

areas. One of the most notable workers was the versatile Guettard,¹ who travelled through France, England, Germany, and Poland, and whose great desire it was to reproduce his scientific observations on maps.

Guettard's mineralogical map of France and England naturally cannot compare with the present Geological Survey maps; but it certainly gives so much accurate information regarding the local occurrence of rocks and minerals, and the position of mines, quarries, fossil localities, mineral springs, hot springs, coal, etc., that it can still be used with advantage. The map is not coloured. The accompanying text refers only in a very meagre and unsatisfactory manner to the stratigraphical succession of the rocks.

It was a pet scheme of Guettard's to publish a mineralogical atlas of the whole of France. This gigantic plan was never completed; Guettard, in collaboration with his colleague, the chemist Lavoisier, published twenty-nine parts, and Monnet, in 1780, added thirty-one farther sheets. Indirectly, this idea of Guettard's was productive of very important results, for the preparation of the maps demanded an energetic search in the open field for the necessary data. The enthusiasm of Guettard inspired others, and there rapidly appeared a large number of scientific papers on the mineralogical features of different French terrains. One very interesting paper gives an enthusiastic account of the neighbourhood of Paris, its rocks, its minerals, and a large number of fossils.

Guettard described the processes of land denudation effected by the solvent and destructive agency of rain and rivers, and by the abrasion of the waves. This is probably the first paper in which a systematic account of denudation is given in its relation to changes in the configuration of the earth's surface. But the most brilliant of Guettard's achievements was his discovery of the volcanic rocks in the Auvergne region.

In 1757 he was journeying to Moulins and Riom, when he observed that black stones were very common on the roads and in buildings. Recognising that these were fragments of volcanic lava, Guettard, accompanied by his friend Malesherbes,

¹ Jean Etienne Guettard (1715-86), son of an apothecary, while still a boy displayed a passion for natural history, especially for botany; studied medicine in Paris, afterwards accompanied the Duke of Orleans on his travels, and was made keeper of his natural history collections. In 1734 he was elected a member of the French Academy.