Vitamin B12—evidence of design

John McEwan

Vitamins are organic compounds required by organisms in tiny amounts as nutrients. In other words, an organic chemical compound is called a vitamin when it cannot be synthesised in sufficient quantities by an organism, and must be obtained from the diet. Vitamin B12 has a recommended intake for an adult of a tiny 2 to 3 μg (micrograms) per day. It contains cobalt, and so it is also known as cobalamin, or the red vitamin, due to its bright red colour.[1] It is exclusively synthesized by bacteria and is found in the diet primarily in meat, eggs and dairy products.[2] Vitamin B12 is necessary for the synthesis of red blood cells, the maintenance of the nervous system, and growth and development in children.

Since vitamin B12 can be stored in the body, nutritional deficiency of vitamin B12 is rare. Approximately 2–5 mg is contained in the body in adults, around 50% of this in the liver. In people changing to diets low in B12, including vegans and some vegetarians, it can take over 10 years for deficiency disease to develop.[3]

The discovery and identification of the functions of B12 have been particularly fascinating. B12 deficiency causes anemia. By accident, George Whipple discovered the cure for B12 deficiency by investigating anemia in dogs. He found that feeding large amounts of liver seemed to most-rapidly cure the dogs' anemia, and hypothesized in 1920 that liver ingestion be tried for pernicious anemia in humans (a form of anemia due to inadequate absorption of vitamin B12).

After a series of careful clinical studies, George Minot and William Murphy set out to find the substance in liver that cured anemia in dogs, and found that it was iron. They found further that the liver-substance that cured pernicious anemia *in humans* was something else entirely different. In 1926 vitamin B12 was identified by this coincidence. For their work in pointing the way to a treatment for anemia, they shared the 1934 Nobel Prize in Physiology or Medicine.

A Nobel Prize was also awarded to Dorothy Crowfoot Hodgkin and her team in 1956 for determining the complicated chemical structure of the molecule (figure 1).

What makes B12 particularly interesting is how it is taken up into the body from food. The absorption/transport of B_{12} from food to cells relies on four successive proteins in mammals; HC (haptocorrin), gastric IF (intrinsic factor), the IF-receptor and TC (transcobalamin).[4] Initial uptake of B12 requires binding in the stomach to salivary HC, which then serves to protect the B12 from stomach acids. Then in the duodenum (the first part of the small intestine), enzymes digest the HC and release B12 again. IF, a protein synthesized by gastric cells, next binds the B12 specifically.

Cells in the ileum (the last part of the small intestine) absorb the IF–B12 complex by a specific receptor, yet another protein. Inside the cell, the IF–B12 complex is degraded and B12 is transferred to TC, which delivers B12 around the body in the blood.[5] B12 must be attached to IF for it to be absorbed, as ileum cells only recognize the B12-IF complex, not B12 alone. It is more commonly an inability to produce or absorb IF than a low level of B12 in the diet that leads to B12 deficiency.

Therefore, absorption of food vitamin B12 requires HC, IF, IF-receptor and TC. Also required are an intact and functioning salivary system, stomach, pancreas and small intestine. Problems with any one of these organs makes vitamin B12 deficiency possible. Each of the proteins involved in B12 absorption are highly complex molecules with their own specific role, and the chance of any of these forming by random processes is miniscule! Furthermore, the irreducibly complex combination of proteins and organs all operating at different stages in B12 absorption defies biological evolution. Since bacteria have the ability to make B12, why would this have been lost in 'higher' animals and replaced with such a complicated uptake system

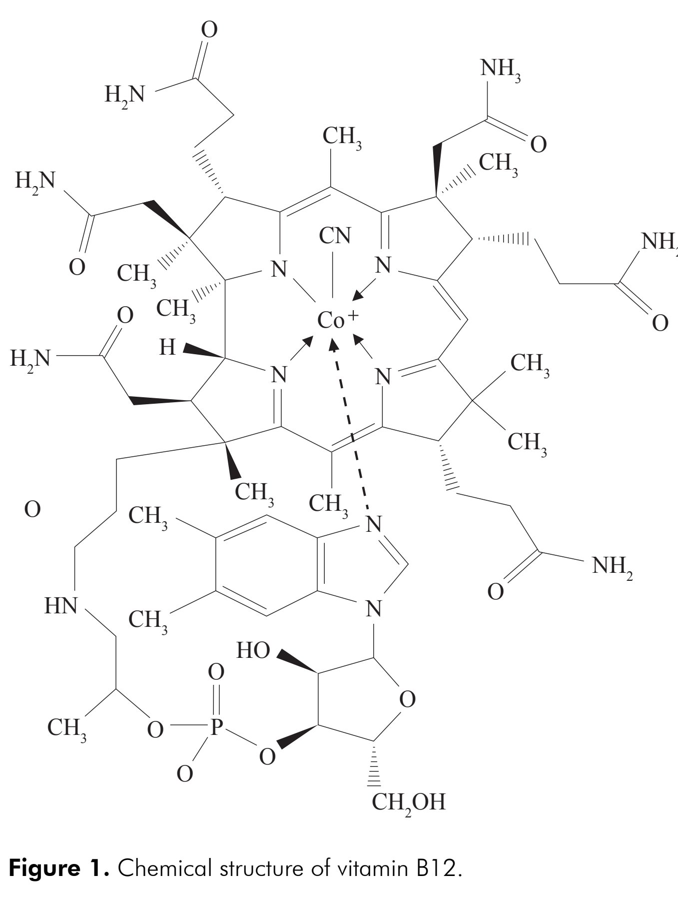

Figure 1. Chemical structure of vitamin B12.

(as microbes are supposed to have evolved into molecular biologists)? Vitamin B12 absorption is testimony to the Creator's design!

References

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How does andesite lava originate in the earth?

Michael J. Oard

Andesite is a type of lava intermediate between rhyolite, typically associated with explosive volcanism, and basalt, which flows like honey along the earth's surface. Andesite is very common and forms volcanic cones or stratovolcanoes. It is especially abundant along what is called the 'ring of fire' around the Pacific Ocean. With the advent of plate tectonic theory, it had been assumed that andesite represents the formation of new continental crust since about the Precambrian.[1] Precambrian continental crust is another issue and it is difficult to understand how it would originate naturalistically. Some authors assume that 30% of the crust formed after 450 million years ago,[2] and a significant proportion of this is presumably by the addition of andesite. Andesite is thought to form when one tectonic plate, generally an oceanic plate, moves beneath another plate at a subduction zone. In early plate tectonics models, andesite was thought to form directly from the melting of the ocean crust, but in later models, it is considered to result from the injection of water into the hot mantle above; this lowers the melting point and creates andesite lava from the partial melt:

> "Andesite volcanic rocks were identified early in the development of plate tectonic theory to represent new additions to continental crust. They are abundant in subduction zones and resemble continental crust in composition. When one tectonic plate dives beneath another in a subduction zone, the magnesium- and iron-rich (mafic) oceanic crust it is carrying might partially melt to yield andesite. Or, in a later theory, water from that crust escapes and causes hot mantle above it to partially melt. When formed from a solid source and collected into a body, such magma is called primary. Continents grow inexorably by andesite addition, it has been argued … ."[3]

Figure 1. Mount Hood, Oregon, USA, reflected in Mirror Lake.