

CHAPTER XVII

VITAMINS

§1. Introduction. In addition to oxygen, water, proteins, fats, carbohydrates and certain inorganic salts, a number of organic compounds are also necessary for the life, growth and health of animals (including man). These compounds are known as the "accessory dietary factors" or *vitamins*, and are only necessary in very small amounts. Vitamins cannot be produced by the body and hence must be supplied. Vitamin D, however, may be supplied in food or may be produced in the skin by irradiation (ultraviolet) of sterols.

Many vitamins have now been isolated and their structures elucidated. As each vitamin was isolated, it was named by a letter of the alphabet, but once its structure had been established (or almost established), the vitamin has generally been renamed (see text).

The vitamins have been arbitrarily classified into the "fat-soluble group" (vitamins A, D, E and K), and the "water-soluble group" (the remainder of the vitamins).

A number of vitamins have already been dealt with in various chapters dealing with natural products with which these particular vitamins are closely associated chemically, *viz.* vitamins A₁ and A₂ (§7. IX), vitamin C (§11. VII) and the vitamin D group (§§6, 6a, 6b. XI). This chapter is devoted to a number of other vitamins (see the reading references for further information).

From the point of view of chemical structure, there is very little common to the various vitamins, but from the point of view of chemical reactions, many of the water-soluble vitamins have one feature in common, and that is their ability to take part in reversible oxidation-reduction processes. Thus they form a part of various co-enzymes (see §17. XIII), *e.g.*, nicotinamide is present in co-enzyme I (diphosphopyridine nucleotide; DPN), and in co-enzyme II (triphosphopyridine nucleotide; TPN); phosphorylated pyridoxal is the co-enzyme of transaminases; riboflavin in flavin adenine nucleotide (FAD); pantothenic acid in co-enzyme A; etc.

VITAMIN B COMPLEX

§2. Introduction. Eijkman (1897) found that birds developed polyneuritis when fed with polished rice, and were cured when they were given rice polishings. Then Grijns (1901) found that rice polishings cured beriberi in man (beriberi in man corresponds to polyneuritis in birds; it is a form of paralysis). Grijns suggested that the cause of this paralysis was due to some "deficiency" in the diet, and this was confirmed by Funk (1911, 1912), who prepared a concentrate of the active substance from rice polishings. Funk believed that this active substance was a definite chemical compound, and since he separated organic bases when he prepared his concentrate, he named his "deficiency compound" a *vitamine*. It was then found that "vitamine B" was a complex mixture, and when a number of "vitamines" were obtained that contained no nitrogen, the name *vitamin* was retained for them. The name vitamin B is now reserved for the complex mixture of vitamins in this group.