of plants is nothing more than the restoration of the equilibrium which has been disturbed by the function of animals. Animals restore to the atmosphere and to the soil those constituents which it is necessary for plants to obtain to form their tissues. This was shown by Liebig, who proved that in the extensive pine forests grown in Germany, the carbon and hydrogen contained in the wood of those trees must be derived from other sources than the soil upon which they grow; such soil containing scarcely a trace of carbonaceous matter. Upon a single acre of this land, there was reared in the course of a few years trees which contained several thousand pounds of carbon. How could this find its way into the tissues of those trees if it were not derived from the atmosphere? A knowledge of the atmosphere gives the solution. The atmosphere contains the whole of the carbon requisite for the formation of the carbonaceous tissues of plants. When we take into consideration the enormous extent of the atmosphere, the quantity of carbon contained in it in the form of carbonic acid, and the manner in which the atmosphere is brought into contact with the leaves of plants, we can find sufficient to account for the whole of the carbon discovered in the tissues of plants. It is now well known that the leaves of plants exposed to sunshine or diffused daylight absorb this carbonic acid very rapidly from the atmosphere, and eliminate from their surface pure oxygen gas. Now the carbonic acid is composed of carbon and oxygen: hence, it is mathematically certain that the carbon must remain in the leaves. It does not remain as charcoal, but is assimilated with the elements of water, and is converted into sugar, starch, woody fibre, or other substances which contain carbon along with the elements of water. In the same way, nitrogen has also been proved to be derived from the ammonia in the atmosphere. This is a most important point for agriculturists, especially for those on poor soils; because a large quantity of the manure applied to soils are manures rich in nitrogen—a material which is capable of being abstracted from the atmosphere by plants, providing they have the other mineral requisites to build up the organic substances, which they form from carbon, nitrogen, and water. If we supply these mineral substances, we can rely upon plants deriving sufficient nitrogen from the atmosphere to form the compounds before spoken of—namely, those nutritive properties which are the chief objects contemplated in agriculture.

We then see clearly that plants derive their nutriment from two sources: from one source which is perfectly independent of all man's operations—namely, the atmosphere; and from a second source—namely, the earth. We also find that it is necessary to provide certain ingredients if they are not already present in the soil. The principal of these ingredients are phosphoric acid and the alkalies; sulphuric acid is also requisite; these materials being essential to the formation of the nutritive properties already alluded to. We therefore need only look, in agricultural operations, to the supply of these inorganic constituents—namely, phosphoric acid in the form of bone-dust, and potash in some cheap form, as from decomposing materials; the nitrogen (such an essential constituent in these nutritive principles,) and the carbon being entirely derived from the atmosphere. There is, however, one condition in which we can apply nitrogenous manures with advantage, and that is, where a soil is exceedingly rich in mineral ingredients, and on which we want to raise large crops of plants which are rich in nitrogen. In order to effect this, we must supply manure artificially, and in the form of ammonia; this being the only condition in which nitrogen can be assimilated by plants. We are also enabled to see, from the application of chemistry to agriculture, the causes of the advantage derived from the rotation of crops, fallow, and quick lime. The advantages of the rotation of crops is now appreciated by most agriculturists in almost all districts. But the way in which this advantage is derived is not by any means so clearly understood. It is well known to chemists and scientific agriculturists, that different kinds of plants absorb different kinds of constituents from the soil. Wheat, for instance, requires a large quantity of silica and phosphorus for its perfection. Another class of plants scarcely requires silica at all; while a third class probably needs only salts of potash or soda. In this way we divide plants into three classes: plants which require silica; plants which principally require potash or soda. Now when we plant wheat upon a soil, we withdraw from it a large quantity of silicious materials, silica or flint in a soluble state, and a considerable am ount of phosphoric acid. Consequently, if yo u continue to crop the land with wheat, you will find your crops diminish in quantity, and nually you cannot grow any more wheat on th e land. But if in the same soil, you plant pot toes, you may have an abundant crop, even w thout the application of any manure. An again, upon soil where potatoes almost cea se to exist, you may grow a considerable cr op of clover. These circumstances are rea dily explained when we take into consideratio n the ingredients withdrawn from the soil by e ch of these classes of plants. Now if we wis continually to crop land with the same desc iption of plant; if, for instance, we wish to plant wheat every year upon th same surf ce of land, we have nothing more