THESIS

SEEDS AND SEEDLINGS

BY

E. Joy Heck. 1895

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Botany

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The primary object of this thesis is to note the effect of different depths of planting on the growth of some of the cereals- wheat, indian corn, oats, rye and barley. Along with this work I have added supplimentary matter, viz., The growth of the roots, the position of the parent seed, etc.,

GERMINATION AND GROWTH OF THE GRAINS.

A grain of wheat, being deposited in the earth, in a short time assumes the appearance represented in figures 1, 2 and 3 or plate 1. In these figures are shown the radical X, lateral roots A and A', and the central root B, the last being the first to make its appearance. Later on the next pair just behind the plumule make their appearance. In fig.3 is represented the grain at a still later period of growth. Here the five roots,- four lateral and one central root, are well developed. While growing the seedlings I cut off the ends of several of the lateral roots.. The remainder of the roots ceased to grow, but the uncut roots thrived as well as the corresponding roots on the seeds which were unmolested. In several of the specimens the ends of the roots turned brown. This was due to a lack of moisture. Although they were afterwards watered, they did not survive but all succumbed to the influence of the drouth.

After a certain time had passed from the deposit of the seed, varying with the depth at which it was sown, the plumule was noticed at the surface of the ground. In fig.1 of plate 3 the seedwas planted at a depth of one-half inch; in fig.2 at one and one-half inches; and in fig. 3 at 6 inches. In fig.1, the plumule was first noticed in eight days

from the time of planting; in fig.2, in 11 days; and fig.3, in 17 days. Fig.1, in which the seed was sown at a depth of one-half inch, shows a plant in a thrifty and vigorous condition. It has four broad, dark-colored, well-developed, healthy looking leaves. These leaves are supported by short well-formed stems, which is nourished by numerous roots, thus combining the qualities necessary for a thrifty plant. Fig.2. in which the seed was planted at a depth of one and one-half inches is also a well formed plant. Instead of having the roots projecting from a single node, as in fig.1, they appear in different portions of the stem, thus furnishinga much larger amount of nutriment to the plant, This is well shown by the number and condition of the leaves-in place of four there are six. This is of great physiological importance in the growth of the plant. The evil effects of too great a depth in sowing is well illustrated in fig.3. The stalk surmounted by only a couple of leaves is small and unthrifty as compared with the plant represented in fig.2, which was sown at a depth of one and one-half inches. The great distance which it was necessary for the plumule to traverse before emanating from the ground and emerging into the air, sharing the vitalizing influence of the light, has entirely exhausted the store of nutritious material furnished by the seed. Hence its future growth is retarded and the stalk is in more danger os disease and accident.

The growth of the other cereals is very similiar to that of wheat. The dangers which surround this plant are common to the others, as will be seen by the drawing.

Figs. A and B of plate 6 are representations of indian corn. The nutritious parts of the seed is entirely exhausted and the roots are so

few that they can barely sustain the life of the plant. Figs. A and D of plates five show the rye plant. Figures C and E show the barley plant. In these the seedlings are very young and hence the drawings do not show the effect of the different depths of planting to as great as advantage as do the drawings of corn and wheat. In figures A and B of plate four this distinction is very marked. The one is a healthy well-developed plant, the other an unthrifty one. Figure A of plate two is a representation of a seedling of corn, at H is shown the manner of throwing out roots. This is better shown in figure B, the drawing of an old stalk one-sixth its natural size. The roots are thrown out at the first, second, third, fourth and fifth nodes. The last drawing represents a stalk that was leaning, the portion shown is the part next to the ground.

The node invaribly remains at the parent seed, not drawing away from the seed as supposed by many. This is well illustrated by Figure nine of plate one, which represents an entire spike of rye that had been left on the ground and sprouted. Figure eight of same plant shows root penetrating the pericarp of the seed, but not the parent seed as it is still attached to the plant. In figure 3 plate five is a similiar drawing. In figures B and C of plate six are representated roots penetrating straw and wood. Figure H of plate one shows a cross-section of a grain of wheat, with the two outer coats. Figure four of same plate illustrates the five rudimentary roots in a kernel of wheat. Rye, oats and barley have the same number of

roots. On Plate seven are pasted seedlings of wheat and corn. These shows the roots as they grow naturally, but the stem of the seedlings of corn are much longer than the normal growth as they were grown in pots which were not exposed to sufficient light. This is due to the tendency all plants have to seek light.

Plate I

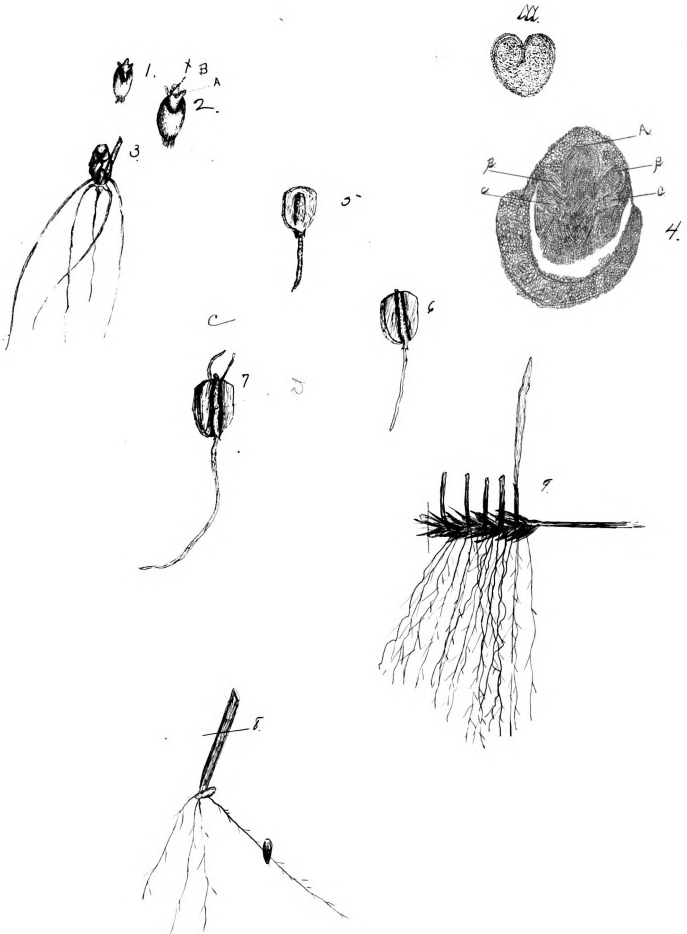


Plate II.

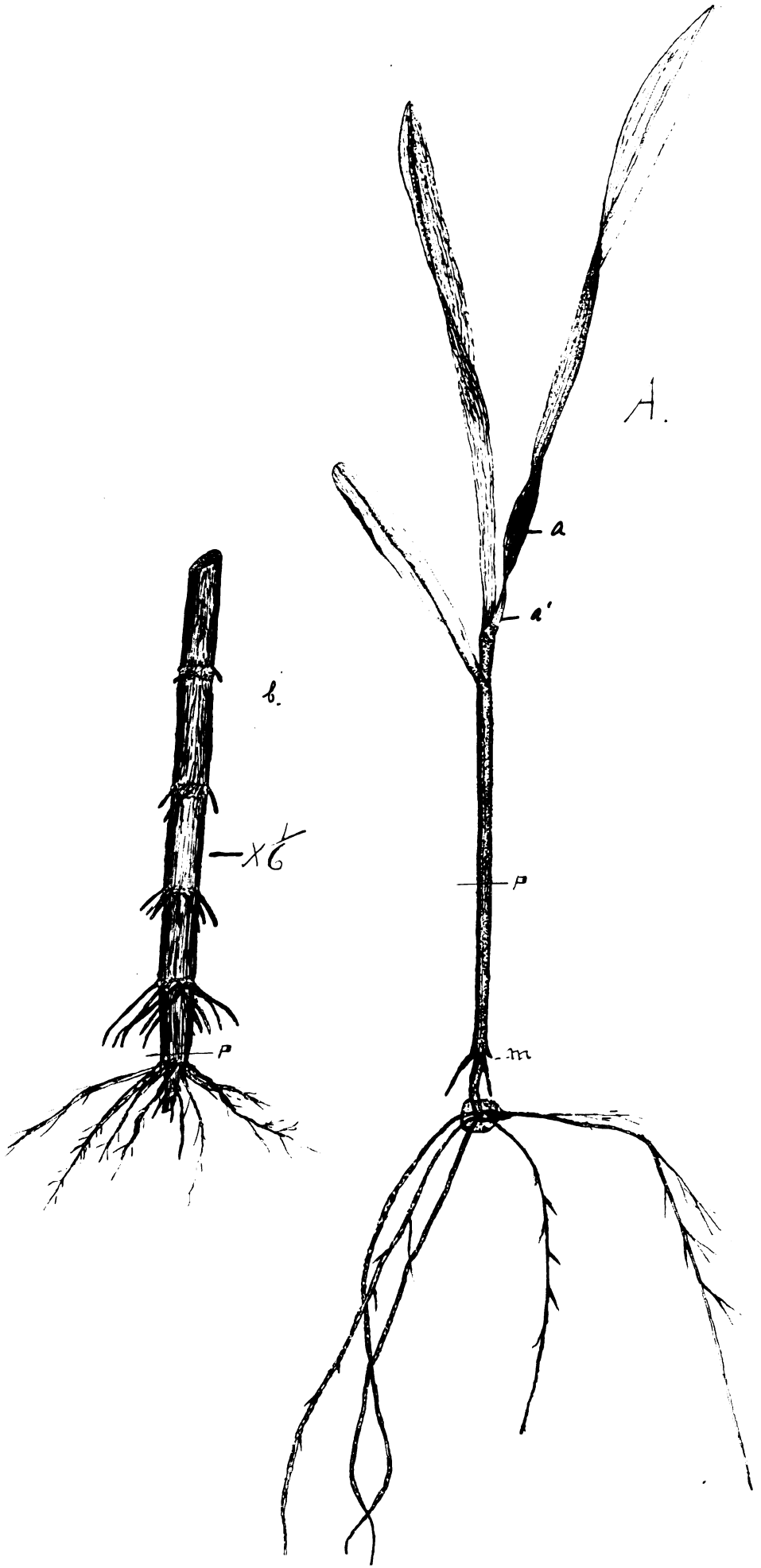
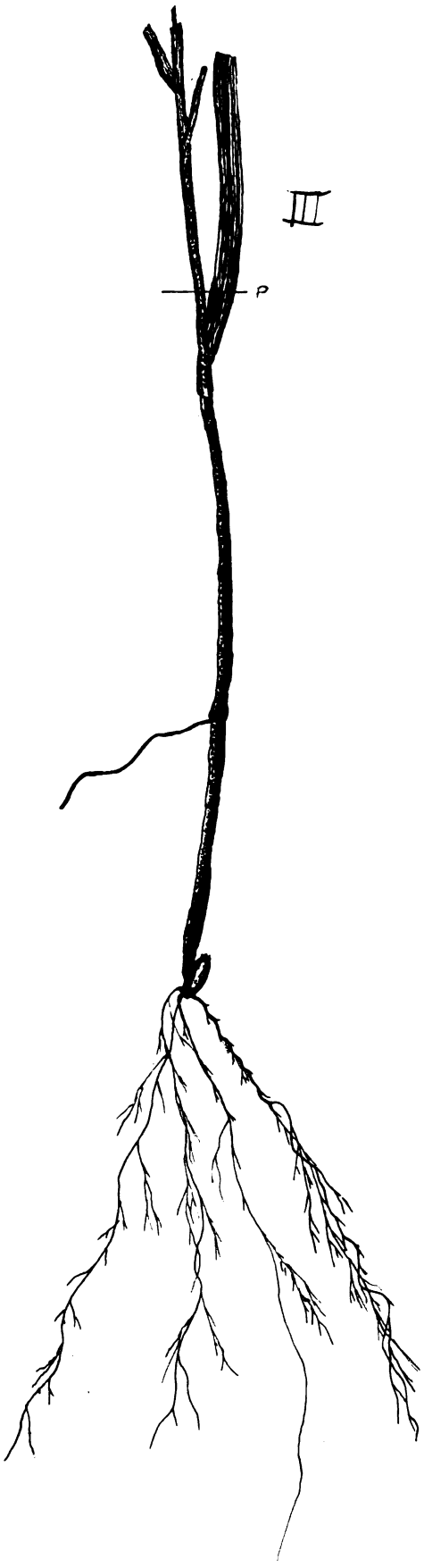
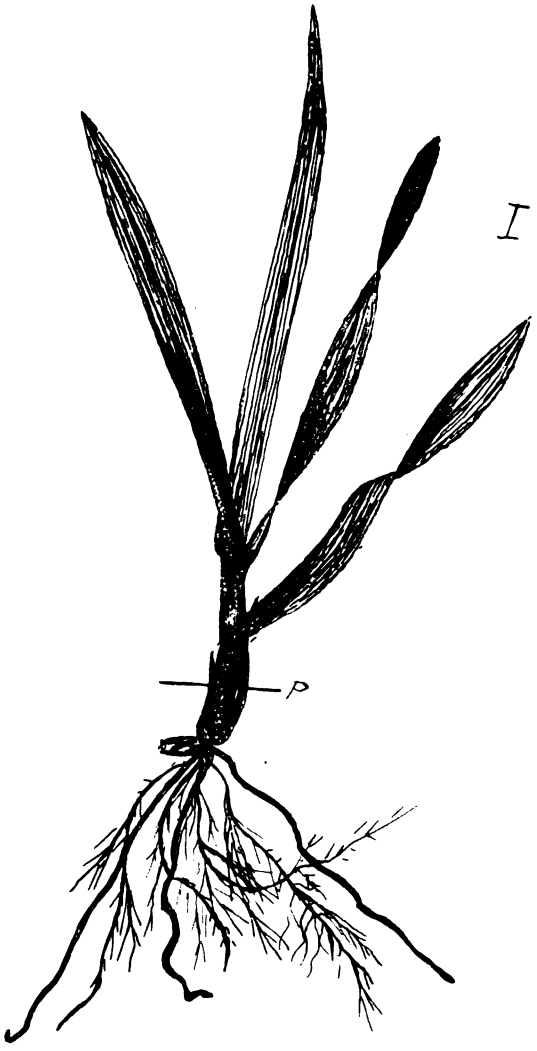
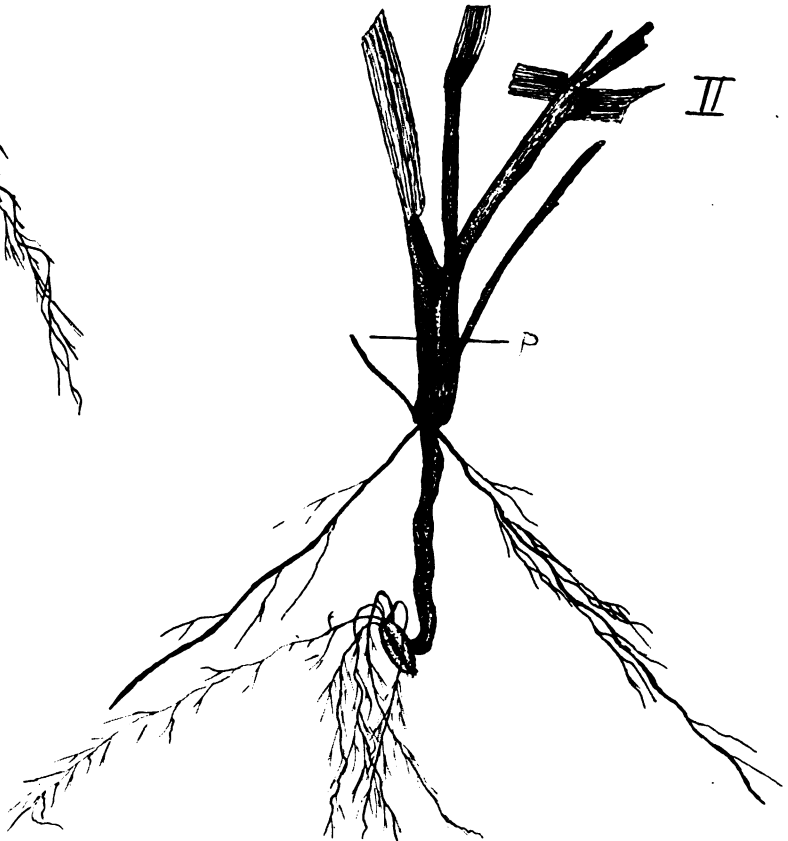
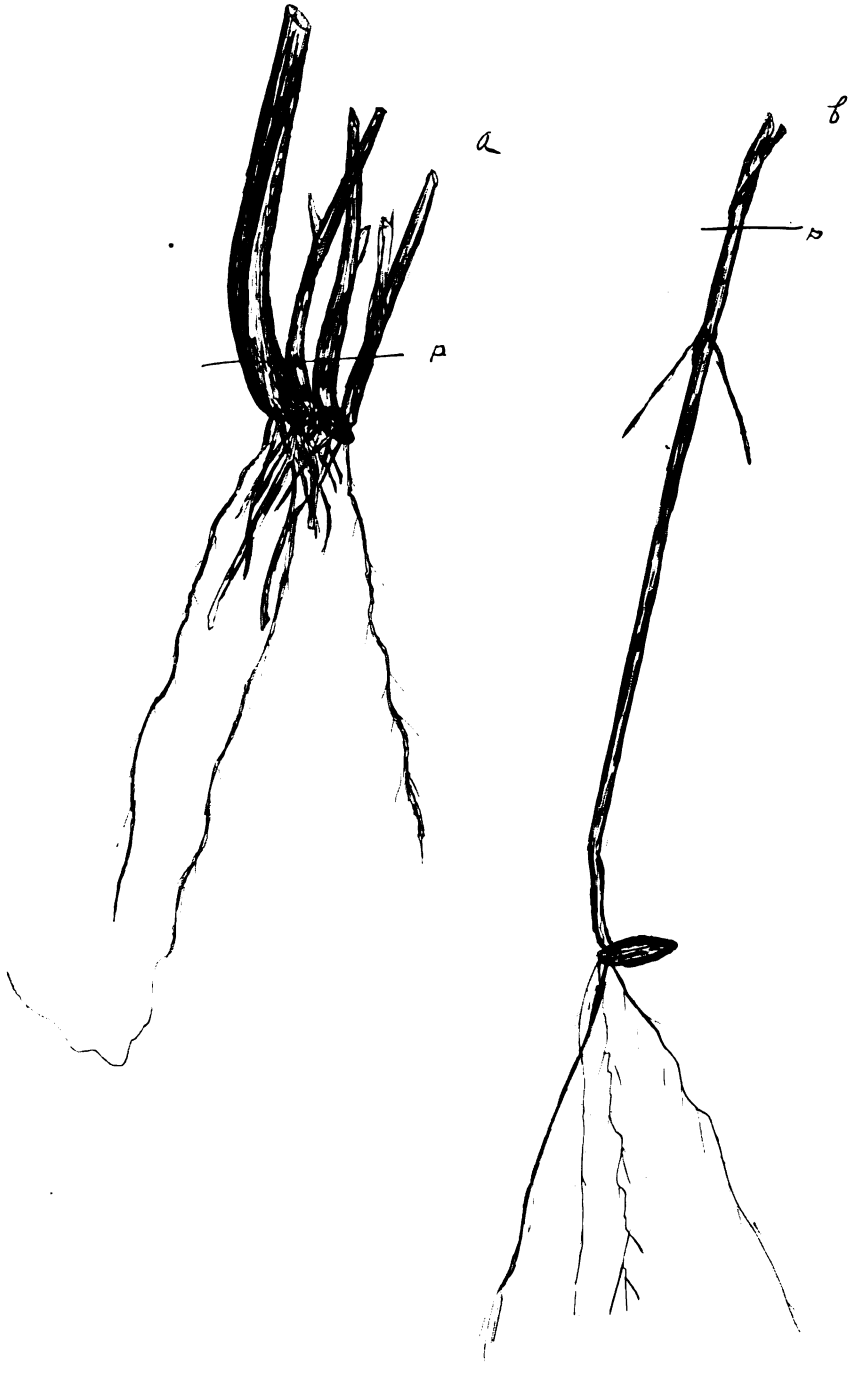


Plate III.





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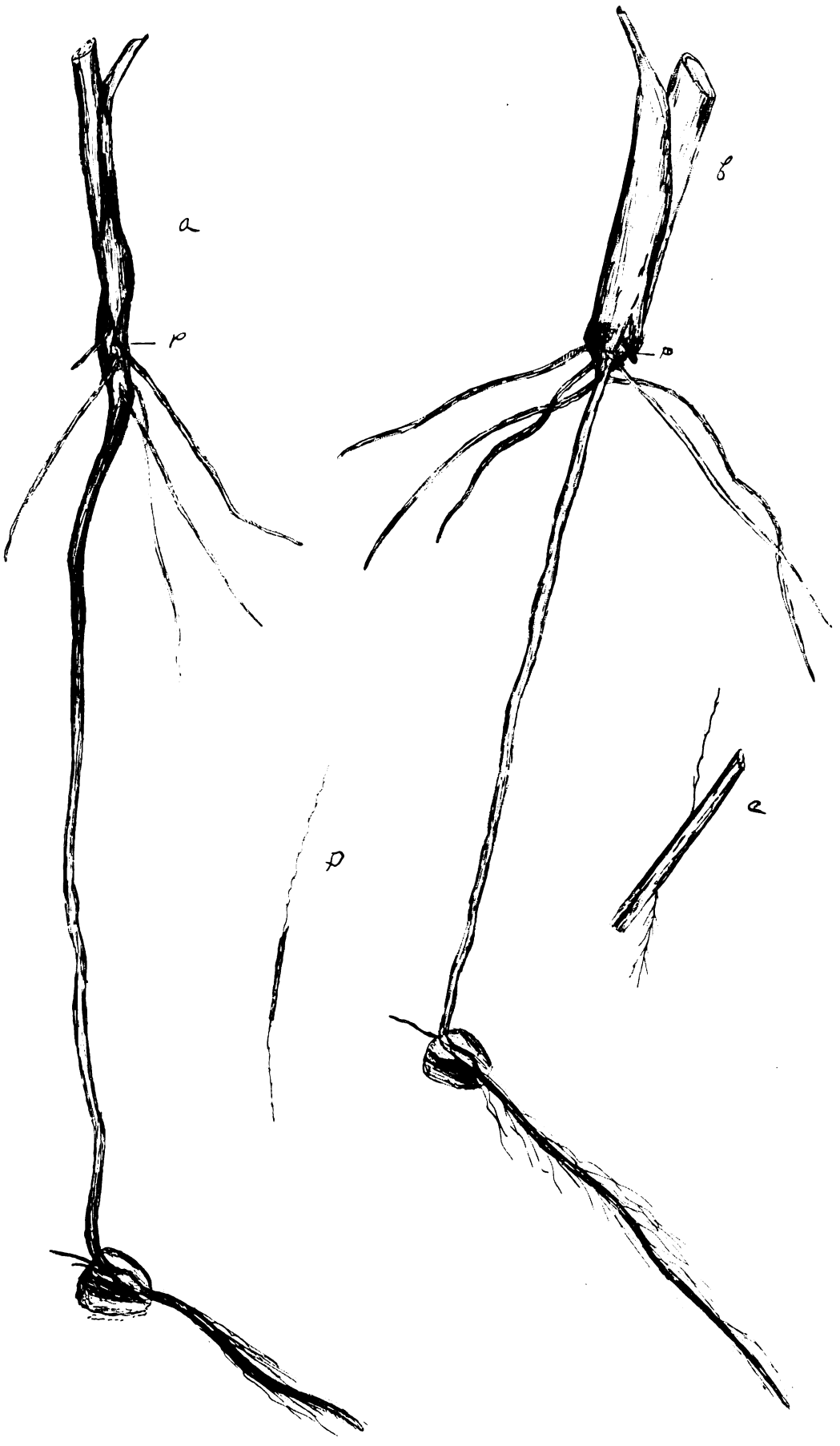

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