

## DIGESTION OF JUNIPER POLLEN BY COLLEMBOLA

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Owing to the semi-transparent exoskeleton of *Onychiurus pseudofimetarius* Folsom (Collembola, Hypogastruridae), the intestinal food bolus is visible in both living and preserved specimens. With cautious treatment, it is possible to clear away much of the body musculature and expose the intestinal contents to minute microscopic examination.

For this study, alcohol-preserved specimens of *O. pseudofimetarius* were cleared in beechwood creosote and mounted in Canada balsam. In specimens cleared less than 36 hours, the exoskeleton is too opaque for precise examination of the bolus. In specimens cleared more than 72 hours the bolus has been destroyed. In specimens cleared about 48 hours the bolus is clearly visible, though shrunken from the intestinal wall.

To obtain suitable mounts, specimens were observed closely after 36 hours, and were mounted in balsam just before optimum clarity was achieved to allow for additional clearing which occurred in the balsam.

Under the microscope, pollen grains of *Juniperus pachyphloea* were observed intact and in various stages of digestion (Figure 1).

The spheroidal pollen grain of *J. pachyphloea* (about 20 microns in diameter) consists of a thin tough outer coat (exine), two thick inner coats (outer and inner intine), and the protoplast with vacuoles. Furrows, pores, and bladders are absent (Wodehouse, 1935 and 1945; Brown and Yater, 1949).

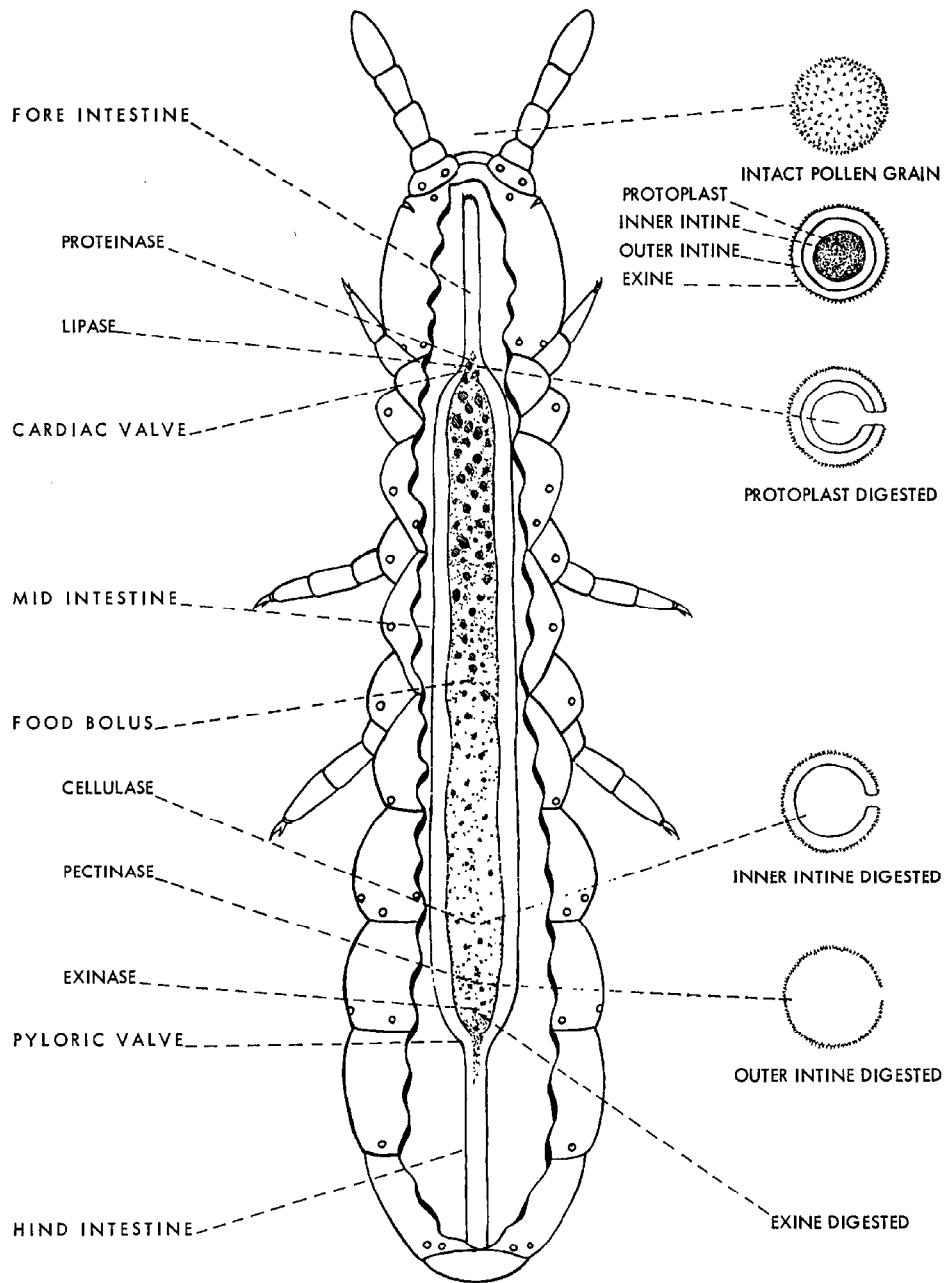
According to Muller-Stoll (1948), the spiculate exine is constructed of complex carbohydrate, the stiff outer intine of pectin, the flexible inner intine of cellulose and pectin, and the protoplast of lipid and protein (no starch).

Observation of the pollen grains in the intestine of *O. pseudofimetarius* indicates that either (1) the digestive enzymes penetrated the exine at some chemically susceptible point, or (2) the exine of each grain was burst by the intine in response to moisture as described by Wodehouse (1945, p. 26). Whichever occurred, the protoplast was attacked at the level of (or just prior to) the cardiac valve. The inner intine was attacked in the mid-intestine, approximately at the juncture of abdominal segments II and III. The outer intine was attacked in the mid-intestine approximately at the middle of abdominal segment III, while the exine was broken up just prior to the pyloric valve.

Based upon these observations, it is probable that proteinase, lipase, cellulase, pectinase, and an exinase were secreted at the points indicated in the figure. These observations correlate in general with available knowledge on insect digestion (Day and Waterhouse, 1953; Folsom and Welles, 1906).

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