

- pl. xvi. f. 8 (non *Corbula truncata*, Sow., d'Orbigny, Terr. Cret. vol. iii. pl. 388, fs. 8-12) [right and left valves]. Up. Greensand, Blackdown.
- Cucullæa formosa*, J. de C. Sowerby (Fitton), Trans. Geol. Soc. ser. ii. vol. iv. p. 342, pl. xvii. f. 7; W. Downes, Q.J.G.S. vol. xxxviii. p. 87 [left valves]. Up. Greensand, Blackdown.
- Cypricardia floptera*, G. F. Whidborne, Q.J.G.S. vol. xxxix. p. 529, pl. xviii. fs. 19, 19a [valves united]. Inf. Ool. Dundry.
- Cyprina rostrata*, J. de C. Sowerby (Fitton), Trans. Geol. Soc. ser. ii. vol. iv. p. 341, pl. xvii. f. 1; *Veniella* (*Venilicardia*), F. Stoliczka, Cret. Pel. of S. India, p. 193 [right valve]. Up. Greensand, Blackdown.
- Cytherea subrotunda*, J. de C. Sowerby (Fitton), Trans. Geol. Soc. ser. ii. vol. iv. p. 341, pl. xvii. f. 2; *Caryatis*, F. Stoliczka, Cret. Pel. of S. India, p. 161 [right valve]. Up. Greensand, Blackdown.
- Gervillia gladiolus*, G. F. Whidborne, Q.J.G.S. vol. xxxix. p. 516, pl. xvi. f. 7 [double shell]. Inf. Ool. Dundry.
- Gervillia rostrata*, J. de C. Sowerby (Fitton), Trans. Geol. Soc. ser. ii. vol. iv. p. 342, pl. xvii. f. 17; *Perna*, J. Morris, Cat. Brit. Foss. 2nd ed. p. 179; *Melina*, F. Stoliczka, Cret. Pel. of S. India, p. 400 [valves united]. Up. Greens. Blackdn.
- Gryphea abrupta*, G. F. Whidborne, Q.J.G.S. vol. xxxix. p. 493, pl. xv. f. 7 [left valve]. Inf. Ool. Dundry.
- Gryphea Sollasi*, G. F. Whidborne, Q.J.G.S. vol. xxxix. p. 495, pl. xv. f. 9 [valves united]. Inf. Ool. Dundry.
- Harpar Tawneyi*, G. F. Whidborne, Q.J.G.S. vol. xxxix. p. 514, pl. xv. fs. 18, 19 [2 single valves in matrix showing interiors]. Inf. Ool. Dundry.
- Leda* ? *ambigua*, W. J. Sollas, Q.J.G.S. vol. xxxv. p. 497, pl. xxiv. f. 7 [valves united]. Up. Ludlow, Cae Castle, Rhymney.
- Lima antiquata*, J. Sowerby, Min. Conch. pl. 214, f. 2 [valves united]. Syn. of *L. succincta*, Schlotheim, R. Tate, York. Lias, p. 365. L. Lias, Fretherne, Gloucestershire.
- Lima poetica*, G. F. Whidborne, Q.J.G.S. vol. xxxix. p. 511, pl. xvii. f. 9 [left valve]. Inf. Ool. Dundry.
- Lima subovalis*, J. de C. Sowerby (Fitton), Trans. Geol. Soc. ser. ii. vol. iv. p. 242, pl. xvii. f. 21; *Radula* (*Ctenoides*), F. Stoliczka, Cret. Pel. of S. India, p. 414 [valves united]. Up. Greensand, Blackdown.
- Lucina* ? *orbicularis*, J. de C. Sowerby (Fitton), Trans. Geol. Soc. ser. ii. vol. iv. p. 341, pl. xvi. f. 13; *Limopsis*, F. Stoliczka, Cret. Pel. of S. India, p. 252 [valves united]. Up. Greensand, Blackdown.

(To be continued.)

## NOTICES OF MEMOIRS.

LE PIEGHE DELLE ALPI APUANE. CONTRIBUTUZIONE AGLI STUDI SULL' ORIGINE DELLE MONTAGNE. Per CARLO DE STEFANI, Professore di Geologia nel R. Istituto di Studi Superiori di Firenze. pp. 114. Con una Carta Geologica, due Tavole di Spaccati, ed Incisioni nel Testo. (Firenze, Le Monnier, 1889.)

THE FOLDINGS OF THE APUAN ALPS. CONTRIBUTIONS TO THE STUDY OF THE ORIGIN OF MOUNTAINS. By Prof. C. DE STEFANI. With coloured Geological Map, two Tables of Sections, and Woodcuts.

THE author of this work, who has for many years studied the Apuan Alps, commences by giving a description of the different beds of which they are composed and of the fossils contained in them. The lowest strata consist of dark magnesian limestones, with numerous remains of *Orthoceras*, Crinoids, and Sponges, which are referred on general grounds to the age of the Middle or Upper Silurian. These are succeeded by peculiar bluish, bituminous limestones, technically known as 'grezzoni,' belonging to the Middle Trias or Muschelkalk, and above these, a series of limestones, marbles and schists of the age of the Upper Trias. In this series are included

the famous statuary marbles of Carrara, and their true geological horizon, now no longer doubtful, was first determined by Prof. Stefani. Some of the limestones are in part siliceous, and there are also beds of red jasper, several mètres in thickness, which are regarded by the author as due to Radiolaria.

In places the limestones are mainly composed of Crinoidal remains, referred mostly to a single species, *Encrinurus granulosus*, Müntz. Following the Trias in upward succession are limestones of Rhætic or Infraliassic age; the Lower Trias, including the zones of *Psilonoti*, *Angulati* and *Arietites*; the Middle and Upper Lias; Jurassic schists with *Posidonomya ornati*, Quenst., which may probably represent the Oxford Clay; the Tithonian; Neocomian; Middle and Upper Chalk; Nummulitic limestones, clays and sands of Eocene age, represented also by serpentines, gabbros and diabases; gravels and clays of Upper Miocene age; Pliocene; Post-pliocene and Glacial deposits. References are given to the principal fossils present in these beds respectively, and they are briefly compared with synchronous deposits in other parts of Italy and elsewhere in Europe. The breaks or interruptions in this series are considered in a separate chapter, and this is followed by a table showing in a concise form the different successive zones and their characters.

No small part of the work is taken up by a detailed description of the various anticlinal and synclinal folds which form such marked features of the Apuan Alps, and the characters and course of these are well shown in the accompanying map and plates of sections. The author treats further of the displacements of beds which have been produced by foldings of the strata, and arrives at the conclusion that the greater part of these displacements does not result from an original discordance, but has been produced by movements in the beds themselves. He likewise opposes the view that the formation of the marbles and the *uralitization* of the Eocene diabases have been due to phenomena of compression, and attributes these alterations in the rocks to slow molecular changes produced or favoured by circulating waters and by the ordinary metamorphic surroundings. Jointings in the rocks, and the origin of valleys independently of faults, are likewise considered. Numerous instances are given of the partial inversion of strata which occur on the outer borders of mountain chains, which result from purely superficial phenomena, but may have nevertheless an important influence on the formation of these ranges.

The final chapter treats of the general conclusions on the origin of mountains, deduced from the Apuan Alps, but having a wider application. As the result of his observations, the author states that the secondary folds which constitute mountains are probably only the result of relatively subordinate phenomena which take effect at no great distance below the terrestrial surface, in the interior of greater and more general undulations, through compression produced by the overlying superficial strata; and in support of this view he refers to the paper of Mr. Charles Davison<sup>1</sup> 'On the Secular Straining of the Earth.'

<sup>1</sup> GEOL. MAG. May, 1889, p. 220.