

bable. A rail-road consists of bars or rails of iron fastened to the ground, for the wheels of carriages to move on. The carriages are thus moved forward with much greater ease, even when pulled by horses; but, when propelled by steam, their speed is truly astonishing. It was in 1822 that a project was first entertained to form a railway between Liverpool and Manchester, and this, after many difficulties were overcome, was carried in 1833. The distance between Liverpool and Manchester is, I think, about thirty-one miles, and steam-carriages will run over the space in little more than an hour.

*Gilbert.*—That must be like flying! It must be just like going in a balloon!

*Traveller.*—I do not mean to say that steam-carriages usually go at such a rate, but they have done so. From the first opening of the rail-road, in September, to the end of that year, 70,000 persons passed along it; and in the last half year of 1832, more than 86,000 tons of goods, and 39,000 tons of coal were carried. It is not for man to see into futurity; but the probability is, that the advantages of rail-roads will, in a few years, cause them to be very general where they can be adopted. But it is only where the traffic is very considerable that the expense of making them can be repaid.

*Gilbert.*—I should like to see a rail-road. There are others, I suppose, beside that at Manchester and Liverpool?

*Traveller.*—O yes, many more are in progress, and among them the Greenwich rail-road, which is now in part finished, and steam-carriages are daily taking passengers a distance of about two miles and a half in six minutes. This, you know, is only at the rate of twenty-five miles an hour, but quite fast enough for all reasonable purposes. When I first got into one of the steam-carriages, on this rail-road, my journey seemed ended almost as soon as it was begun.

Different people are variously affected by the great speed of the steam-carriages: a passenger on my right hand was frightened by it, while it made no impression on the one who sat on my left. To me it was very agreeable, exciting me to such a degree, that, while being whirled rapidly along, I felt as if equal to undertake any thing. It impressed my mind with the great power which God had delegated to man, and with the responsibility of the latter, to use it for the extension of his glory.

As we hurried forward, a fellow traveller lifted up his hands with wonder; and, putting his mouth to my ear, said, "What will this astonishing power lead to?" So great is the velocity of the carriages, that if you look out at the window at the ground and iron rail-road, they resemble a piece of stair-carpeting; for the eye cannot distinguish the iron and earth, and discerns nothing but straight stripes of different colours.

The rail-road must have been very expensive, being formed the whole of the distance on very high arches of brick. The carriages in which passengers travel are distinct, but fastened one to another according to the number wanted. There is a strong spring between every two carriages, to prevent a concussion when they stop. One engine is quite sufficient to draw along any reasonable number of carriages. About two thousand persons only travel along the rail-road.

To such as live in London, Deptford, and the adjacent places, I recommend a trip along this road. The ground through which the line of road passes is very fertile. Large tracts are laid out, with great regularity, in the production of lettuce, cabbage, fennel, rhubarb, radishes, onions, peas, beans, and other kinds of vegetables, while an occasional orchard of pear trees diversifies the scene.

The advantage of rail-roads is unquestionably great, but the spirit of speculation may be carried too far. About an hour ago, a friend put a printed paper in my hand of a new steam-carriage company now forming in London; and an intelligent man told me, the other day, that so many undertakings of this kind are projected, that, in his opinion, all the money in the kingdom would not be sufficient to complete them. Many thousands will probably be ruined by engaging in some of the schemes now proposed.

In country places, where no coaches run, we often have to walk along pleasant, shady, green lanes, with neat hedges growing on each side. In such places I have been more happy and delighted than I ever expect to be travelling along an iron rail-road with no hedges and trees.

I am afraid that, in the neighbourhood of cities and large towns, rail-ways and steam-carriages will occasion the fourth commandment to be broken to a fearful extent, as they will tempt pleasure parties to spend the Sabbath in an improper manner.

*Edmund.*—I should like to travel by the mail coach better than in one of these carriages.

*Traveller.*—A steam-carriage is not so good-looking as a mail coach, nor a steam-boiler pouring out its smoke so handsome as four chestnut or grey horses in new harness; but the speed, the safety, and the cheapness of rail-road travelling, will most likely put an end to other modes of conveyance, and enable us to breakfast with one friend, dine with another a hundred miles off, and return home in good time for supper, when persons live upon or near the line of a rail-road.

*Edmund.*—We might then soon see all the grand sights in England, the ships, the wind-mills, the water-mills, the glass-houses, the printing-presses, the steam-engines, and the rail-roads into the bargain.

*Traveller.*—But as that is not likely to take place just at present, let me advise you to lose no opportunity of improving yourselves at home. You will want all the wisdom you can acquire. Be wise for this world in doing good and abstaining from evil, in getting knowledge, and putting it to a good purpose; and be wise for the next, in looking to the Saviour of sinners for life and salvation, obeying his word, and living to his praise.

## AGRICULTURE.

### Extracts from a Lecture,

DELIVERED BY PROFESSOR JOHNSTON, BEFORE THE HIGHLAND SOCIETY, AT THE LAST MEETING IN EDINBURGH.

Professor Johnston commenced the lecture by observing, that an impression had long existed in the minds of many persons connected with agriculture, that various departments of science, particularly chemistry and geology, were capable of being applied to it in such a way as to improve the cultivation of the land. But the difficulty was for such persons to answer distinctly the question which was frequently put by practical agriculturists. What can science do for agriculture? Now he appeared there to endeavour to answer that question. Science may impart a practical money benefit to the cultivation of the land, either by enabling farmers to raise larger crops with more certainty and of better quality, or by teaching them how land, previously of little value, may be made capable of raising better crops, which crops again will tend to produce a greater quantity of production of another description, that is, beef and mutton. In illustration of the subject which he had chosen for his lecture, a multitude of subjects presented themselves, and the difficulty was how to select a number of topics which were connected together in their nature, and might be bound up by their common form in their memories. Perhaps the best course for him to follow with such an object would be to take up the seed when it is first put into the ground, and to follow it through its different processes of development till it arrived at maturity. With regard to the selection of seeds they were all aware what an important matter it was, and how much depended upon it; but it was only chemists who could understand the scientific causes of these differences. They also knew that seeds would grow on one kind of soil, while they refused another kind; now the reason of this could only be cleared up by chemical examination of the soil and of the seed. It was a common practice to steep the seed before it was sown, for the purpose of destroying the eggs of minute insects, which injure the plant as they grew up. That might be one effect; but another effect of the steeping was chemical; and that effect was seen in the great luxuriance of the crop. When the seed was put into the ground, it sent forth a little sprout in its germination. Connected with this there was a beautiful chemical process. It must be understood that there were two substances which were important parts in the composition of every plant—sugar or starch, and gluten or albumen. Both of these were in the seed in a solid state; but when the plant began to germinate, it was necessary that these substances should become soluble, to be sent from the seed to the stem. Now it was remarkable, that at the root of every stem, just where it joined to the seed, there was a substance called *clearest acid*—and this substance, according to a well-known chemical process, renders the starch and the gluten soluble, and thus enables it to ascend to the stem of the young plant, in proportion as it is required for nourishment. Accordingly along with it, there would always be detected, by a microscope, a portion of the gluten and the starch in a soluble state. So soon as the plant reaches the surface, it expands into a leaf. Up to this time, it lives at