SOME PHYSICAL AND CHEMICAL PROPERTIES OF THE CELL SAP OF HALICYSTIS OVALIS (LYNGB.) ARESCH.

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(Accepted for publication, May 10, 1932)

During the summer of 1929, at The Hopkins Marine Station, at Pacific Grove, California, the following brief study was made of some of the physical and chemical properties of the cell sap of *Halicystis ovalis* (Lyngb.) Aresch. This was done in connection with a more extensive study by the writer on its morphology and reproduction which has, in part, been already reported by Dr. G. M. Smith (1930).

The specific gravity of the sap was determined by means of a small pyknometer drawn to a fine capillary for insertion through the cell wall of the plant. The latter was carefully cleaned and dried at the point of insertion and the sap of only one plant was used in each determination.

Determination of cell flotation was possible because occasionally plants could be severed from the *Lithothamnion* on which they grow without rupturing the cell wall at the point of attachment and without loss of turgor. These isolated cells sink readily in sea water in contrast to those of the Bermuda species (Blinks, 1927; 1929–30) which float. By varying the concentration of the solution in which they were immersed, a solution was obtained in which the plants were just suspended. It is interesting in this connection that the plant is able to withstand slight changes in the salinity of the water (0.46 to 0.55 molar) without apparent ill effects.

Barger's method was employed in determining vapor tension. This was by means of a capillary tube in which a small drop of the sap was placed between two similar drops of NaCl solution of a known concentration, the ends of the tube being sealed with oil. A concentration of the salt solution was finally found with which there was no change in the size of the drop of sap observable under a low power magnification with the use of an ocular micrometer. The method gives only approximate results.

In chloride determinations a small pyknometer was again employed to get a known volume of the sap from a single plant. Volhard's method of determination was used, adding excess $AgNO_3$ and titrating the excess with KCNS, using $Fe_2(SO_4)_3(NH_4)_2SO_4$ as an indicator.

Sulfate was determined as $BaSO_4$ by means of a small weighing bottle with a fused glass filter after precipitation with excess $BaCl_2$.

The pH was determined with brom cresol purple and brom cresol green.

The chief results are as follows:

Specific gravity (25°C.)
- *Halicystis* cell sap (average of four samples)..... 1.0257
- Sea water at Pacific Grove (average of three samples)..... 1.0258

Flotation (expressed as specific gravity) of total cell
- Average of three vegetative plants..... 1.0265
- Average of two plants in reproductive stages..... 1.0275

Vapor tension about equal to that of 0.60 M NaCl and practically identical with that of sea water at Pacific Grove (= 0.606 M*).

Chloride content
- Average of three vegetative plants.....1.926 per cent or 0.543 M
- One plant recovering from a reproductive period.....1.933 per cent or 0.545 M
- Average of six plants in reproductive stages..1.978 per cent or 0.558 M
- Sea water at Pacific Grove (average of three samples)..... 1.851 per cent or 0.523 M

Sulfate content
- *Halicystis* sap (average of two samples of several plants each)..... 0.013 per cent or 0.00135 M
- Sea water at Pacific Grove (one sample)..0.279 per cent or 0.029 M

pH
- *Halicystis* sap..... 5.4
- Sea water at Pacific Grove..... 8.15*

Index of refraction
- The N_d based on a number of samples ranged from 1.3384 to 1.3387 at 25°C. with little variation among different plants and practically identical with that of sea water at Pacific Grove throughout the range of temperatures studied (2.5–34.7°C.).

It may be added that Brooks (1930) has reported the K ÷ Na ratio of the sap to be 1.5.

* This study was made under the direction of Dr. L. B. Baas-Becking at The Hopkins Marine Station. The figures marked with an asterisk were supplied by him.

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