posed with the formation of ammonium. We have observed no marine bacteria which require urea for their growth.

CLAUDE E. ZOBELL
CATHARINE B. FELTHAM
SCRIPPS INSTITUTION OF OCEANOGRAPHY
UNIVERSITY OF CALIFORNIA
LA JOLLA, CALIF.

A GROWTH-INHIBITING SUBSTANCE IN LETTUCE SEEDS[1]

LETTUCE seeds which fail to germinate on moist blotters at 25° C. in the light may be germinated at this temperature by placing the seeds on moist absorbent cotton or in water.[2] The increased germination obtained by this method suggests that the promotion of germination may be due to the exit of an inhibiting substance which diffuses from the seed into the aqueous medium. If an inhibiting substance is formed during the process of germination then the repeated placing of seeds in contact with the same substratum should cause a gradual reduction in the percentage of germination. The germination tests that have been made on cotton and in water to test this hypothesis show that lettuce seeds do form a substance of unknown nature which diffuses from the seed, and if present in sufficient quantities prevents germination.

The inhibiting material is formed most readily by freshly harvested seeds of the white-seeded varieties of lettuce which tend to go into dormancy at 25° C. Big Boston lettuce seeds which germinated 3 per cent. on moist blotters at 25° C. in the light germinated 80 per cent. when placed on moist cotton. The percentage of germination upon this same cotton medium was reduced to 5 per cent. after five lots of 100 seeds each had been in contact with the medium over a period of 10 days. In like manner germination in a shallow layer of water was completely inhibited after 600 seeds had been in contact with the medium. When the water from a similar inhibiting medium was used to moisten a freshly prepared cotton substratum the germination of lettuce seeds upon the cotton was reduced from 80 per cent. to 10 per cent. A saturated medium which inhibited the germination of Big Boston seeds at 25° C. failed to prevent the germination of Black Seeded Simpson seeds of the same age, which indicates that the physiological condition of the seed is a factor in determining the response made by seeds to the inhibiting substance.

The increased germination of lettuce seeds in the light indicates that light may promote the diffusion of the substance from the seeds, and although light may accelerate the process, tests have shown that an inhibiting substance passes from the seeds in total darkness. A cotton medium upon which 600 new crop lettuce seeds had been in contact for a period of 10 days in the dark, and then used as a substratum for germination in the light completely inhibited the germination of one-year-old Big Boston seeds. When this cotton medium was washed in water and then used as a substratum a similar lot of seeds germinated 98 per cent.

The age or more specifically the physiological condition of the lettuce seed is a factor influencing the formation of the inhibiting substance, and is also a factor in determining the response made by seeds when placed in contact with a saturated substratum. The inhibiting substance is formed most abundantly by seeds immediately after harvest and in smaller amounts or not at all in old seeds, and appears to be in some way associated with the dormant condition which develops in the seeds when placed at unfavorable temperatures for germination. The marked increase in germination obtained in the light indicates that light may facilitate the passage of the inhibiting material from the seed. The response to light is complicated by the fact that the dormant condition in light-sensitive lettuce seeds can be broken by placing the seeds in an atmosphere that is saturated with water vapor and giving them an exposure to light. The latter response may take place in swollen seeds within a few seconds and without the presence of water in the form of a film surrounding the seed which precludes the possibility of any substance diffusing from the seed. The fact that the material may pass from the seed in total darkness indicates that the function of light is to prevent or break the stable condition of unknown nature which characterizes seeds in secondary dormancy.

A. L. SHUCK
NEW YORK STATE AGRICULTURAL EXPERIMENT STATION

[1] Approved by the director of the New York State Agricultural Experiment Station for publication as Journal Paper No. 53, October 24, 1934.

[2] A. L. Shuck, *New York State Agr. Exp. Sta. Tech. Bul.* No. 222, 1934.

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