piled up against the primary rocks, proving that *they had been thrown up by the upheaving of the primary rocks*; and the relative ages of the mountains composed of these primary rocks could be ascertained by an examination of the stratified rocks which they had disturbed,—geology having previously ascertained the relative ages of the stratified rocks in all the portions of the earth which had been examined. Having thus got a mode of fixing the ages of mountains, we might hope to be able to ascertain how the great upheaving power had been acting. As had been observed in a previous lecture, our mountain masses were distinguished by being associated with parallel ranges, and it had been ascertained that these parallel ranges always corresponded in age. Thus instead of looking on the surface of the earth as a mere mass of mountains, connected by no general principle or regularity in the mode of their distribution, we had the great truth that the upheaving cause had through time been operating in different parts of the world, in consequence of some expansive power from below, sending upwards enormous rocks; and that each operation of that sort had been accompanied by the appearance, not of one range, but of a great series of ranges, of mountains, disposed in parallel lines. Of these great evolutions, we were now acquainted with 17 or 18 instances. The most youthful of the mountains were the Andes, with their parallel chains. With them probably originated the river Mississipi; and it was evident, from an examination of the stratification of its delta, that it must have been in existence for at least two millions of years. The mountains last thrown up before the Andes, were the Himalaya, Caucasus, and Atlas ranges; then mount Blanc, and part of the Scandinavian Alps; further still among the depths of the past, Lebanon, part of the Ural, Corsica, and Sardinia; next the Pyrenees, the Appennines, and part of the Alleghanies; and, across another immense interval, stood forth Snowdon and Ben Nevis. Here it was time to stop. Between the epochs of each of these upheavals there had been long periods of comparative quiet, such as that in which we were at present. Two questions naturally arose,—first what is this vast cause or power, and in what manner has it operated? They had already seen something of its mode of operation. It seemed to be a power acting now here, now there, expanding outwards, and casting upwards enormous tracts of the earth; the existence of mountain ridges along the tract which is upheaved being rather an incident than the thing itself—the real effect being a gentle throwing up of vast portions of the crust. A theory regarding the cause of this, much favoured in the older times of geology, was, that a great portion of our globe was still in an incandescent state, merely an outward crust being solid; and that mountain masses or fractures of this crust had been the result of action and reaction going on between the crust and the central incandescent mass. On looking at the moon (in a previous lecture) they had found reason to doubt this theory; and this doubt was confirmed by two or three facts connected with climatology. Had the earth been gradually cooling down, as was supposed by this theory, the temperature of all parts of its surface, or the climate, which was found to have greatly changed, ought to have been getting gradually cooler; but this had not been the case, as in some portions of the surface the climate was now warmer than it was formerly, and that within a recent geological period. A fact supposed to confirm the theory of the incandescence of the central portion of the earth's mass was that, in descending into the earth, after we had passed a line below which the sun's rays did not affect it, we found the heat gradually increase. The rate of increase having been ascertained, it had been calculated, what according to this theory would be the thickness of the earth's crust; and it was found that it would be only 100 miles. Undoubted facts, learned by astronomy, however, proved to us that the thickness of the earth's crust was at least 1,000 miles, which must prevent the theory of the earth's incandescence receiving any confirmation from the increase of heat as we got below its surface. This phenomenon he suggested might have been caused by the earth's having been at one period of its history in a space where it was surrounded by many more stars than at present, and from which it may now have been carried by the revolution of the sun in its orbit. The next question that arose was, what was the condition of the earth, during previous epochs, how were land, water, and climate distributed, and what were the functions of our globe? To these questions we could only obtain an answer by observing in what manner the present epoch was bequeathing its history to a future time, and what indications would remain of it; and thus the physical geographer became of the greatest assistance to the geologist.—(Applause.)

Agriculture.

JETHRO TULL.

On the 3d of June, 1740, died Jethro Tull, the inventor and unwearied advocate of drill sowing and frequent hoeing—*the greatest improvements* which have been introduced into the modern practice of tillage. The saving of seed effected by this practice is no small consideration, for let it be remembered, that millions of acres are annually sown to grow food for man and his assistant animals, and that by drilling, more than one third of the requisite seed is saved. But this is of trivial importance when compared with the facility that drilling affords for the destruction of weeds, and loosening the soil by the hoe. Every weed, living as it does upon the same food as the cultivated plants among which it grows, is really a robber, depriving them of a certain portion of their nourishment, and rendering them less vigorous by depriving them of light and air proportionate to its own size. On the importance of loosening the soil we need not farther insist, for we have repeatedly explained that importance, and our coadjutors almost weekly advocate the benefit derivable from the practice. Before Tull's time, thick sowing by hadcast, and the scanty employment of the hoe, were the established modes; and when Tull adopted and published a work recommending a practice totally the reverse, though many came to see his "new system of husbandry," yet they, for the most part came to deride it, and his very labourers thwarted him in "his new fangled ways." Yet he wrestled firmly and unhesitatingly against all difficulties; and so nobly does he stand forth in every period of his life, that we must glance over its prominent passages, and hold them up to the cultivators of the soil, to cheer them as well as warn. Tull was educated for the legal profession, but acute disease drove him from a sedentary life, but not into idleness. During his travels in search of health he directed his attention to the agriculture of the countries through which he passed, and finding that they never manured their vineyards, he rashly concluded that all plants might be similarly cultivated. On returning to England he occupied his own farm of Prosperous, at Shalborne, in Berkshire, and commenced that warfare, to win success against adverse circumstances, from which he only ceased on his death-bed. If any cultivator despairs over a thin and hungry soil, let him take courage—for Tull won crops from a soil of the same character: nor let him be subdued though sickness enervate him, for Tull was afflicted with agonizing diseases, yet was never cast down. The tradition of his neighbourhood is, that when confined to his couch by his incurable maladies, he carried on his experiments in boxes placed before his windows—sowing his seeds and trying his surface stirring processes with all the enthusiasm of an inventor. If stupid, prejudiced, and perverse servants encumber and thwart the cultivator, this, too, was Tull's fate; and like him let the cultivator meet such obstinacy and ignorance with a firmness that will defy all such opposition. He is still spoken of by the old labourers of the district as being a man whom it was impossible to oppose with success; and the secrets of his triumphs over peasant prejudices is told in his own apothegm. "There is more than a penny-piece in saying to the husbandry servants, *Go and do this, or Come let us do it.*" Like many other inventors he arrived at some conclusions not justified by his experiments; and among these errors was the opinion that hoeing and pulverizing the soil might supersede the use of manure altogether; but he lived to see his mistake, and, which is still more worthy, to acknowledge it. Our space warns us to conclude and we will do so in the words of Mr. Cuthbert Johnston, who well appreciates his merits! "Tull lies buried without even a stone to indicate where such a benefactor of agriculture reposes. His grave is even undetermined; and if he died at Shallborne, there is no trace of burial in its parish register. The tradition of the neighbourhood is, that he died and was buried in Italy. His deeds, his triumphs, were of the peaceful kind with which the world in general is little enamoured; but their results were momentous to his native land. His drill has saved in seed alone, the food of millions; and his horse hoe system, by which he attempted to cultivate without manure, taught the farmer that deep ploughing and pulverization of the soil, render a much smaller application of fertilizers necessary." —*Cottage Gardener.*

Oriental Sayings.

Sadi, the great Persian Moralist, tells the following story of himself. Having taken offence with the society of some of my friends at Damascus, I retired into the wilderness of the Holy Land, and abode there in the company of the animals that make their abode there, until I was made a prisoner by the Franks, and made to work along with some Jews in the ditches at Tripoli. There I toiled for some time, till at last a chief of Aleppo, who was an old acquaintance of mine, happened to pass by and at once recognized me. How is this, said he, with great astonishment, how came you to be thus occupied my friend? I answered, what can I say? I was withdrawing from the society of man, and sought an abode in the wilderness, for my resource was in God and in him alone; now, fancy to thyself what my feelings must be, to be forced thus to work for a people scarcely human. Truly, to be linked in a chain with a company of acquaintances would be pleasanter than to walk in a garden with strangers. My friend took pity on me, and after having redeemed me from captivity with the Franks for ten Dinars, carried me along with him to Aleppo, and gave me his daughter in marriage, with a dowery of a hundred dinars. I had not long been married, when this damsel proved to be a quarrelsome vixen, and showed such a perverse spirit and scolding tongue as to destroy all my domestic comforts. Surely, I exclaimed frequently, a scolding wife is the dwelling of a peaceable man, is his hell even in this world; protect and guard us against a wicked inmate. Having on one occasion given liberty to her tongue, she said to me, are you not that fellow whom my father redeemed from captivity of the Franks for ten dinars? I replied, yes! I am that same person whom he delivered for ten dinars, and enslaved me with you for an hundred.—I have heard that a mighty man once released a sheep from the murderous jaws of a wolf—that same night he was thrusting his knife into its throat, when the spirit of the sheep reproached him, saying, thou hast rescued me from the jaws of the wolf, when at length I perceive that thou provest a wolf to me thyself. R.