THE INJECTION OF SULFATES INTO VALONIA.

By L. R. BLINKS.

(From the Laboratories of The Rockefeller Institute for Medical Research.)

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Cells of *Valonia macrophysa*, while ordinarily free from sulfate in the vacuolar sap, occasionally are found in apparently normal state yet giving a test for this ion. In order to determine its effect directly, the following experiments were performed in Bermuda in 1924. The number of cells was small (30) but the results sufficiently definite to justify certain conclusions. The method furthermore is of interest in view of its later employment for the injection of toxic substances.

Two successive operations were employed. A small amount of sap (about 1/8 of the cell volume) was withdrawn through a fine capillary. This was removed and a second capillary inserted, containing the solution for injection. The contents were forced in under air pressure (taking care that no bubbles entered) until the cell was turgid. The capillary was removed while the pressure was still being applied.

Mortality was high due to the two punctures and the consequent temporary softness of the cell, but a small number of cells survived in both of two groups. In group A a solution of 0.6 M KCl was injected. Of these 2 cells survived and lived 2 weeks, when the experiment was discontinued. In group B a solution of 0.4 M K₂SO₄ was injected, and 3 cells survived. At the end of 2 weeks the sap was removed from all the cells and tested for sulfate ion. Group A gave no test, while group B gave a very strong one (approximately as much as the surrounding sea water). The cells were turgid and seemed normal in every respect. Hence, as far as we can judge from these experi-


2 Rapkine and Wurmser have also reported the injection of dyes into the vacuole of *Spirogyra*, using the method of Chambers as modified by the Needhams (Rapkine, L., and Wurmser, R., *Proc. Roy. Soc. London, Series B*, 1927, cii, 128).
ments, the protoplasm can tolerate a considerable amount of sulfate on the vacuolar as well as on the outer surface.

It is also evident that there is no mechanism for rapidly disposing of sulfate after it has entered. If, therefore, the cells have in the past suffered mechanical or other injury which temporarily increased the permeability of sulfates, recovery would still leave a certain amount of these in the vacuole, without subsequent injury to the cell.

**SUMMARY.**

Potassium chloride and sulfate were injected into the vacuole of *Valonia*. The surviving cells tolerated the presence of these solutions. Sulfate, although ordinarily absent from the sap, is not rapidly eliminated when introduced. Hence the sulfate occasionally found in cells of normal appearance may have entered due to temporary injury followed by recovery.