cars, those men are now entirely dispensed with, as the two brakesmen can, it is said, unload the same number of the Patent Cars in from 5 to 8 minutes.

Mr. Fogg's improvement possesses the advantages of simplicity, compactness, less expense and is not liable to get out of order. The present Flat Cars can be altered at a small expense if required. So it will be thereby seen that Mr. Fogg's Car will do away with:

In unloading.... ..... Manual labour.
In locomotive power..... From 20 to 30 per cent.
In ballast..... From 10 to 20 per cent.
In time..... From 20 to 30 per cent.

Still further it is adapted to the common horse waggon, for moving earth, gravel, or other loose material, as a waggon box can be constructed on the same principle, at a small expense, so that the driver can unload the waggon himself without stopping his horse or moving from his seat. Any information with regard to the invention may be obtained from Mr. Thomas Fogg, Brantford, C. W.

## PROGRESS OF GEOLOGY.*

Although I have had the honour of presiding over the Geologists of the British Association at several previous meetings since our first gathering at York, now thirty years ago, I have never been called upon to open the business of this section with an address; this custom having been introduced since I last occupied the geological chair at Glasgow, in 1855.

The addresses of my immediate predecessors, and the last anniversary discourse of the President of the Geological Society of London, have embraced so much of the recent progress of our science in many branches, that it would be superfluous on my part to go again over many topics which have been already well treated.

Thus, it is needless that I should occupy your time by alluding to the engrossing subject of the most recent natural operations with which the geologist has to deal, and which connect his labors with those of the ethnologist. On this head I will only say, that, having carefully examined the detrital accumulations forming the ancient banks of the river Somme in France, I am as complete a believer in the commixture in that ancient alluvium of the works of man with the reliquiæ of extinct animals as their meritorious discoverer, M. Boucher de Perthes, or as their expounders, Prestwich, Lyell, and others. I may, however, express my gratification in learning that our own country is now affording proofs of similar intermixture both in Bedfordshire, Lincolnshire, and other counties; and, possibly, at this meeting we may have to record additional evidences on this highly interesting topic.

But I pass at once from any consideration of these recent accumulations, and, indeed, of all Tertiary rocks; and, as a brief space of time only is at my disposal, I will now lay before you only a concise retrospect of the progress which has latterly been made in the development of one great branch of our science. I confine myself, then, to the consideration of those primeval rocks with which my own reseaches have for many years been most connected, with a few allusions only, to metamorphism, and certain metalliferous productions, &c.

There is, indeed, a peculiar fitness in now dwelling more especially on the ancient rocks, inasmuch as Manchester is surrounded by some of them, whilst, with the exception of certain groups of erratic blocks and drifts, no deposits occur within the reach of short excursions from hence, which are either of Secondary or Tertiary age.

Let us, then, take a retrospective view of the progress which has been made in the classification and delineation of the older rocks since the Association first assembled at York, in 1831. At that time, as every old geologist knows, no attempt had been made to unravel the order or characters of the formations which arise from beneath the Old Red Sandstone. In that year Sedgwick was only beginning to make his first inroads into those mountains of North Wales, the intricacies of which he finally so well elaborated, whilst I only brought to that, our earliest assembly, the first fruits of observations in Herefordshire, Brecon, Radnor, and Shropshire, which led me to work out an order which has since been generally adopted.

At that time the terms of Cambrian, Silurian, Devonian, and Permian, were not dreamt of, but, acting on the true Baconian principle, their founders and their coadjutors have, after years of toil and comparison, set up such plain landmarks on geological horizons that they have been recognized over many a distant land. Compare the best map of England of the year 1831, or that of Greenough, which had advanced somewhat upon the admirable original classification of our father, William Smith, and see the striking difference between the then existing knowledge and our present acquirements. It is not too much to say that, when the British Association first met, all the region on both sides of the Welsh border, and extending to the Irish Channel on the west, was in a state of dire confusion; whilst in Devonshire and Cornwall many of these rocks which from their crystalline nature were classed and mapped as among the most ancient in the kingdom, have since been shown to be of no higher antiquity than the Old Red Sandstone of Herefordshire.

As to Scotland, where the ancient rocks abound, though their mineral structure, particularly in those of igneous origin, had necessarily been much developed in the country of Hutton, Playfair, Hall, Jameson, and McCulloch, yet the true age of many of its sedimentary rocks and their relations were unknown. Still less had Ireland, another region mainly palæozoic, received any striking portion of that illustration which has since appeared in the excellent general map of Griffith, and which is now being carried to perfection through the labors of the geological survey under my colleague Jukes. If such was our benighted state as regarded the order and character of the older formations at our

* Thirty Years Retrospect of the progress in our knowledge of the Geology of the Older Rocks—being an Address to the Geological Section of the British Association at Manchester, Sept. 5, 1862; by Sir Roderick Impey Murchison, D.C.L., LL.D., F.R.S., Director General of the Geological Survey of the United Kingdom, President.