tiva cells were not found in these biopsies.

Although it is tempting to postulate that the observed difference in receptivity of cancer cell homografts between normal and cancer patients is related to cancer per se, there is no present evidence against the more plausible explanation that the difference is due merely to the general debility of the cancer patients. However, no consistent differences such as uremia, hematologic abnormalities, or medications can be adduced to explain the apparent weakness of defenses in the cancer patients. Neither did the cancer patients have an "immunologic paralysis" since they did produce antibodies against viruses that were inoculated at about the same time in experimental therapeutic studies. Further studies designed to detect possible differences in cellular and humoral defense mechanisms are in progress.

CHESTER M. SOUTHAM
ALICE E. MOORE
CORNELIUS P. RHOADS
Division of Experimental Pathology, Sloan-Kettering Institute for Cancer Research, New York, New York

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4. We, as well as our collaborators, wish to express our appreciation of and admiration for these volunteers, both cancer patients and normal individuals, who, without expectation or possibility of personal gain, have made these studies possible.
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Exchange of Sodium Ion in Ulva lactuca

The exchange of potassium between the cells of the green alga *Ulva lactuca* and the surrounding sea water has been measured previously, using K^{42} as a tracer (*1*). Supporting the evidence previously presented that two separate mechanisms are concerned with sodium and potassium regulation in the organism are the data presented here, which reveal that the kinetics of sodium exchange are entirely different and much more rapid (*2, 3*).

Ulva collected from Perch Pond, near Falmouth, Mass., was conditioned for at least 24 hours in running sea water under incandescent illumination. Disks 1¾ in. in diameter were cut from a single frond and brought to the correct temperature shortly before each experiment was started. The disks were dipped in sea water containing tracer concentrations of Na^{24} of about 0.5 to 1.0 mc/lit. Then the disks were rinsed in two changes of isotonic sucrose for a total of 30 seconds and blotted three times in absorbent tissue to remove all extracellular potassium and sodium.

Water loss previous to counting was prevented by placing a sheet of parafilm over the counting planchet; counting was done under a Geiger-Müller end-window counter. Cellular sodium was extracted by heating with 1*N* HNO_3 at 110°C for 2 hours. The extracts were then made up to volume in 50-ml volumetric flasks and analyzed for sodium with the Beckman flame spectrophotometer. Samples of sea water (1 ml) were dried in the counting planchet containing a disk of thin paper and moistened to approximate closely the moisture present in a disk of *Ulva*. Specific activities were calculated according to the formula

$$\text{Specific activity} = \frac{\text{counts/min}}{\text{meq/sample}}$$

The data show that after 10 seconds the specific activity of the alga is 92 percent of the specific activity of the sea water when the temperature of the run is 20°C, and after 20 seconds at 1.0°C (Fig. 1). Previous experiments have shown that all extracellular sodium and potassium are removed by the sucrose rinse within 3 seconds (*4*). Other experiments indicate that there is substantially no loss of activity after 30 seconds compared with 15 seconds in sucrose, and only an 8 percent loss after 60 seconds in sucrose. Hence all extracellular sodium must be removed by the sucrose rinse and the triple-blot procedure. It was found also that there is no loss of sodium in the cold.

The presence of the metabolic inhibitor phenylurethane in the radioactive sea water in which the algal disks were dipped had no appreciable effect on the rate of exchange at 20°C. Uranyl ion, which is heavily and preferentially adsorbed on the surface of yeast cells (*2*) also had no appreciable effect on the rate of exchange at 20°C when it was present in a bicarbonate-free artificial sea water containing the Na^{24}.

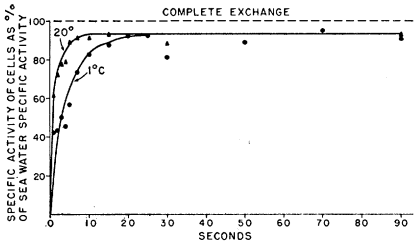

Fig. 1. Exchange of sodium ion in *Ulva lactuca*. Each point represents an average of three samples.

The turnover of sodium as found for *Ulva* is exceedingly more rapid than that found for erythrocytes, requiring only 5 seconds in *Ulva* for 88-percent exchange as compared with 30 hours in human erythrocytes (*5*). In resting giant axon of the squid, complete exchange of sodium takes place in 20 to 30 minutes (*6*).

The existence of a metabolic pump for sodium has been demonstrated for *Ulva* (*4*); its participation in this exceedingly rapid exchange of the majority (92 percent) of sodium is improbable. The data suggest, however, the presence of a small second compartment for sodium, which is presumably within the cell rather than at the surface. Within 90 seconds, temperature caused no determinable difference in the exchange rate of sodium in and out of this second compartment.

GEORGE T. SCOTT, ROBERT DE VOE,
HUGH HAYWARD, GARY CRAVEN
Department of Zoology, Oberlin College, Oberlin, Ohio, and *Marine Biological Laboratory, Woods Hole, Massachusetts*

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