

suitable for very low voltages in the armatures. For instance, the input of the 60 h.p. motor is about 620 amperes at 100 volts. This choice of voltage no doubt greatly facilitates the design from the point of view of a low transformer voltage, but such a choice would be almost impossible for traction work, owing to size of the controlling gear. At this voltage the current required by four 100 h.p. motors in parallel would be approximately 4000 amperes; and even, if connected two series two parallel, the control of 2000 amperes would involve very heavy cables and switches.

If, on the other hand, a higher voltage had been chosen, a higher value of the transformer voltage would have resulted; but this is precisely the difficulty which has to be met in practice. For railway work, voltages less than 220 are practically unknown.

The book concludes with two appendices, the first of which deals with the theory of the repulsion motor, taking account of magnetic saturation, and the shifting of the brushes; and the second gives some oscillograph tests dealing with the commutation of a small motor operating with alternating currents.

Mr. R. F. Looser, in translating this book from the German, has accomplished his task with excellent results.

#### VOLCANIC HISTORY OF AUVERGNE.

*L'Age des derniers Volcans de la France.* By Marcellin Boule. *La Géographie* (Mars, Mai, 1906.) Pp. 64; illustrated. (Paris: Masson et Cie.)

THE volcanic outbursts of Auvergne are to a certain extent disconnected locally and different in age. The western group is the more linear in arrangement, the eastern the more sporadic. In the one, the broad mass of the Cantal sends off a short spur—Aubrac—to the south-east, and a long one to the north, which extends through the famous Mont Dore district and terminates in the chain of Puys west of Clermont-Ferrand; in the other group we have the noted chain of the Velay and the outlier of Mezenc, Megal, and Coirons. The eruptions, apparently, were the latest to begin in the first of these districts, and the latest to cease in the region of the northern Puys. The tuffs and other sedimentary deposits, which are associated with the lava flows and masses of coarser scoria, have furnished palæontological data which fix the age of some of the volcanic outbursts, and make it possible by a comparative study of the ejecta to synchronise the discharges in different districts. The materials oscillate from basalts to andesites, with fairly abundant phonolites in two areas, and occasional rhyolites and trachytes among some of the older rocks. The earliest outbursts occurred in the Upper Miocene. Volcanic activity ceased in one of the southern extremities with the Lower Pliocene, in another with the Middle, in the Cantal itself with the Upper. It was prolonged in four districts well into the Quaternary, the date of its cessation being still far from certain.

In the neighbourhood of Le Puy, eruptions, as the discovery at Denise showed in 1844, were contemporaneous with Palæolithic man. The evidence of the

Gravenoire skeleton (found in 1891) is doubtful, as it is from one or two other places, while that from Pranal, Blanzat, St. Saturnin, and Neschers is negative. There is none anywhere to show that eruptions were contemporary with Neolithic man; but an awakening, as Vesuvius once proved, is possible after a long slumber. Has this been the case in Auvergne? For that, according to some authorities, we have historical evidence. Here Prof. Boule's title and preface led us to hope for some additional information, but we have been disappointed. In fact, his discussion of the evidence is hardly so full as that which it received in the *Geological Magazine* so long ago as 1865. As was then stated, several earthquakes occurred about the year 451 A.D., and the wild deer became so terrified as to take refuge in Vienne. A third "portent" happened, but whether this was a volcanic eruption depends on the translation of certain Latin words in two letters written by bishops. If these refer to severe fires—possibly the consequences of the earthquakes—the language is extraordinarily bombastic; if to an isolated volcanic outbreak, this could not be in the "Puy" district, and there is much difficulty in locating it nearer Vienne. We do not find that the uncertainty has been diminished by Prof. Boule's researches; but, notwithstanding this disappointment, and though most of the information has been already published, we welcome as a boon to students this clearly written summary of the volcanic history of Auvergne from one who has taken such a leading part in its elucidation. T. G. BONNEY.

#### OUR BOOK SHELF.

*The Birds of the British Islands.* In twenty parts. By Charles Stonham, C.M.G. With illustrations by L. M. Medland. Part i. Pp. 40 and plates. (London: E. Grant Richards, 1906.) Price 7s. 6d. net.

To use the language of sport, Mr. Stonham may claim to have established a new record. He has aimed at a colourless book, and colourless it is, both in the plates and in the text, though whether it is "far in advance of anything of the kind which has so far been attempted" must be left to the individual judgment of the reader.

In saying this, however, we are far from implying, or wishing to imply, that the work is without merit; it gives a careful and pleasing description of the species and their habits, and shows considerable acquaintance on the author's part with most of them; but nothing strikes us as impressive, nothing as an addition to our knowledge, nothing, in short, as unlike what may be found without much trouble elsewhere.

All this may, of course, be altered when families other than the Turdidæ come under discussion, but in this part—and it is this part that we are called upon to notice—we can see no sufficient reason for the publication of the work. Nevertheless, we infinitely prefer it to many other books treating of British birds, and hope, for the author's sake, that it may meet with more success than we anticipate. We can hardly believe, however, that the considerations of fine paper, brilliant ink, and so forth, advanced in the prospectus, will outweigh those of comparative cost. 6l. 15s. is no small price for a publication of this kind with black plates, especially when it is proposed