tions for *V. ventricosa* were made in fused quartz, so the errors should be smaller.

The results of these new analyses, together with former ones, are listed in Table I and presented graphically in Fig. 1. The striking dissimilarity between *Halicystis* and *Valonia ventricosa,* with which it formerly was identified, is very noticeable. The genus *Valonia,* on the other hand, falls into a natural group, although each species is distinct enough in its sap for chemical diagnosis. The *V. macrophysa* from Fort Jefferson is seen to vary in the opposite direction from *V. ventricosa* with reference to the Bermuda species. The presence in it of more sodium, as well as of measurable amounts of calcium, magnesium and sulphate, raises the suspicion of contamination or of injury. It seems possible from our experience that these cells are not healthy in the summer. They are much shorter lived in the laboratory than *V. ventricosa,* and readily form zoospores, to the destruction of the protoplasm. Their electrical conductivity is higher than that of the Bermuda species, and it is possible that there is an entrance of sea-water ions and an exit of potassium.

The amount of potassium found in *V. ventricosa* is consistently greater than in *V. macrophysa.* This is evident from Table II, which shows analyses of saps from cells exposed to varying conditions.

Grateful acknowledgment is made to the Carnegie Institution of Washington for use of the facilities of its Marine Biological Laboratory at Tortugas.

SUMMARY

Comparison is made between the saps of *Valonia ventricosa* of Florida and the Bermuda *Halicystis,* formerly known as *V. ventricosa.* An even higher percentage of potassium is found in *V. ventricosa* than in *V. macrophysa,* while *Halicystis* has been shown to have very little.

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THE PROBABLE AMOUNT OF ULTRA-VIOLET RADIATION OBTAINED INDOORS THROUGH ULTRA-VIOLET TRANSMITTING GLASS

THE recent advances in heliotherapy have led to the development of a number of ultra-violet transmitting glasses and glass substitutes which are designed to give ultra-violet radiation indoors. One of the best transmits from 50 to 60 per cent. of the solar radiation between 290 and 320 mμ when it is new and about 30 per cent. after it has aged. If it is used in a solarium there is no doubt that a patient exposed to the direct rays of the sun under it would get about as much ultra-violet radiation in three hours as he would get in one hour in the open sunshine, provided the intensity of the sunlight remained the same. But ultra-violet transmitting glass is also being sold for school and office windows, and the question arises as to how much ultra-violet radiation can be obtained in a room where it is installed. A worker indoors would not sit in the direct sunlight because of the glare and, although the illumination in a room falls off rapidly from window to wall, it is perhaps safe to assume an average illumination of ten foot-candles. One would like to know, therefore, how much ultra-violet radiation reaches a point inside where the

TABLE II
SAP CONTENT OF VALONIA VENTRICOSA

	A		B		C		D		Av.: B, C, D
	Molar	Per cent.	Molar	Per cent.	Molar	Per cent.	Molar	Per cent.	Per cent.
Cl + Br	0.620	100	0.588	100	0.605	100	0.697	100	100
K	0.587	94.74	0.537	91.35	0.574	94.90	0.654	93.85	93.37
Na	0.35	5.73	0.057	9.70	0.038	6.28	0.046	6.60	7.53
Ca	Trace	....	0.0007	0.12	0.0006	0.09	Trace	....	0.11
Mg	Trace	....	0.0003	0.05	0.0002	0.03	Trace	....	0.04
SO_4	Trace	....	Trace	....	Trace	....	Trace	....	....
	Freshly gathered June, 1927.		Three weeks in changing sea water. August, 1926.		Three weeks in closed bottle of sea water. Aug., 1926.		Collected Aug., extracted Nov. 23, 1926, at New York. Sea water unchanged and slowly evaporating to about 85 per cent. of original volume.		

TABLE I

Date	Minutes to give 1 unit of ultra-violet radiation		Foot-candles illumination		Units of ultra-violet radiation in 2 minutes direct sun	Time (hours) to give same number of units 5 meters from north window
	direct sun	hemisphere north sky	hemisphere north sky	5 meters from north window		
Mar. 5	2.3	10.4	324	9.5	0.87	15.4 hours
6	1.8	9.0	391	10.0	1.10	19.4
8	2.0	9.5	372	10.0	1.00	17.7
April 2	2.3	10.1	429	9.5	0.87	19.8
13	1.4	6.2	410	9.6	1.43	19.0
18	1.9	8.0	400	10.0	1.05	16.8
May 2	1.3	5.0	477	11.5	1.54	16.0
14	1.3	5.0	620	19.0	1.54	12.5
24	1.3	5.2	763	22.0	1.54	14.0

illumination is ten foot-candles, through windows of an ultra-violet transmitting glass. The amount is so small that it is probably impossible to measure it directly, but the results of a few indirect measurements are given below.

A large room on the seventh floor with a north exposure was chosen for the measurements. By means of a Macbeth Illuminometer the foot-candles received on the window sill, from a hemisphere of north sky, were determined, and also the illumination in foot-candles at various points in the room. In March and April, when the illumination from the hemisphere of north sky was approximately four hundred foot-candles, the illumination in the center of the room, five meters from the window, was ten foot-candles. Since ordinary glass transmits 90 per cent. of the visible and an ultra-violet transmitting glass about 30 per cent. of the far ultra-violet radiation, only about 1/120th of the far ultra-violet radiation from the north sky would reach this point.

The ultra-violet radiation from the north sky and from direct sunlight was measured by a method published some years ago.[1] In the original method the rate of darkening of a light sensitive paint (lithopone) was used to measure the intensity of ultra-violet radiation. The method has been improved by substituting for lithopone a special C. P. zinc sulphide ground to a moist paste with saturated lead acetate. The paste is pressed flat under a piece of quartz and the time necessary to darken it to a certain shade is taken as the time needed to give one ZnS unit of ultra-violet energy. It is essentially similar to a photographic method, but the zinc sulphide darkens only with wavelengths shorter than 350 mμ and has its maximum sensitivity at 310 mμ.

In March it takes about two minutes to give one unit in direct sunlight at noon, with the zinc sulphide exposed in a box with blackened sides to protect it from stray radiation. At the same time north skylight, from a hemisphere of sky, gives one unit in ten minutes. If 1/120th of this north sky ultra-violet light reaches a point inside where the illumination is ten foot-candles it would take twelve hundred minutes or twenty hours to get one unit of ultra-violet radiation at that point. Or, in other words, if the room were equipped with ultra-violet transmitting windows, a child would have to sit in that place for twenty hours to get as much ultra-violet radiation as he would get in two minutes outdoors in sunlight at noon. Even this is probably too low an estimate, for it assumes that north skylight has as much ultra-violet energy in it all day long as it has at noon, which of course is not true. A table of data (Table I) obtained in this way, on perfectly clear days at noon, during March, April and May, 1928, shows that, although the intensity of ultra-violet radiation increases from March to May, it is still necessary to sit about fifteen hours at five meters from a north window of ultra-violet transmitting glass to get as much ultra-violet radiation as can be gotten in two minutes outdoors in direct sun at noon, although the illumination at this point has risen to twenty foot-candles. This amount is obviously too small to be of any great value. Any child going out for recess or any stenographer going out to lunch will get more ultra-violet radiation than she could get all day behind a window of ultra-violet transmitting glass. So, although these materials have an undoubted field of usefulness in solariums, and probably in animal houses and zoos, it is unnecessary to put them in schools and offices where it would be cheaper and more efficient to send the individuals concerned out into the sunshine for a few minutes every day at noon.

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[1] *Amer. Jour. Physiol.*, Vol. lxix, p. 200, 1924.