rats under the conditions obtaining in New Bedford were bearing at the rate of from three to four litters per year.

Limitation of numbers in nature is thus seen to be accomplished by a restriction of the reproduction rate as well as through the action of natural enemies. In other words, a physiological limit is imposed probably through the influence of nutrition. Trapping or poisoning merely serves to increase the available food supply for survivors.

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VITAMIN B

Now that the vitamin originally known as "Vitamin B" has been definitely shown to be made up of at least two other vitamins, this laboratory has devised a method of separating these vitamins from each other and thus leaving them in a liquid form which can be easily used.

When these two fractions are fed alone and separately from the basal diet there is only a slight stimulation of growth for two or three weeks and then a gradual decline, but when the two are fed together there is a moderate rate of growth. This rate of growth, however, is not what one expects from the amount used (equivalent to 1.0 gm of original yeast daily) nor is the rate of growth comparable to that produced by the original yeast. In looking about for an explanation it was thought that possibly the yeast-residue contained the missing factor. A check lot of rats was given this yeast-residue, but instead of a good growth there was slight growth for about two weeks and then a decline and death. However, when these two other vitamins were added to the yeast-residue and the same fed to rats, excellent growth resulted. This new substance found in the yeast-residue after the two other vitamins have been removed meets all the definitions of a vitamin. It appears to be thermostable, and insoluble in water. It activates the two other vitamins of the vitamin-B complex and causes a greater growth than the two alone.

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WHAT IS OSMOSIS?

THE recent edition of the text-book of General Botany by Holman and Robbins states:

> The word osmosis has been given such a variety of meanings by those who have used it that it has lost any precise meaning whatever. As far as possible we shall avoid its use.

That it has been badly used, or rather misused, is evident, but should it be abandoned for this reason? The word is applied to a very definite physical phenomenon and has an exact meaning regardless of whether it has been misused or not.

Examination of standard text-books of botany reveals the source of the present status of the term. A single illustration will suffice. One widely used text states:

> Diffusion through a membrane is osmosis. When two fluids (liquids or gases) of different densities are separated by a porous membrane, diffusion through the membrane will take place until equilibrium results. The diffusion will be more rapid from the less dense to the more dense fluid.

The use of the term *dense* in this connection is meaningless. Students usually interpret it in terms of viscosity, a condition unrelated to osmosis. If it be considered to mean specific gravity then again the definition will not account for the direction of movements of all materials, for the dissolved salts of an egg, to use the illustration given in connection with this definition, will diffuse out into the water in which the egg is immersed at the same time water diffuses in. In this case, however, the movement is from the egg or "denser" medium, to the water or "less dense" medium. Therefore, the "law" is not applicable and consistent for the relatively simple example used to illustrate the process.

Any discussion introducing such terms as "dense solution," "less dense solution," "weaker solution," "stronger solution," and similar descriptions of the concentration of materials in a solution is entirely misleading and can but cause confusion.

A clear statement of the principles involved should remove all possibility of misunderstanding and restore to usage a term too important to be discarded.

In the first place osmosis follows the simple law of diffusion in that the direction of major movement of any material is determined by the concentration, *i.e.*, the number of molecules or ions of that material. The general direction of movement is always from a region where the diffusing material is higher in concentration of particles. The particles of the diffusing material are moving in *both* directions through the membrane, but more are moving away from the position in which most are found than are returning.

Materials move independently of each other, no matter how heterogeneous the solution in contact with the membrane may be. In no case are the diffusing particles dependent on the movement of water or any other material for their own movement.

Osmosis, then, can be defined briefly and accurately as diffusion through a membrane, the direction of