THE PENETRATION OF m-BROMO-PHENOL INDOPHENOL AND OF GUAIACOL INDOPHENOL INTO VALONIA VENTRICOSA

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This paper is a continuation of the study of the penetration of oxidation-reduction indicators into living plants of Valonia ventricosa. Two indicators have been used, namely, meta-bromo-phenol indophenol and guaiacol indophenol. The first one is the most positive of any of the indicators so far used in this series and is very readily reduced by living cells. The second one is in the region of neutrality of Clark's1 oxidation-reduction scale, between Lauth's violet which penetrates Valonia in the oxidized form, and o-cresol indophenol which penetrates in the reduced form.

The method of experimentation was substantially that described in a previous publication.2 The marine alga, Valonia ventricosa, was placed in solutions of the indicators and the sap subsequently examined as to its dye content. It was found that the first dye penetrates readily and is found in the sap in the reduced form. Even when the plants are very soft and the concentration of dye inside equals that in the external solution, thereby showing that the plants are injured, the dye in the sap is still in the reduced state. The second dye is more difficult to reduce. It was therefore of interest to see whether it would be found in the sap of Valonia in an oxidized or reduced form. This dye penetrates less readily than the other indophenol dyes, but is reduced by the plants. In a few cases, when a more concentrated solution was used, dye in the oxidized form was found in the sap, showing that it is on the border-line of oxidation-reduction in the case of Valonia.

The rate of penetration of both dyes depends upon the pH of the external solution, temperature being constant, but is greater for the first dye than for the second. In both cases the concentration of the dye in the sap of uninjured cells at equilibrium is less than that in the external solution.

Spectrophotometric analyses of the dye penetrating into the sap show that the dye has not been altered chemically in penetrating; that the wave length of maximum absorption in each case coincides with that for the dye in the external solution.

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