NOTES ON THE MORPHOLOGY OF PHILOTRIA.

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The study of Philotria canadensis was begun by the writer in July, 1902, with the expectation of making a careful investigation of its morphological characters.

On account of difficulty in obtaining a complete series the work was delayed and in the meantime a preliminary report on the same subject was presented at the St. Louis meeting of the American Association for the Advancement of Science by R. B. Wylie and later the paper was printed in full, Bot. Gaz. **37**: 1-22. So carefully has he worked out nearly every detail that there seems little to add to the subject except in the way of verification. Yet it is thought advisable to make a note of some of the most important points.

Material for study was collected from Sandusky Bay, Lake Erie where the plant grows more or less abundantly but blooms rather uncertainly. None of the material obtained gave satisfactory stages beyond fertilization. The staminate flowers were found on the opposite side of the Bay from the carpellate colony.

The staminate flowers were uniformly of nine extrorse bisporangiate stamens, the three center ones being more or less united by the filaments and in some cases these extended above so as to form a resemblance to a stigma. Staminodia were found also in the carpellate flowers, but these showed no traces of sporangia.

Measurements of flowers which gave the archesporial cell stage were about 4 mm. long. Opened flowers varied in length according to the distance of the stem at their origin from the surface of the water. The average length was about 100 mm. or 4 inches.

The single archesporial cell cuts off one parietal cell usually. The primary sporogenous cell is always much the larger and divides into four megaspores the lowest being the functional one. The upper one was often quite long and was usually the last to succumb to the rapidly enlarging embryo sac. The widening of the embryo sac was great in only one plane and was not very marked when sections were cut at right angles to that plane. The pouch-like form of the antipodal region was very noticeable. Miss Burr found a similar pouch in Vallisneria, Ohio Nat. **4**: 439–443. In every case three pale vesicular nuclei could be found deep in the pouch. In some cases a large brightly stained nucleus was found just above the antipodals but careful examination showed that it was either the lower polar nucleus in a typical eight celled embryo sac or else the evidence was that there had been a division of the definitive nucleus and one of the first

daughter nuclei had travelled to the antipodal region just as Schaffner finds to be the case in Sagittaria, Bot. Gaz. **23**: 252–272, and Miss Burr in Vallisneria. In the case of Philotria however, no definite wall was found cutting this nucleus off from the rest of the embryo sac. While Wylie seems to indicate in Pl. II, figs. 35-36 that there is fusion of the second sperm nucleus with the definitive nucleus it seems difficult to account for the extra nucleus in the antipodal region unless there had already been a division of the defiinitve nucleus or the polar nuclei had failed to conjugate, for in the slides which the writer examined the polar nuclei were in close contact long before fertilization and the antipodals were too vesicular to indicate the possibility of any further activity.

The synergidæ stained quite characteristically so that they were easily distinguished from the other nuclei in the embryo sac.

The pollen grains showed distinctly the tube nucleus and the crescentic sperm nuclei connected by a slender filament of cytoplasm while the four members of the tetrad still remained in close contact.