The digitigrade *Proterotherium* was more monodactyle even than the horse; the differences with the 'Solipeda' are, however, considerable.

Nesodon, among the Plantigrada, has fore-limbs presenting more analogies with the Carnivora and certain Rodents (e.g. the squirrels) than with the herbivorous Ungulates. The fore-limbs of *Homalodotherium* at first sight recall those of an enormous Carnivore, but like those of *Nesodon* were endowed with less mobility.

Posterior limbs.—The posterior limbs of *Pyrotherium* are, like the anterior, those of a Rectigrade; having to fulfil the same functions as the posterior limbs of the Proboscidea and the Amblypoda, these organs have converged in the three distinct groups. *Astrapotherium* also was apparently a Rectigrade; the body being less massive than in the typical Rectigrada, the posterior limbs were endowed with a certain degree of mobility.

Like the Rectigrada, the Digitigrada touched the ground with their ungual phalanges only; the conformation of their astragalus, however, shows that their posterior limbs possessed a great amount of flexibility. Besides, their limbs were slenderer and more elegant.

In the Plantigrada, on the contrary, the rotation of the tibia on the astragalus was rather limited; their fore-limbs being adapted to prehensile or fossorial functions, they required a certain amount of immobility in their posterior limbs.

III.—DET CENTRALE NORGES FJELDBYGNING. By K. O. BJÖRLYKKE. 8 and 595 pages and map. With a supplement: NOTES ON GRAPTOLITES FROM BRATLAND IN GAUSDAL, NORWAY. By CHARLES LAPWORTH. 16 pages and plate. Norges Geologiske Undersøgelse, No. 39. Kristiania, 1905.¹

THE first part of this memoir of the Geological Survey of Norway deals with the district around the Mjøsen Lake. The formation known as Sparagmite is in great force. It lies unconformably on the Archæan, and consists of—

1. At the top, light-coloured felspathic sandstone and conglomerate.
2. A limestone, the Biri-kalk.
3. A conglomerate, the Biri-conglomerate.
4. A dark-coloured sparagmite (felspathic sandstone).

Above the Sparagmite Formation there is a quartz-sandstone and grey-greenish shales, shown by the author to be allied to the blue quartzite of Valdres, and above this come the schists, etc., of the Silurian. The author gives a full account of the Sparagmite Formation, and in his second part traces it into Osterdal, the valley through which the Christiania-Trondhjem railway runs.

The third part of the memoir deals with Gudbrandsdal. The author describes some small patches of rock which underlie the dark

¹ "On the Geology of Central Norge," by K. O. Björlykke. A summary of a larger (the above) work, 2 and 27 pages and map, Kristiania, 1905.

sparagmite, and which he believes to be the oldest part of that formation.

Passing to the tributary valley of the River Jöra, the author deals with a rock, which, though resembling sparagmite, rests upon and not under, the Silurian, and he names it the Younger Sparagmite. He believes it to be of Devonian age. It is closely associated with the post-Silurian eruptive rocks of the Jotunheim Mountains.

The fourth part of the work deals with Valdres, Hemsedal, and Laerdal, and the author traces the Younger Sparagmite to the Sogne Fjord, and south-west into the district around Vossevangen. The rocks included in the Younger Sparagmite Formation are a part of those grouped together by Kjerulf¹ under the general title Høifjelds kvartsen.

Brøgger speaks of the group as the Younger Gneiss Formation, and has described it in his valuable memoir on the Hardanger vidda.² He points out that in places it bears a great resemblance to the Archæan Gneiss, but, like Kjerulf, he treats the succession as normal, and the Younger Gneiss as of later date than the Silurian schists upon which it rests.

In the present work Mr. Björlykke describes how various authors, himself included, have been led to suggest that some part, at least, of this younger gneiss may be overthrust masses of the Archæan. Professor A. E. Törnebohm has gone much further, and has brought forward a series of overthrusts on a gigantic scale in explanation of the structure of the Scandinavian mountains.

Mr. Björlykke's recent work in the field leads him to think that the theory of overthrusting has been carried much too far, and he doubts whether the evidence goes further than to show quite local pushing of strata over one another. He accordingly reverts to the opinion of Kjerulf and Brøgger, that the succession is on the whole normal, and the Younger Gneiss group newer than the Silurian schists. He divides that group into two parts. The first is the Younger Sparagmite Formation, of which we have already spoken, and in the other he places the more gneiss-like rocks, suggesting that they are more or less metamorphosed igneous rocks connected with the great mass of post-Silurian eruptives which are largely developed around the head of the Sogne Fjord and in the Jotunheim Mountains.

The author explains that Norway is affected by two systems of folding. The first, which he terms the "Mountain-chain" system, runs N.N.E. and S.S.W., whilst the other, which he terms the "Strike-system," runs W.N.W. and E.S.E.

The memoir is accompanied by a sketch-map geologically coloured, and numerous maps and photographs are inserted in the text.

In the Supplement, Professor Lapworth describes and figures a series of Graptolites collected by Mr. Björlykke in Gudbrandsdal.

HORACE W. MONCKTON.

¹ Th. Kjerulf, "Udsigt over det sydlige Norges geologi," Christiania, 1879, p. 164.

² "Lagfølgen paa Hardanger vidda Norges Geologiske undersøgelse," No. 11, 1893.