

On examining the leaves microscopically we find that the epidermis of the upper surface consists largely of triangular or polygonal cells, radiating from the numerous oval stomata. The epidermis of the lower surface bears no stomata, but in the centre of each radial system is a rounded cell with abundant protoplasm, which much resembles the mother-cell of a stomate. The lower epidermic cells are considerably larger than the upper ones.

A cross-section of a leaf shows; -

(1) The upper epidermis with stomata;

(2) Several rows of palisade-cells, which become rounded and irregular below. Among the palisade-cells are large air-chambers, which communicate as usual with the stomata.

(3) The lower mesophyll, consisting of large cells with irregular and extensive air-spaces;

(4) The lower epidermis with occasional jointed hairs;

(5) The vascular bundles, enclosed in prominent ribs upon the lower surface. In the larger ribs the bundles are associated with spongy, air-filled tissue. Into the larger air-spaces of the ribs and lower mesophyll, branched hairs, like those of other Nymphaeaceae, project.

At intervals of $\frac{1}{16}$ to $\frac{1}{8}$ of an inch as a rule, but with no great regularity, are found the pores already mentioned. In the



neighbourhood of a pore the air-spaces of the lower mesophyll disappear, and the palisade-cells become closer. The leaf gradually contracts towards the pore, where it has only about half its ordinary thickness. At the pore the epidermis dips nearly vertically into the leaf, forming a pipe, which effects continuity between the upper and lower epidermis. In the neighbourhood of the pores, no stomata are formed, and it is not difficult to find pieces half an inch in diameter altogether devoid of stomata. In such tracts a peculiar modification of the upper epidermis is found. The radial grouping of the cells, though irregular, can still be discerned. But the central cell of each complete radial system is wanting, and in its place is a cavity, which as far as the minuteness of the parts enables us to judge, leads into the interior of the leaf. These vacuities of the upper epidermis appear to be potential, but undeveloped pores.

