A Comparative Study of Oxycoccus macrocarpus and Oxycoccus Oxycoccus

by

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Introduction.

This comparative study of the two cranberries, O,macrocarpus and O,oxycoccus, found growing near McLean New York, was taken up for the purpose of determining whether or not there was any differences in structure of these two plants.

Material of the two plants was carefully gathered, killed, and preserved,October nineteenth,when it was possible to obtain mature fruit as well as leaves,stems, roots, etc.

At the same time that I was gathering material for micro scopical study, I took up several clumps of each species and set them in a shallow tank in the greenhouse in hopes of having plenty of fresh material to work on during the winter. The large form O,macrocarpus remained green during the winter, but had not started to grow the middle of March, while the small form O,oxycoccus started to grow early in February and was in full bloom by the twentieth of February. I made no attempt to make use of the flowers, as I had only the one form at that season of the year, but expected to make a comparative study of the flowers in spring.

In this study I shall endeavor to point out only a few of the common likenesses of the two plants, or should there be difference, I shall also note that with drawings to make plain any of the various parts.

The Plants as a Whole.

The sizes of the two plants is the first difference that one notices. A mature plant of the O,oxycoccus, , is not as large as a mature plant of O,macrocarpus, neither is it's leaves or fruit as large.

In putting up the material,I found that the fruit of the O,oxycoccus was more acid than the fruit of the O,macrocarpus, and aside from an inconstant variation in shape I could see no other differences in the two plants.

Sections of the fruit.

On plate 1, Fig. 1, we have a drawing of a cross section of the epidermis and a few of the fruit cells of a fruit of the O,macrocarpus, and on plate 2, Fig.1, we have a similar cross section taken from the fruit of a O,oxycoccus. These two drawings were made under the same magnifying power and drawn by the aid of a camera lucida.

By a careful study of the two sections both under the microscope and from the drawing, I was unable to detect the least difference, either in structure or content. In fact it would have been difficult to tell which was from which, had it not been for the difference in size of the berry.

Leaves.

Plate 1, Figs. 2 and 3, are drawings showing the

upper and lower epidermis respectively of a leaf of the O,macrocarpus, and on plate 2, Figs. 2 and 3, we have similar drawings made from the upper and lower epidermis of the O,oxycoccus. In each species the cells are large irregular thick walled with ragged margins, showing no differences whatever in structure. It is possible that the stomata in O,macrocarpus are a trifle more numerous, but even this is doubtful.

The Stem.

Plate 3, Fig. 1 is a portion of a transverse section of a stem of O,macrocarpus,--showing (a) epidermis, (b) periderm, (c) primary cortex, (d) cambium region, (e) medullary rays and (f) pith cells.

Fig. 2 of the same plate is a longitudinal section of a stem of the same plant showing longitudinal views of the cells. Plate 4, Fig. 1, is a portion of a transverse section of a stem of O.oxycoccus, showing (a) epidermis, (b) periderm, (c) primary cortex, (d) cambium region, (e) medullary rays and (f) Pith cells.

Fig. 2 of the same plate is a longitudinal section of a stem of the same plant showing longitudinal view of the cells present.

By a careful examination of these two drawings, we find various differences but none of which are of importance. I think they are more apt to be due to the

differences in sizes of the two stems than real differences of structure. The greatest difference is noticeable in the cortical region. In O,oxycoccus, the cells are smaller and more compact than in the O,macrocarpus.

The dividing line of xylem and phloem is also more distinct in the former.

The longitudinal sections also show differences,but comparisons of longitudinal sections are hardly fair since it is difficult to take two even from different stems of the same plant and make rigid comparisons.

Leaves.

Plate 5, Fig. 2, a portion of a transverse section through the median vascular bundle of a leaf of O,macrocarpus, (a) upper epidermis, (b) palisade cells, (c) xylene (d) phloem, (f) lower epidermis, (e) parenchyma.

Plate 6, Fig. 2, a portion of a transverse section through the median vascular bundle of a leaf of O,oxycoccus, (a) upper epidermis, (b) palisade cells, (c) xylene, (d) phloem, (e) parenchyma, (f) lower epidermis, (g) crystal.

By a careful study of these two drawings, one will readily see how very much they resemble one another. Aside from the difference in size of the bundles, one could hardly recognize any difference whatever.

In the parenchyma near the under surface of the O,oxycoccus one finds a few large crystals not found in O,macrocarpus. In all the material examined this same condition prevailed throughout.

Plate 5, Fig. 4, a portion of a cross section of a leaf of O,macrocarpus under lower power than Fig. 2 of the same plate.

Plate 6, Fig. 4, a portion of a cross section of a leaf O,oxycoccus under lower power than Fig. 2, of the same plate.

Each of these drawings show a secondary bundle, very much alike in each case. In O,oxycoccus there is an extra row of palisade cells but this did not seem to be constant so I do not take it to be a difference. Here,as in other studies on this plant,I am compelled to admit that there is no noticeable difference. Figures 1 in Plate 5 and 6 are portions of cross sections of large roots of each of the two plants. There is practically no difference in the structure of these parts. The bundle arrangement in each plant is very interesting from the mere fact of its simplicity. Figures 3 of plates 5 and 6 are cross sections of some of the smallest roots of each plant. An interesting phase in each case was the thick walls of the epidermal cells.

Fruit.

In comparing the fruits of these two plants the shape of the cells, the arrangement and number of seeds and general outlines were the same in all cases. As a rule the fruit of O,oxycoccus was a third smaller than the fruit of O,macrocarpus.

The fruit buds of each plant was sectioned and studied under low power. O,macrocarpus had smaller individual flowers and more bud scales than O,oxycoccus.

Conclusion.

After carefully going over all parts, I came to the conclusion that it would be impossible to tell the species apart by histological methods.

Plate No. 1.

Oxycoccus macrocarpus.

Fig. 1. Cross-section of the epidermis and a few of the fruit cells of a mature fruit.

Fig. 2. The upper epidermis of a mature leaf of the plant. Showing the shape and appearance of the cells.

Fig. 3. The lower epidermis of a mature leaf. Showing stomata, arrangement and shape of cells.

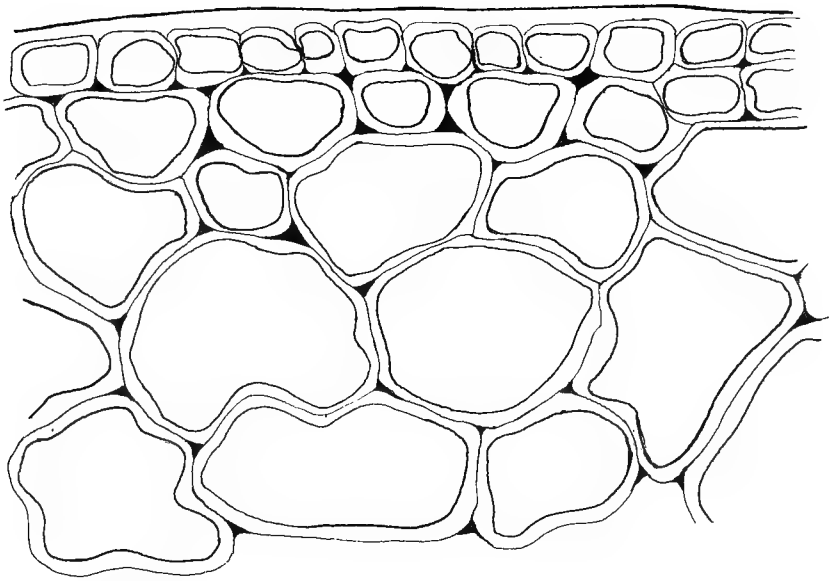


Fig. 1.

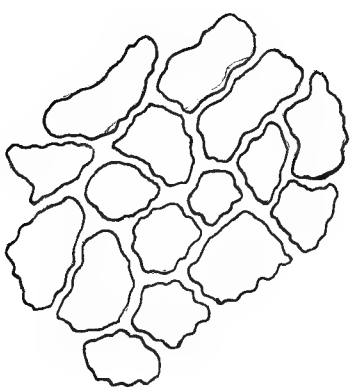


Fig. 2.

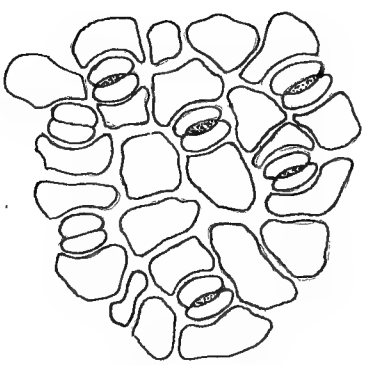


Fig. 3.

Oxycoccus macrocarpus (Ait) Pers.

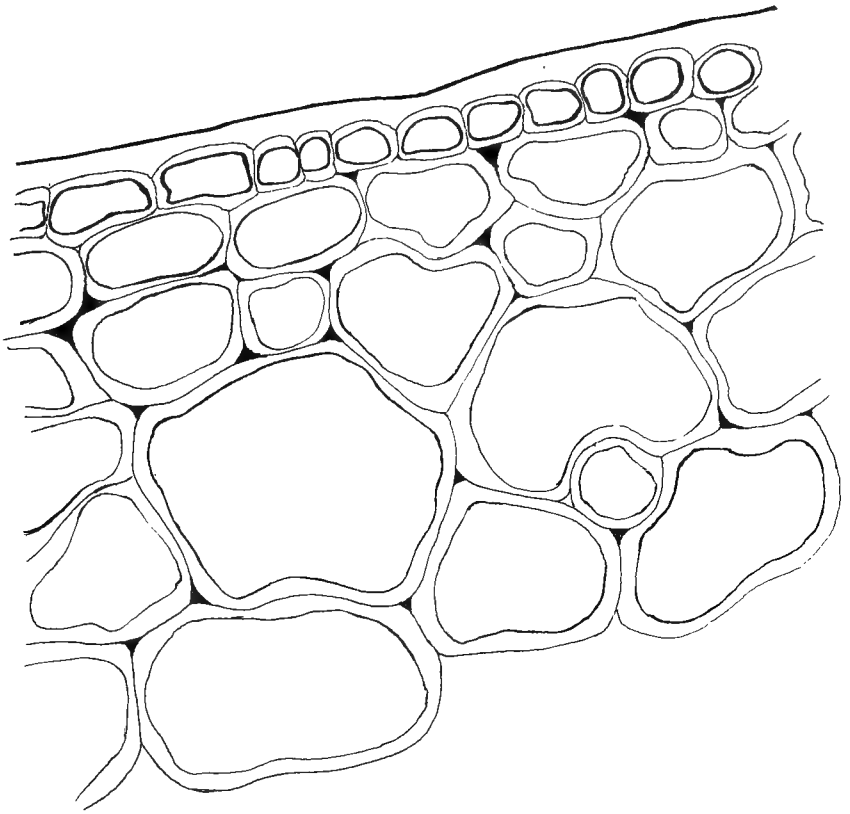
Plate 2.

Oxycoccus Oxycoccus.

Fig. 1. Cross-section of the epidermis and a few of the fruit cells of a mature fruit.

Fig. 2. The upper epidermis of a mature leaf of the plant, showing the shape and appearance of the cells.

Fig. 3. The lower epidermis of a mature leaf, showing stomata, arrangement and general shape of the cells.



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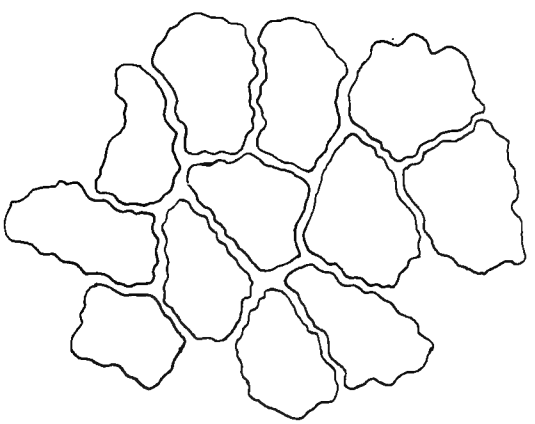


Fig. 2.

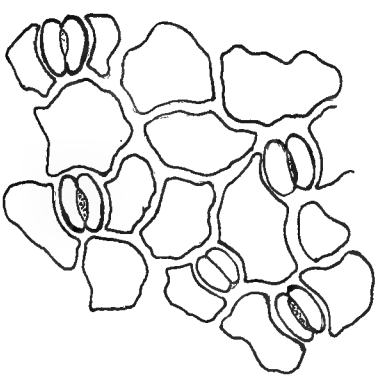


Fig. 3.

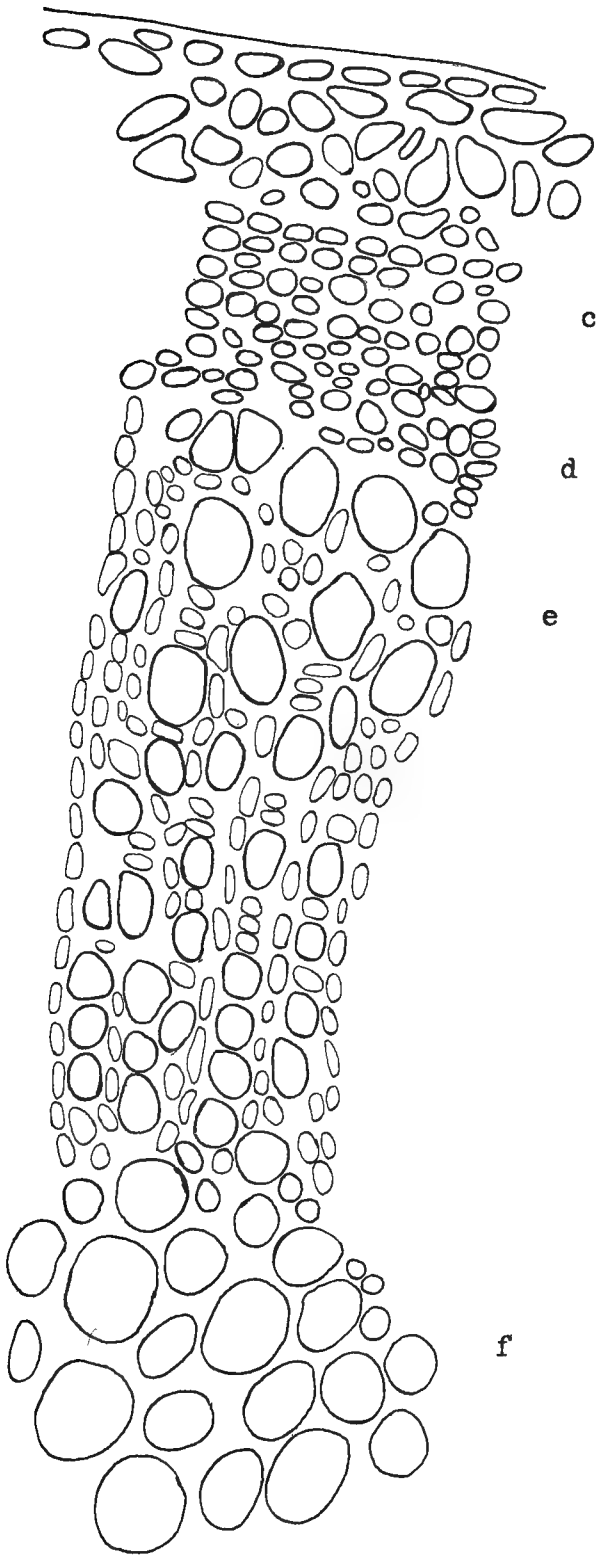
Oxycoccus Oxycoccus (L) MacM.

Plate 3.

Oxycoccus macrocarpus.

Fig. 1. A portion of a cross-section of the stem of the plant, showing portions of the pith, xylem and the phloem regions.

Fig. 2. Longitudinal section of the stem; showing cells of the various tissues in position.



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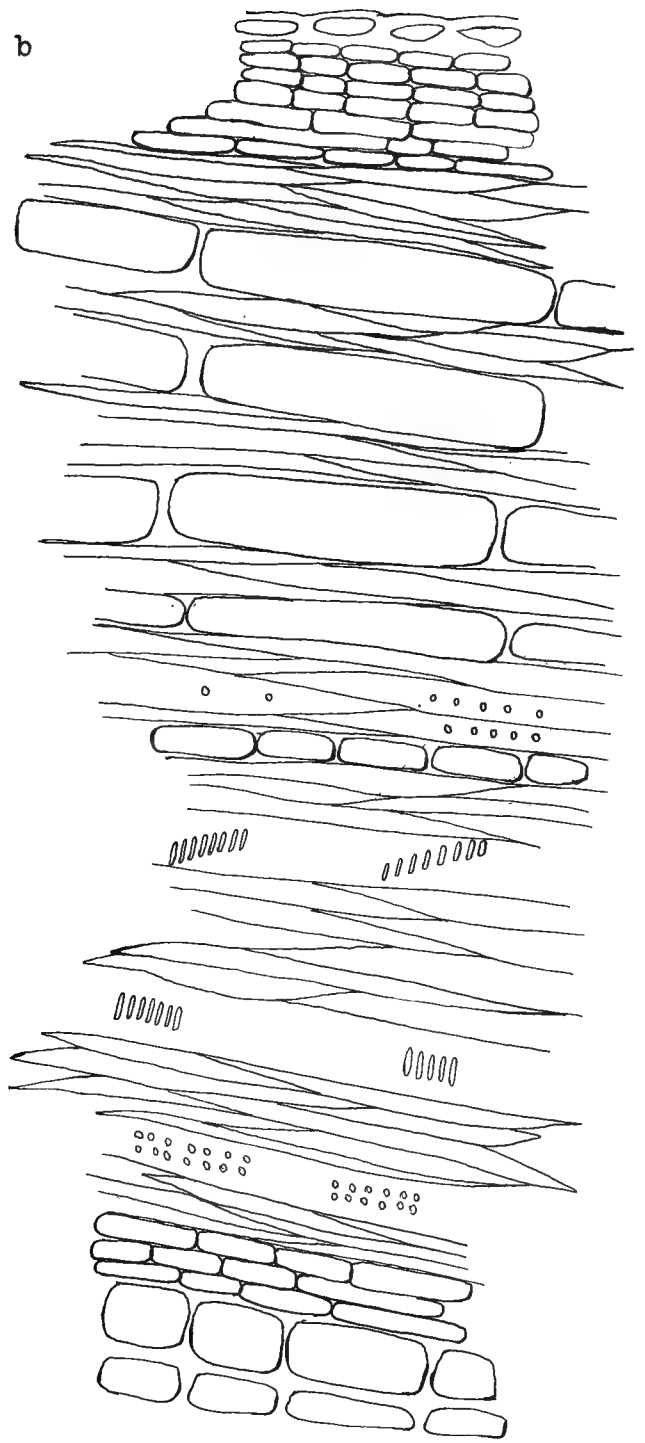


Fig. 2.

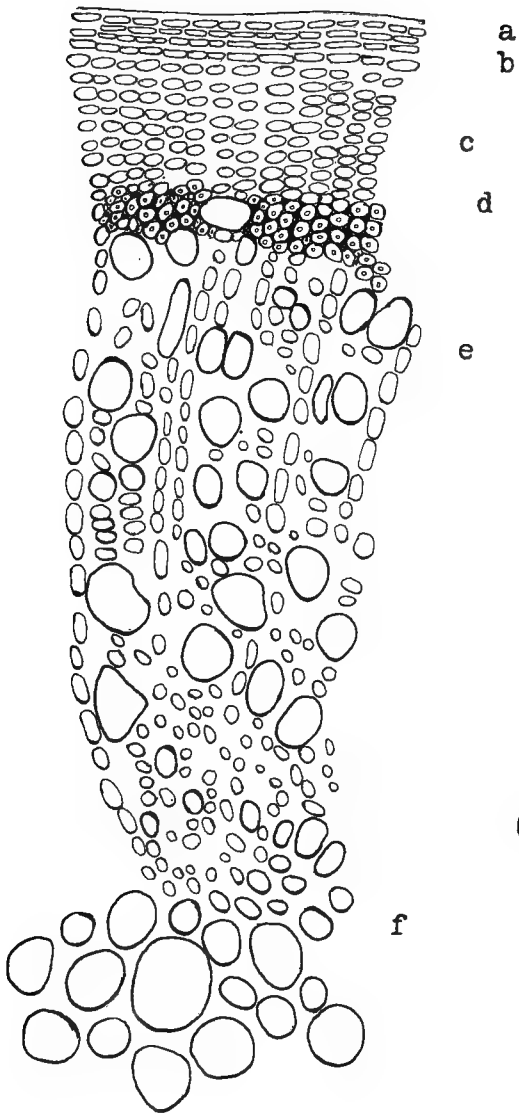
Oxycoccus macrocarpus (Ait) Pers.

Plate 4.

Oxycoccus Oxycoccus.

Fig. 1. A portion of a cross-section of the stem of the plant, showing portions of the pith, xylem and the phloem regions.

Fig. 2. Longitudinal section of the stem; showing cells of the various tissues in normal position.



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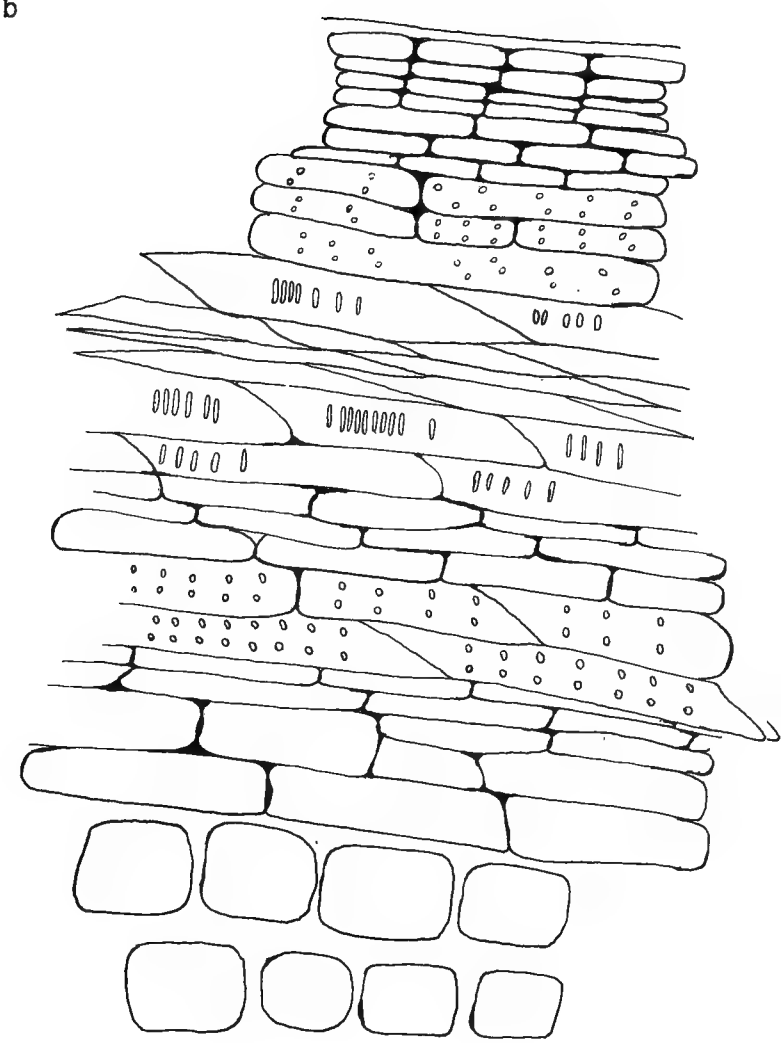


Fig. 2.

Oxycoccus Oxycoccus (L) MacM.

Plate 5.

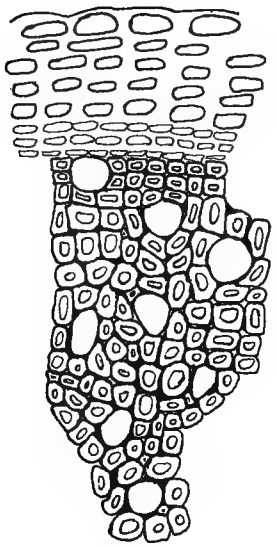
Oxycoccus macrocarpus.

Fig. 1. A portion of a cross-section of a large root of the plant, showing tissues from the pith to the bark.

Fig. 2. A cross-section through the mid-rib of a leaf, showing the vascular contents of the bundle, as well as the upper and lower epidermal cells with a few adjacent parenchial cells.

Fig. 3. A cross-section of a very small root, showing the simple development.

Fig. 4. A cross-section of a leaf, showing secondary bundle, stomata palisade cells and parenchyma.



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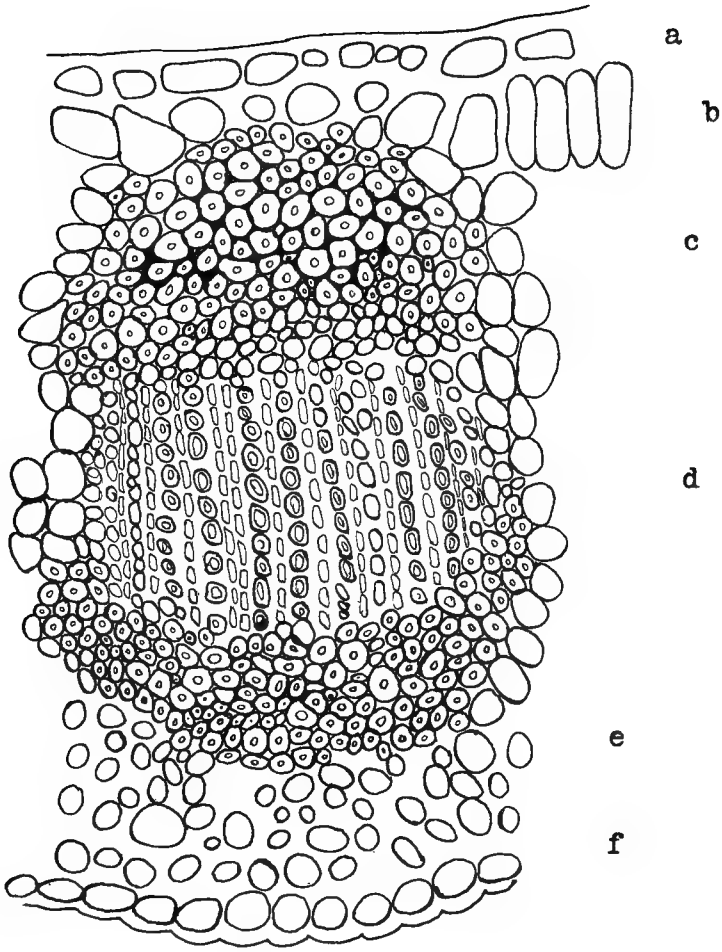
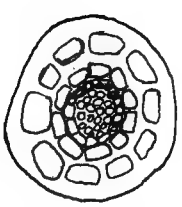


Fig. 2.



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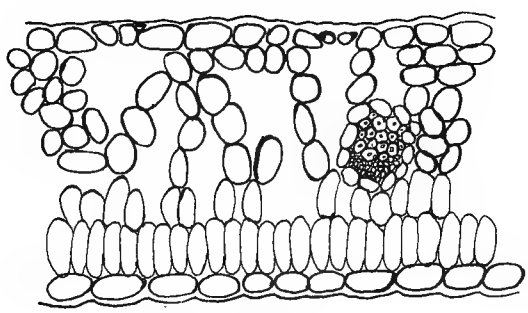

Fig. 4.

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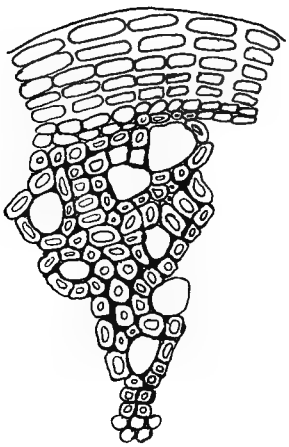
Fig. 2. A cross-section through the mid-rib of a leaf, showing the vascular contents of the bundle as well as the upper and lower epidermal cells with a few adjacent parenchial cells.

Fig. 3. A cross-section of one of the smallest roots showing the simple arrangement, and small variation of tissue.

Fig. 4. A cross-section of a leaf showing secondary bundle, stomata, palisade cells and parenchyma.



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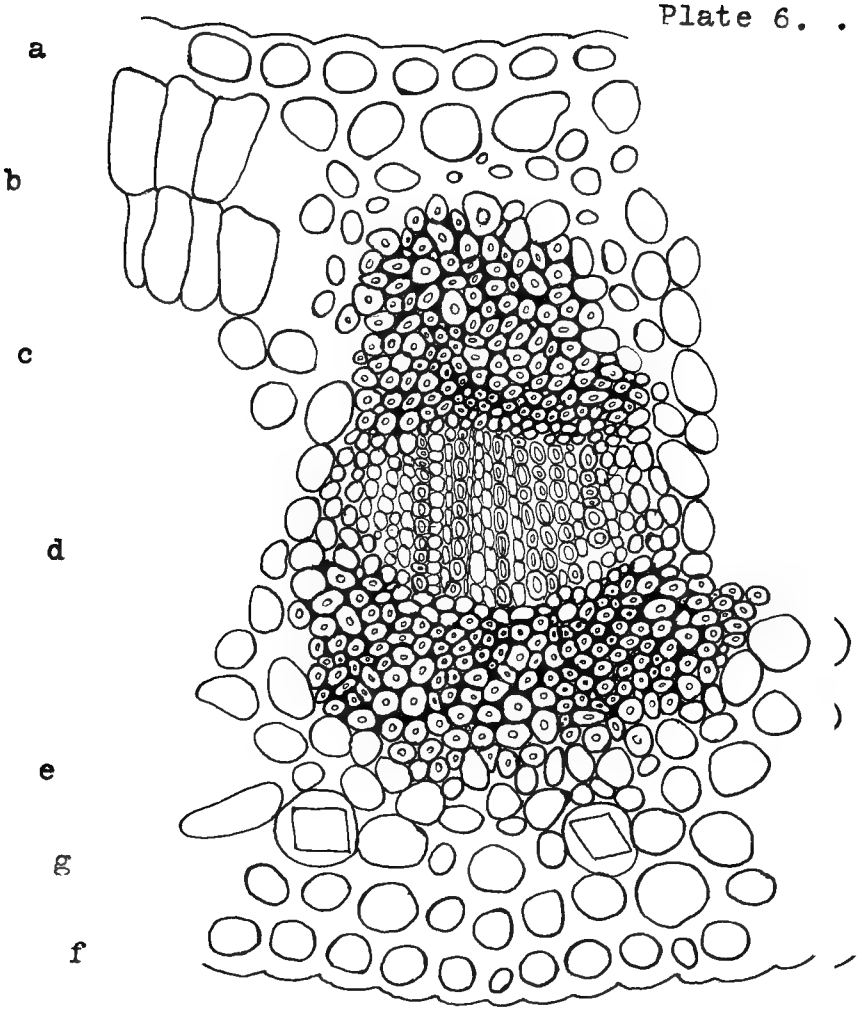

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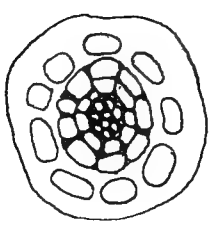

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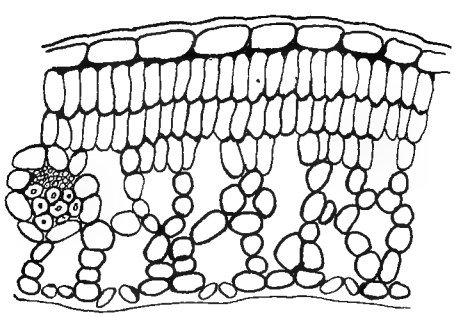

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