

THE AIR CAVITIES OF EQUISETUM AS WATER RESERVOIRS.

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It is seldom that cavities in vegetative organs serve as reservoirs for holding water. Schimper found that the large intercellular cavities in the swollen spindle-shaped petioles of an epiphytic Aroid, *Philodendron cannifolium*, are filled with slimy water in wet weather. He also noted that the water gradually disappears from the cavities during a dry period.

Westermaier* described the cavities of *Equisetum hyemale* and *E. telmateja* as being full of water in winter and thought that the same condition might be found in summer also. Although Westermaier reported his observations in 1884, this interesting condition in *Equisetum* does not seem to be generally known.

While walking through a deep ravine near Zürich, Switzerland, the past winter, I found a large patch of *Equisetum hyemale* in which to my surprise the cavities of the aerial stems were all turgid with water. The central cavities as well as the vallecular and carinal cavities from the lowest to the highest internodes were filled, and this was true for both old and young shoots. In many the water was frozen, especially in the lower joints.

Some plants were pulled up and taken into my living room and by the end of the fourth day the free water had entirely disappeared from the cavities. During January numerous observations were made. Usually the plants were found with cylinders of ice in the central and outer cavities. On January 14, most of the plants examined had little or no water in the central cavities but the vallecular cavities mostly contained cylinders of ice. Favorable plants were taken home and the bases placed in water. In nine days there was still some water in the lower parts of the central cavities of the middle internodes, but above and below the cavities contained air only. Plants with pieces of rhizome still had a little water in the bases of the central cavities on the thirteenth day, but at this time shoots without rhizomes contained air only.

During the middle of May observations were made at Columbus, Ohio, on *Equisetum robustum* but even after a heavy rain, plants growing in very wet places showed no free water in any of the cavities. If the two species act similarly in this respect, it would seem that the water is present only during the cold period of the year and probably has some physiological connection with

* WESTERMAIER, M. Untersuchungen ueber die Bedeutung todter Roehren und lebender Zellen fuer die Wasserbewegung in der Pflanze. Sitz. d. K. Preuss. Ak. d. Wiss. zu Berlin. 1884: 1105-1117.

the plant in relation to cold and freezing. The water is probably excreted by the cells surrounding the cavities, the membrane lining the central cavity being especially characteristic. It is white and very tough and can easily be removed unbroken from the rest of the tissue.

The Equisetums thus make an exceedingly interesting group for field study in the winter and it might be worth while to make observations on all of our native species.
