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The Staminate Flower of Elodea

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THE STAMINATE FLOWER OF ELODEA.

BY ROBERT B. WYLIE.

Vegetatively Elodea is perhaps the best known of the submersed seed plants, as it is so commonly employed in the laboratory for experiment and study. The flowers, however, have received proportionately less study since they are small and inconspicuous and seldom appear in the usual laboratory aquaria. The purpose of this paper is to call attention to an unusual form of staminate flower recently noted.

While the flowers in this genus are usually functionally dioecious they are of special interest in that the suppressed parts are nearly always present in rudimentary form and the separation of the sporangia is doubtless correlated with their adjustment to the aquatic environment. They are unquestionably quite recently derived from perfect flowers. They present an ingenious solution of the problem of pollination since the minuteness of the flowers enables them to use the surface film of water to good advantage.

The pistillate flowers of Elodea, as is well known, are regularly elongated, and reach the surface, if at all, through the lengthening of that part of the flower between the ovary and floral parts. This "floral-tube" of the epigynous flower may attain to a length of 10-15 centimetres though having a diameter of only a fraction of a millimetre. The staminate flower, on the other hand, employs an entirely different method of reaching the surface of the water. These ordinarily do not elongate, or but slightly, and remain until fully developed within the sessile globose spathe. At maturity the stem or pedicel weakens, the flower escapes from the sheath, and rises to the surface of the water, there scattering the pollen. My observations have led me to think that the detachment and rapid rise of these flowers and their bursting open as well is greatly facilitated by the bubbles of gas that form at their tips buoying them up like balloons tugging at their anchorages.

During the summer of 1909, in connection with work at the Iowa Lakeside Laboratory, the writer noted an unusual form of staminate

flower on the Elodea plants growing in the upper end of East Okoboji Lake. These plants flourish most luxuriantly in the waters near the town of Spirit Lake, and every one of the hundreds of flowers examined displayed the same peculiarities, seeming to indicate a distinct strain of this genus in that locality.

The flowers under discussion displayed a form and habit markedly different from described types in that they elongated similarly to the pistillate flowers. The lower portion of the spathe early appears contracted giving it a stalked appearance, and this may be the condition described as "spathe peduncled" by Rydberg\(^2\) in his description of Philotria Planchonii (Casp.) Rydb. and P. linearis Rydb, though the spathe is of course really sessile. The outer end of the spathe expands abruptly into a flattened, circular, cleft portion which loosely invests the body of the flower which is truly pedicillate on an axis within the spathe. At maturity the axis elongates pushing the flower out through the cleft in the spathe and upwards toward the surface of the water. The stamens and floral parts are thus carried up on a slender stalk looking very much like that of the pistillate flower. But while these habits are biological equivalents and the parts concerned look much alike the morphology of the structures involved is very different. The "floral tube" of the pistillate flower represents that complex of structures found above the ovary in epigynous flowers, while the elongated thread in the staminate flower is the pedicel.

The flower has usually a bubble of gas tugging at its apex, and in some instances it was noted that the attached flower had partly opened into this gas chamber. Sooner or later the weakened axis usually gives way and if the flower has not already reached the surface it rises and sheds its pollen on the surface film. The break occurs near the base, generally within the spathe, and the free floating flowers have each a long thread trailing behind. These become entangled and where the plants are numerous the empty flowers form windrows at the margins of the open water.

The degree of elongation in these staminate flowers is fully as great as in the pistillate flowers, and the lengthening of the axis is due to the stretching out of cells formed at an earlier stage. A measurement of these stalk cells at different stages showed that they increase in length nearly twenty-five times, this being accompanied by a slight decrease in breadth. These flowers show other structural differences which may not be taken up at this time.

In brief, this form displays a type of flower and a mode of pollination apparently not hinted at in previously described species and offers the sharpest contrast to the habit of releasing the pollen bearing flowers without elongation. Biologically this trait is of interest as suggesting two unlike and probably independent types of evolution in this genus in the efforts of this plant to meet the difficulties of pollination in its habitat. The first and simpler, and doubtless the more primitive, is seen in the short-stalked flowers that come to nothing unless detached. The second and probably derived condition is seen in the attempt, often successful, to reach the surface by elongation of the axis, the plan regularly employed by the pistillate flower. The subsequent detachment of the staminate flowers may be due to the breaking down of tissues in the now useless structure.

The pistillate flower and the vegetative body conform more nearly to the described species, but in both departures were noted from the common type. In the opinion of the writer this form may deserve specific rank, and the name *Elodea Iowensis* (*Philotria Iowensis*) is proposed should it prove to be a new species. Further observations will be carried on this coming summer, and a more detailed description prepared in due time.