full sized egg, is greater than the amount of it in a smaller one, and the *reason* in both cases is the same.

Before the true leaves of this cabbage appeared, and this is generally the case in the higher order of plants,* two little green sprouts resembling leaves, called *cotyledons*, issued forth, and these were connected with the embryo, and acted as nurses to the growing plant, until the real leaves succeeded above them; they then dropped off, having discharged their duty of conveying air to the embryo within: after the leaves appeared, the woody fibres of the plant began to be formed; and principally through their means, in a manner which will appear by and by. To show you the necessity of moisture to the first existence, and after progress of any plant, I need but mention that a grain of mustard seed (if sufficiently shaded from the light), will grow in water without any earth.

Hyacinth bulbs grow in dark glasses filled with water. Some of you I dare say, have seen malted barley—if so, you know that the grains have pushed out shoots from having been soaked in water of a sufficient temperature,—*heat* being always necessary to the growth of a plant, and more or less so, according to its particular nature and constitution,—but though seeds will sprout and live without any earth in the commencement, they will, generally speaking, perish quickly if not placed in the earth, which is undoubtedly their natural position; nor would any plants live long in *pure* water.

It is plain that the roots are necessary to enable the plant to take a good *hold* of the ground for protection, but they have a yet more important part than this to perform.

Examine the roots of this cabbage—you perceive that they are furnished with a great mass of fibres, like coarse threads of hemp or flax; and that some of these fibrous roots have struck downwards into the soil to a considerable depth, while others have branched out sideways—and if you look closely at the extremities of the roots, you will see (where they have not been destroyed in the taking up, for they are extremely delicate,) soft white threads from six to eight inches long, covered with a fine down resembling cotton; these ends, which are called spongioles, from their power of imbibing moisture like a sponge, suck up portions of the nourishment which the earth and air around them contain, and convey it upwards through the roots, (which may be considered a multitude of mouths,) into the stalk, and thence with force and rapidity as it rises into the stems, and leaves, and every part of the plant.

Since then, a continued process of nourishment to the plant from the soil is going on, I cannot understand how it is possible, that the steeping of seeds in certain substances (as I have read of with doubt and astonishment,) can afford future nourishment to the plants, and render a supply of manures, or whatever may be their usual food, unnecessary to them after the grain of seed has disappeared, and thus render their mouths useless. If such wondrous effects can be produced by such simple means, and if more luxuriant and quickly grown plants can be obtained by the process to which I am alluding on the seed alone, there is an end of all received opinions regarding vegetation.

On account of the exceeding tenderness of the spongioles, they cannot absorb any nourishment in a solid form; it is therefore received by them in that of fluid, containing gases and earth salts in a dissolved state. This fluid is the sap, which though at first very thin, becomes thicker and heavier as it rises to the farthest points of the branches, and penetrates into the leaves, by dissolving some of the slimy vegetable matter which it meets in the stalk, and at last it becomes changed into a sweetish substance of the leaves.

The leaves perform their work by means of a vast number of little holes on their surface, which can only be distinguished by a microscope, called sporules, which, like the pores of the human skin, have the power of perspiring,—and they have also the faculty of inhaling air, and which causes the sap to flow; while the more watery and lighter parts of the *crude* juice, (as the sap in its first state is called) escape through those pores, the most substantial particles remain, and thus the returning sap, being digested and changed in its qualities by the leaves, which may be considered both as lungs and stomach, gives solidity to every part through which it runs, depositing like a flowing river, rich matter in its course, and enlarging every portion of the plant through which its fertilizing particles pass.

The rising juices have different channels to avoid confusion between them. The rising sap flows through the part of the stem called the *alburnum*, which is the newest portion inside, and falls thro' another layer called the *liber*, which is next the rind; and the falling sap does not descend in a straight course downwards through the liber, for if it did, that part only would be benefitted, but by little cross tubes called the *marrow rays*, which lead to the heart of the stem; this central part is the most firm and substantial, from being fed through these rays with the *proper* juice, until it can consume no more. The greater age of the heart, is undoubtedly the chief reason of its being the most solid part; but it is probable also, that this solidity is owing to compression, caused by new layers continually increasing around it, and also to its greater protection from outward moisture.

The leaves, as you have seen, are most important members, and according to the nature of any plant, more or less porous; and therefore, more or less capable of taking in, or giving out air and moisture.

In those vegetables of which the leaves are few and small, the soft green part of the rind performs the same offices.

Understanding the nature and functions of the leaves, you must perceive the folly of stripping off the sound and active leaves of such a plant as this cabbage, before it has completed its growth, for by so doing, you diminish its powers of digestion, and therefore prevent it from becoming so large and solid, as it otherwise would be. By destroying the proper balance of power between the roots and the leaves, there is danger (but to some plants more than others) of overloading the system with food; for if the roots or mouths swallow more than can be converted by the leaves into fit nourishment, then the circulation becomes checked, and the patient may die of indigestion, or at least be cut short in its growth.

For this week I must end here, subscribing myself your faithful friend,

MARTIN DOYLE.

* In some plants, such as wheat, there is but *one* cotyledon; and in others, such as fern, there is not even one.

Newcastle Farmer.

COBOURG, OCTOBER 1, 1846.

It is but a few years since an intelligent English nobleman, whose attention had been especially directed to Agricultural pursuits, and the effects which must ultimately result from the application of science to that department, remarked, that shortly, in consequence of scientific enquiry, he should be enabled to carry the manure for an acre of land, in his snuff-box; when one of the old school of prejudiced farmers observed, "*when* that is the case, my Lord, I will undertake to carry your harvest from that acre to the barn in my waistcoat pocket."—But his lordship was in the right, for the maximum quantity of what are justly termed hand manures, is so very small, that it is approximating to a mere snuff-box full.

So much has been said and written on the comparative value, mode of application, and beneficial results of the different descriptions of artificial manures, that the mind becomes bewildered amidst scientific descriptions and technical phraseology, so that a plain farmer, unaccustomed to learned, and especially chemical disquisitions, is apt to start back in dismay, and be sorely discouraged at not being able to comprehend the terms themselves, or the mode of application of the materials most likely to prove beneficial.