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Rôle of Bacteria in Decomposition of Plant and Animal Residues in the Ocean.

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A study has been made of the decomposition of marine zoöplankton and of certain marine algae by bacteria in sea water and in marine mud. The formation of carbon dioxide and the liberation of nitrogen in the form of ammonia were used as measures of the rate of decomposition. It was found that the chemical nature of the material has a very important influence upon the rapidity and nature of its decomposition.

Zoöplankton, consisting largely of copepods, and containing 7.9% total N on a dry basis, was found to decompose very rapidly, both in the water and in the mud. Nearly one-third of the total C was liberated as CO_2 within 19 days' incubation, while a large part of the N was liberated as ammonia. A marked difference, however, was observed in the case of the medium in which the decomposition took place, namely, although the amount of N liberated was about the same in the water and in the mud, viz., 40.3 and 38.5 mg., a considerably greater amount of CO_2 was evolved in the mud than in the water, viz., 101 vs. 64 mg., above controls. This difference may be due to the fact that while the nitrogenous constituents of the zoöplankton decompose alike in water and in mud, some of the nitrogen-poor or non-nitrogenous complexes are decomposed more rapidly in mud than in water, probably due to the presence in mud of specific bacteria capable of attacking them.

For the decomposition of the algal material, *Ulva lactuca* and *Fucus vesiculosus* were employed. The decomposition of these substances, also, was quite different in water and in mud media; in Ulva, which contained 1.67% N in the total dry material, there was as much decomposition in water as in mud medium, as shown by the CO_2 liberated, viz., 83.4 and 101.8 mg. C. This was accompanied by the accumulation of small amounts of ammonia, viz., 5.2 and 4.1 mg., respectively, above controls. In the case of the Fucus, which contained only 0.86% N, there was very little decomposition in the water, while considerable decomposition took place in the mud, viz., 10.4 and 85.8 mg. C as CO_2, respectively. The reason for this is very easy to find, when one observes that no N was liberated as a

result of the decomposition of the Fucus material by the bacteria. Since the N content of Fucus is very low, considerably less than is needed by the bacteria to bring about its decomposition, the amount of available N proved to be the limiting factor in the extent of decomposition of the Fucus by the bacteria. Since the decomposition of the humus in the mud results in the liberation of small amounts of N in an available form, the bacteria are thus enabled to bring about a considerably greater decomposition of the Fucus in the mud than in the water. This assumption was found to be correct, when, on adding small amounts of N in the form of ammonium salts or nitrates to the sea water, a great increase in the decomposition of the Fucus material took place. It is also possible that mud harbors certain bacteria which are not present in the water and which are able to decompose some of the specific carbohydrates present in the Fucus.

The nature of the organic residues in the sea may thus exert an important influence upon the amount of available N present at any one time in the sea water.

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Influence of Hyperpyrexia on Velocity of Blood Flow.*

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The radiotherm permits the study of hyperpyrexia uncomplicated by infectious disease. The body temperature can be raised or lowered at will. The radiotherm subjects the patient to the field of a high frequency radio oscillator and thereby induces hyperpyrexia (Hosmer,[1] Carpenter and Page[2]). The technique has been described fully by one of us (Bierman[3]).

The recent literature has been reviewed by Cheer,[4] Bazett,[5] and

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5 Bazett, H. C., *J. Am. Med. Assn.*, 1921, **97**, 1271.