboratory demonstrations. Erepsin, pepsin, trypsin and lipase were found active in some and not in others. Cytase, and tyrosinase have not yet been satisfactorily identified in any. Zymase has been found so far only in Siberian crab apple.

36 (1496)

Effect of the anesthetization on the subsequent behavior and intelligence of albino rats.

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The behavior of albino rats was studied in Watson's maze.[1] Young adult rats were first trained so as to find their way out of the maze by the shortest distance and in the shortest period of time. After the animals have been thoroughly trained anesthetics were administered and the subsequent behavior after recovery from anesthesia was studied. The effects of a single anes-

[1] Watson, J. B., *Jour. of Animal Behavior*, 1914, IV, 56–59.