also unite with three quantities of oxalic acid; but it was found, that when two parts of potash are in solution with six equivalent quantities of oxalic acid, they do not crystallize together in this proportion; but one part of the potash becomes a true binoxalate by union with two parts out of the six of oxalic acid taken; and the other part of potash is found united with the remaining four parts of acid.

The author expresses an opinion that we shall not be able to explain satisfactorily, why this acid refuses to unite in the proportion of 3 to 1, till we can attain a just conception of the geometrical arrangement of the elementary particles in all the three dimensions of solid extension. It being supposed, for instance, that the particles are spherical (which is the simplest hypothesis), if they unite 1 to 1, there is but one mode of union. If 2 particles are united to 1, the 2 particles will arrange themselves at opposite poles of that to which they are united. If there be 3 particles, the only regular position in which they could remain is in the form of a triangle in a great circle surrounding the single spherule; but for want of similar matter at the poles of this circle, the equilibrium would not be stable. But again, if there be 4 to 1, a stable equilibrium would occur, when they assume the form of a regular tetrahedron, surrounding the single particle.

But as the author does not place much reliance on this explanation, since such a geometrical arrangement of the primary elements is altogether conjectural, he is desirous that it should not be confounded with the results of the facts above related, which are distinct and satisfactory with respect to the existence of the law of simple multiples.

On the Inconvertibility of Bark into Alburnum. *By* Thomas Andrew Knight, *Esq. F.R.S. In a Letter to Sir* Joseph Banks, *K.B. P.R.S.* Read February 4, 1808. [*Phil. Trans.* 1808, *p.* 103.]

Mr. Knight having on a former occasion observed the bark of trees to originate from a fluid exuding from both bark and alburnum, continues the subject by observations, tending to prove that bark thus formed always remains in the state of bark, and that no part of it is ever converted into alburnum, as various eminent naturalists have maintained.

Equal portions of bark from several branches of an apple and a crab-tree were removed by circular incisions, and transposed from tree to tree in the spring; and a vital union was secured by bandages, and by a plaster of bees' wax and turpentine.

When some pieces of bark were removed in the autumn of the same year, a layer of alburnum was found to have been formed beneath them in every instance; that of the crab-tree having the colour and roughness of the stock on which it was produced, while that of the apple-tree showed none of the sinuosities of the bark of the crab-tree which covered it; neither did the vessels and fibres of the newly-generated alburnum in any degree correspond with those of the trans-

posed bark. And it was evident, that in each instance a new layer, both of cortex and of alburnum, was generated.

Mr. Knight's attention was next directed to the progressive formation of alburnum in the young shoots of an oak coppice; but he could discover nothing like transmutation of bark into alburnum, although the commencement of alburnous layers in this tree is peculiarly conspicuous, by a circular row of very large tubes. These tubes he found, at their first formation, passing through a soft gelatinous substance, much less tenacious than the surrounding pre-existent bark; and there was nothing in the bark at all corresponding to the circular row of tubes contained in the alburnum. The interior surface of the bark is at the same time well defined, and its own peculiar vessels are distinctly visible, and by no means exhibit any appearance of progressive transmutation.

Mr. Knight remarks also, that the qualities of different kinds of wood are not in any degree indicated by the bark which covers them. He instances the wych-elm and the ash, the woods of which, for agricultural implements, are frequently substituted for each other, although the textures of their barks are extremely dissimilar; inasmuch as one is brittle, and the other so tough as frequently to be used for ropes.

Another circumstance, very unfavourable to the theory of conversion, is the firm adhesion which subsists between the layers of bark to each other, in comparison to their adhesion to their alburnum.

Two experiments of Du Hamel are, however, cited by Mirbel in support of that theory.

In the first, pieces of silver wire, inserted into the bark, were frequently found in the alburnum; but the evidence is defective, as it was not rightly ascertained that the pieces of wire did not, at their first insertion, pass between the bark and alburnum, and thus be liable to be covered by a new deposition of either one or the other.

In the second experiment, the bud of a peach-tree, with a piece of bark attached to it, was inserted into a plum-stock: a layer of wood was afterwards found beneath the inserted bark, perfectly similar to the peach; but it is easier to conceive a layer of alburnum, generated by deposition from fluids that have circulated through the inserted bud, than that a part of its bark should be converted into a layer of alburnum more than twice as thick as the inserted bark.

Mr. Knight also remarks, that when the bud is destroyed, the bark deposits no alburnum; but, being small, it becomes ultimately covered by the successive alburnous layers of the stock, and may be found many years afterwards to have made no progress towards conversion into wood.