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James J. Hilbe
Dowling College

T. U. Marron
Iowa Lutheran Hospital

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DIFFERENCES IN THE PHOSPHATASE SYSTEMS OF PLANT AND ANIMAL TISSUES BY A MICHROTECHNIC

JAMES J. HILBE * AND T. U. MARRON **

Gomori [1] has shown the location of phosphatase in animal organs by a michrotechnic.

The principle is as follows: tissue sections are incubated in the presence of a substrate. Phosphate ions will be split off by the enzyme and in the presence of the calcium ion will form insoluble calcium phosphate at the point of liberation. Calcium phosphate can be converted to a dark colored insoluble precipitate. The visible precipitate then indicates the location of the phosphatase.

The purpose of this research has been to subject the plant material to a similar procedure and so demonstrate any similarity or dissimilarity to what is known concerning animal material.

Results: The embryo of germinating wheat seeds were fixed in 70 per cent alcohol, dehydrated, and embedded. The time of exposure to oven heat was reduced to a minimum to prevent excessive destruction of enzyme. Sections were placed on slides and passed through xylol, absolute alcohol, and 95 per cent alcohol. This was allowed to drain off, then a 15 per cent gelatin solution was poured onto the tissue side of the slide to a depth of about 3 mm. The slides were then placed in a refrigerator to harden and dry. This procedure keeps the enzyme from being dissolved in the water.

Two groups of slides were passed through the reagents. The experimental group was subjected to the treatment mentioned above, and the control group was withheld from the substrate.

Black areas, indicating enzyme locations, were found to follow a uniform configuration. The densest aggregations and the darkest granules were found in the region of attachment of the embryo to the seed and in the cell layer just beneath the seed coat. Less dense and smaller granules are found in rapidly growing areas, the density and size apparently (in the growth areas) being directly proportional to the activity of the region. In the relatively inactive areas the indications of phosphatase are scanty.

It is of interest to note that both experimental and control mater-

1 Gomori, G., Proc. Soc. Exp. Biol. & Med., *42*, 23-26, 1939.

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ial had the dark areas indicative of enzyme activity. The only difference was that of greater apparent intensity of activity in the material expose to substrate.

In sections treated with collodion (Gomori) instead of gelatin, comparative results were obtained. The difference was that the collodion film has a tendency to shrink and tear off sections, and passage of solutions through collodion is much slower than through gelatin.

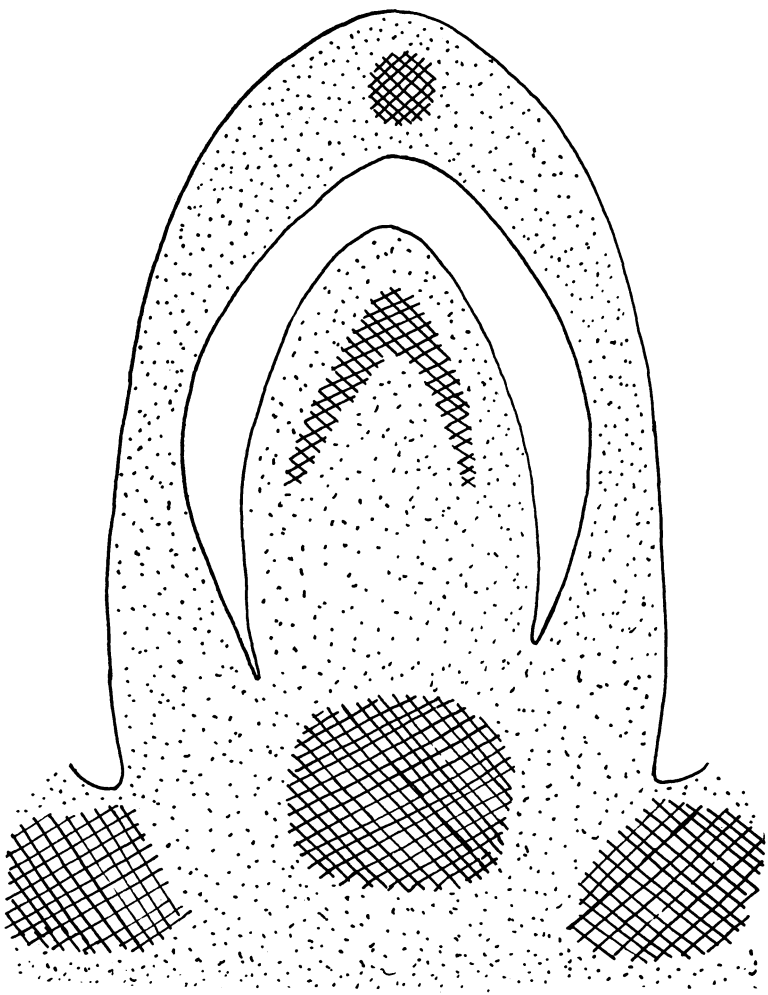

PLATE I: This diagram shows the general location of phosphatase in the wheat embryo, the cross-hatching indicates large amount of phosphatase.

Hilbe and Marron: Differences in the Phosphatase Systems of Plant and Animal Tissue

SUMMARY

Phosphatase has been demonstrated in the sections of wheat embryos. It is most abundant in the cells lying nearest the seed and in the layer of cells immediately beneath the seed coat. In the active part of the embryo, phosphatase appears in direct proportion to cell activity.

A gelatin method for preventing solution of phosphatase has been mentioned.

Confirmation of Gomori's results have been obtained using Guinea pig and rabbit kidneys.

* DOWLING COLLEGE,
DES MOINES, IOWA.

** DEPARTMENT OF PATHOLOGY.
IOWA LUTHERAN HOSPITAL,
DES MOINES, IOWA.