

on foot without the guidance of previous observers or the aid of fellow-labourers,"¹ and "had thus singly effected for the whole of England what many celebrated mineralogists had only accomplished for a small part of Germany in the course of half a century."² Simultaneously with Smith in England, Cuvier and Brongniart were exploring the Paris basin. Thus the three different nations of Europe with whom I am mainly concerned in this work furthered independently the main divisions of geological inquiry. "The systematic study of what may be called mineralogical geology had its origin in Germany, where Werner first described with precision the mineral character of rocks; the classification of the secondary formations belongs to England, where the labours of Smith were steadily directed to these objects; the foundation of the third branch, that relating to the tertiary formation, was laid in France by the splendid work of Cuvier and Brongniart."³ To these words of Lyell we can now add that the theoretical explanations were first suggested, and the correct line of reasoning on this accumulated evidence initiated, by Sir Charles Lyell himself.

The key to the doctrines of Lyell was the study of existing causes — the attempt to show how the slow agencies which we now see at work in nature around us are sufficient to explain the successive changes⁴

¹ Lyell, 'Principles,' vol. i. p. 101.

² An expression of d'Aubuisson, quoted by Dr Fitton, 'Phil. Mag.,' vols. i. and ii., also 'Edin. Rev.,' Feb. 1818.

³ See Lyell, *loc. cit.*, p. 103.

⁴ Id. *ibid.*, vol. iii. p. 273: "It is

only by carefully considering the combined action of all the causes of change now in operation, whether in the animate or inanimate world, that we can hope to explain such complicated appearances as are exhibited in the general arrangement of mineral masses."