

author's name into confounding the present book with one on the same subject published many years ago by Capt. Thomas Brown.

OUR BOOK SHELF

The Gold-Mines of Midian and the Ruined Midianite Cities. A Fortnight's Tour in North-Western Arabia. By Richard F. Burton. (London: Kegan Paul and Co., 1878.)

CAPTAIN BURTON has managed to make a wonderfully interesting and really valuable book out of his fortnight's visit to the ancient land of Midian, on the north-east side of the Red Sea, on and to the south of the Gulf of Akabah. Long ago he had good reason to believe that in this region gold was to be found, but only in March and April of last year was he able to test his surmise, under the auspices and at the expense of the Khedive. The result of this visit is that he is satisfied that there exists a real Ophir, a regular California, extensively worked in ancient times, and whose valuable product is probably not unknown to the tribes who haunt it at the present day. Not only gold exists there, but vast deposits of iron, with copper, tin, and other metals—in fact a welcome treasure-house for the impecunious Khedive. Capt. Burton has hopes that modern Midian, now almost a desert, may yet rival the ancient land from whose people the Israelites, in the exercise of their divine vocation, carried off "the gold and the silver, the brass, the iron, the tin, the lead." Capt. Burton made a minute inspection of some of the ancient sites, and has a good deal to say on the archaeology of the region, as well as its zoology, botany, and geology. But the book is not nearly all on the land of Midian. From the time that the author left Trieste for Alexandria and Cairo, by Suez to Midian, till his return, he saw many things on which, in his own digressive and parenthetical style, he has much to say that is worth listening to. Capt. Burton has just returned from another visit to Midian, and no doubt we shall soon have another work or an enlarged edition of the present.

To the Arctic Regions and Back in Six Weeks, being a Summer Tour to Lapland and Norway, with Notes on Sport and Natural History. By Capt. A. W. M. Clark Kennedy. Map and numerous Illustrations. (London: Sampson Low and Co., 1878.)

THE title of Capt. Kennedy's pleasant volume is rather misleading; before looking into it we thought he would take us as far as Spitzbergen at least, and felt somewhat "sold" when we found his journey ended at Tromsø, in the north of Norway, which, though within the Arctic Circle, is not usually spoken of as in the Arctic Regions. Still Capt. Kennedy's book is thoroughly readable, and though it will add little to our knowledge of Norway or of the Lapps, will prove valuable to any one contemplating a visit to that now much-frequented tourist ground.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Eastward Progress of Terrestrial Magnetism

As the progress of weather eastwards is one of the subjects now engaging attention, while the possible connection between meteorological and magnetical phenomena is another, we are led to ask if there be no traces of an eastward progress in certain of the phenomena of terrestrial magnetism.

I cannot yet affirm that such is the case, but it may interest your readers to know that, as far as a preliminary investigation goes, there are some indications of such a progress when we compare together the Declination-ranges at Kew and at Trevandrum. It will, however, require a more thorough discussion before the fact can be considered as at all established.

Manchester, May 4

B. STEWART

The Phonograph

SINCE writing my former letter on the phonograph (NATURE, vol. xvii. p. 485) I have had the advantage of seeing some of the work that Prof. Fleeming Jenkin is doing with his own instrument, which must, I think, be more sensitive than the one I examined. This work convinces me that the phonograph has already risen beyond the rank of lecture illustrations and philosophical toys, to which I assigned it in my last, and that it promises to lay some permanent foundations for the more accurate investigation of the nature of speech sounds. Prof. Fleeming Jenkin, by a most ingenious arrangement, which I must leave him to describe in his paper to the Royal Society of Edinburgh, obtains vertical sections of the impressions made on the tin-foil by the point of the phonograph, magnified 400 diameters. Some of these original tracings I had the pleasure of seeing yesterday, and they are full of interest. I have termed them "speech curves." They differ considerably from the phonautographic speech-curves of Léon Scott and Koenig, which only succeeded with the vowels, and from the logographic speech-curves of Mr. Barlow, which only succeeded with the consonants, in so much as they succeed with both. In such a word as *tah*, for example, intoned rather than sung, but not simply spoken, as the vowel would otherwise not last long enough for subsequent study, we have first the "preparation," in which the curve gradually, but irregularly, rises, then the "attack," where there is generally a bold serrated precipice, with numerous rather sudden valleys; next the "glide" where there is a perfect tumult of curvatures arising from the passage of voice through a continually changing resonance chamber, producing a rapidly and continuously changing but indistinct series of vowel sounds, which gradually settle down into the "vowel" proper. In the vowel, if well intoned, the curve remains constant for a considerable number of periods, beautifully reproducing itself, but, as the intoner becomes exhausted, "vanishing" away gradually to silence, the distinctive peculiarities of the curve disappearing one by one, till a dead level is again reached.

Then Prof. Fleeming Jenkin subjects this vowel curve to "analysis," reducing it to the separate "pendular" curves of which it can be composed. This corresponds to determining the "partial" tones (*parzialtöne, theiltöne* of Helmholtz, of which all but the lowest are called *oberparzialtöne, obertheiltöne*, and by contraction *obertöne*, whence the unfortunate English word *over-tones*, which is constantly confused with *partials*, thus assuming a part for the whole) out of which the whole "compound" tone is formed. The first two partials are much stronger than the rest, the second often stronger than the first (hence the frequent confusion of octave?), the others generally very weak, although exceptionally one of the higher partials may be stronger. As many as five partials, as far as I remember, were traced out in the analysis Prof. Jenkin showed me, which he had just received from Edinburgh. The results differ materially for different speakers. Also there is a peculiarity in the "phase" with which the different partials enter into combination. Helmholtz showed that this difference of phase would materially alter the form of the curve, but would not alter the appreciation of quality by the ear depending upon the actual partials and their degrees of loudness alone.

The phonograph, as I have said, resembles rather a worn "print" than a "proof" of the human voice. This means, of course, that the delicate upper partials, on which all brilliancy depends, are absent. In some respects this is advantageous for the very elaborate inquiry which Prof. Fleeming Jenkin has instituted, for it enables him to catch the bold outlines on which genera depend, without being at first bewildered by the delicate details which give specific differences. Our speech sounds are, of course, individual, and what is recognised as the same speech sound varies in the same speaker within the limits of its genus, almost every time it is used. We shall do much if we establish the genus. The extent of Prof. Jenkin's researches, as he contemplates them, and the care with which