issued by the London School Board some years ago. The author adopted this scheme for use in his school as soon as it was issued, and the experience gained since then has enabled him to produce a thoroughly practical work We know no better work for teaching elementary science to young children. Though designed for Standards I. to VI. of Board and National schools, most of our private, and many of our public, schools would gain by introducing these object lessons into their curricula.

Précis de Météorologie Endogène. By F. Canu. (Paris: Gauthier-Villars et Fils, 1894.)

LA MÉTÉOROLOGIE ENDOGÈNE is, according to the author's definition, concerned with (1) all acoustic and dynamic phenomena produced more or less directly by variations of atmospheric pressure within the earth's crust; (2) internal manifestations of electricity and magnetism. Ritter gave this branch of knowledge its name, but it was De Rossi who reduced it to a system. M. Canu's volume is an elementary description of phenomena belonging to the physics of the earth. Among the subjects dealt with are the aurora and its connection with the sun; earth currents; subterranean noises, and circumstances affecting them; terrestrial magnetism; earthquakes and earth tremors; and causes producing the escape of fire-damp. All these phenomena are first treated descriptively, and then in relation to other phenomena. Thus, after descriptions of the height, spectroscopic features, acoustic properties, electric character, and geographical distribution of auroræ, we find brief statements of all the causes believed to influence the phenomena. This plan is followed in each chapter, and though the correlation between the phenomena described is sometimes very doubtful, in general the observations quoted deserve consideration. "Pour propager une science," says the author, "il faut avant tout la vulgariser." To accomplish this object the book has been made easily understandable to a French-reading public.

Sach- und Orts-Verzeichnis zu den mineralogischen und geologischen Arbeiten von Gerhard vom Rath. Im Auftrage der Frau vom Rath bearbeitet von W. Bruhns und K. Busz. Pp. 197. (Leipzig: Engelmann, 1893.)

THIS book is a tribute by the widow of Prof. vom Rath, of Bonn, to the memory of her late husband. It had been her wish to republish his numerous memoirs in a collected edition, but the expense of reproduction of the elaborate crystal drawings with which his researches have been illustrated was found to be prohibitory; hence the tribute has taken the form of a detailed Index to his works. The plan adopted for the Index is identical with that of the useful Repertorium of the "Zeitschrift für Krystallographie und Mineralogie von P. Groth." There are two alphabetically arranged lists, the one a subject-index, the other a locality-index. The crystallographical and mineralogical part is the work of Dr. Busz, while for the petrographical and geological part Dr. Bruhns is responsible. The Index gives striking evidence of the vast range of Prof. vom Rath's studies and observations, while the high standard of excellence which characterised his work is known to all who have occasion to refer to his memoirs. By reason of the diversity of the species and subjects discussed by him, this Index will be of great advantage to students of mineralogy.

Elementi di Fisica. Vols. I. and II. By Antonio Ròiti. (Florence: Successori Le Monnier, 1891 and 1894.)

THE first volume of the third edition of this work was published in 1891, but the second volume, revised and enlarged, has only recently appeared. The two constitute an admirably-arranged work on general physics, similar in structure to Ganot's "Natural Philosophy." After an introduction on the properties of matter, Prof. Ròiti passes to the mechanics of solids, and then to the mechanics of fluids. The next section is devoted to acoustics, after which come chapters on heat and energy. These conclude the first volume; the second being concerned with radiant energy, and electricity and magnetism. There are nearly nine hundred illustrations in the complete work, but the majority of them are old friends. However, scientific judgment has been used in making the compilation, and the only matter for complaint is the absence of an index—a common defect of continental publications. In a work of science having the scope of that under review, such an omission is unpardonable.

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 intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Latitude by Ex-Meridian.

THE problem under consideration is that of finding latitude by an altitude of a heavenly body taken near the meridian, commonly called the "Ex-Meridian." The method most frequently employed by navigators is that in which a reduction is applied to the observed altitude in order to reduce it to the meridian, this reduction being either found by calculation or taken by inspection from special tables such as the "Ex-Meridian Altitude Tables," by Messrs. Brent, Walter, and Williams. In the following it is proposed to show how this reduction may be effected by the use of the Azimuth and Traverse Tables.

If l be the latitude, d the declination, and h the hour angle, the formula of reduction is

$$x = Ch^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1)$$

where

$$C = \frac{\cos l \cos d}{2 \sin (l-d)} \left(\frac{\sin^2 15'}{\sin 1''} \right) \text{(Godfray's "Astronomy")}$$

Now since C may be considered constant

$$dx \text{ or } dl = 2\,Chdh \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2)$$

Again from the fundamental relation

$$\cos d \cos l \cos h = \cos z - \sin d \sin l$$

it is easily found that

$$dl = dh \cos l \tan A \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3)$$

where A is the azimuth, and eliminating C between (1) (2) and (3) the formula is obtained in the simple form

$$x = \tfrac{1}{2}\, h \cos l \tan A$$

which expresses the reduction in minutes of arc, h being the number of minutes of arc in the hour angle.

As an example of the use of this formula, take the observation given at the beginning of the Brent Tables.

Date, November 18, D.R. latitude 51° north, hour angle 0h. 24m. 54s., declination 19° 20′ 43″ south, and altitude 19° 29′ 18″. Required the true latitude.

From Burdwood's Azimuth Tables the bearing is found to be about 6° 15′, and we have

$$x = 186'{\cdot}75 \cos 51° \tan 6° 15' = 12' 48''$$

giving a latitude 50° 57′ 11″ north.

The result found in the book is 50° 57′ 10″ north.

To find the reduction by the Traverse Table we may proceed as follows:—With 187 as distance and 51° as course, we have d lat. 117′·7; with this as d lat. and 6° 15′ as course, we have in the departure column 12′·8, which agrees with the result found above.

A difficulty attending the above method is that the Burdwood Tables do not give the azimuths of bodies having an altitude greater than 60°, and are only calculated for bodies whose declinations do not exceed the maximum declination of the sun. However, this should hardly be sufficient to condemn the method, especially as the sun is the body most frequently observed.

It may be also of interest to notice an additional use of the Brent Tables. These are constructed on formula (1), Table III. giving the value of C for every degree of latitude from 0° to 70°, and of declination from 0° to 60°. Now (2) may be written in the form

$$2h = \frac{1}{C}\,\frac{dl}{dh}.$$

So that if we wish to find during what time observations may be taken so that an error dh in the estimated longitude will not produce more than an error dl in the latitude, we have, if t be expressed in time,

$$t = \frac{15}{C}\,\frac{dl}{dh}.$$

Thus in the above example, suppose it were required to find during what time observations should be taken, so that an error of a second of time in the estimated longitude would not produce more than an error of a second of arc in the latitude, we have

$$t = \frac{15}{1{\cdot}23} = 12\text{m. } 11\text{s.}$$

In cases where the latitude and declination are of the same name and do not differ by very much, this time is very small, but when of different names in high latitudes t is considerable.

J. WHITE.

H.M.S. *Hawke*, Mediterranean Squadron.

Magnetism of Rock Pinnacles.

OWING to my absence from home, I have only just seen the letters of the Rev. E. Hill, M.M.S., and James Heelis, in NATURE of August 2 and 9, on the above subject. The writers have apparently overlooked the very interesting report by Profs. Rücker and Thorpe, published in the Brit. Assoc. Report for 1889, p. 586, in which it is shown that "all the principal masses of basalt in the kingdom form centres of magnetic attraction," and that "the Malvern Hills, though composed of diorite in which magnetic polarity can barely be detected, produce deviations of twenty minutes of arc at a distance of one mile from their axis."

The mineral magnetite is an original constituent of basic igneous rocks; and, owing to the action of gravity on this heavy mineral whilst the magma which contained it was still in a fluid or plastic condition, or to some other cause, it has sometimes segregated into masses, or has become more or less concentrated, in certain parts of igneous rocks. Two very interesting papers on gabbros, in which remarkable concentrations of magnetite have been observed, have quite recently been read before the Geological Society—one by Sir Archibald Geikie and Mr. Teall, and the other by Mr. Alfred Harker—in which the concentration observed in these rocks is accounted for in different ways. Rocks in which a local concentration of magnetite has taken place must have a very powerful effect on the magnet even at a distance.

In addition to original magnetite, basic rocks, especially those of igneous origin, contain secondary magnetite, and magnetic pyrites, formed by aqueous and other agents, out of the unstable minerals of which the original rocks were built up. Serpentine, for instance, usually contains secondary magnetite formed out of the mineral olivine, one of the principal constituents of the peridotite from which serpentine was derived.

Owing to the presence of the above original and secondary minerals, small hand-specimens of ordinary igneous rocks—even those in which special segregation of magnetite has not taken place—will generally be found, when examined, to attract a magnet more or less powerfully.

A suitable instrument for testing hand-specimens may be formed by attaching a small horse-shoe magnet to one arm of a chemical balance. After the equilibrium of the balance has been restored, place the hand-specimen under the magnet and raise it carefully. The balance will dip unmistakably towards the specimen if it contains an appreciable amount of magnetite.

20 Nevern Square, S.W. C. A. MCMAHON.

Aurora.

IN Barrhead, Renfrewshire, on Friday (14th), at 9.15 p.m., I witnessed the finest aurora I have observed for years. The luminous arch extended from south-west to north-east, and shortly reached the zenith. The rapid fluctuations in the streamers were remarkable. There were no coloured bands. The moon, nearly full, was shining, rendering the appearance less vivid. In about fifteen minutes the auroral light began to wane.

Tynron, Dumfriesshire, September 18. J. SHAW.

BRIGHT PROJECTIONS ON MARS' TERMINATOR.

THE appearance of bright spots on the surface of Mars has been long familiar to observers of this planet. An idea of the ease with which they may be observed can be gathered from the following words of Schiaparelli, our highest authority on Martian questions.

"It would not be difficult to find a series of hypotheses which would explain satisfactorily the appearance of the polar and other white spots by attributing them in some way to the evaporation of the supposed seas, and to the atmosphere of the planet whose existence is indisputable. But I consider it more useful to point out that these different white spots are, of all the species of appearances on *Mars*, the easiest to observe. They require only an instrument of moderate power and a very persevering attention. The . . . . peculiarities concerning these spots show that they offer a field for the most interesting investigations, whose importance in the study of the physical constitution of Mars is obvious; and in this field useful work could be done by those observers who are not able to decipher the much more difficult details of the canals and their doubling."

Now the appearances of some of these spots in different positions on the planet's disc have been observed at times to undergo rapid changes in brightness, and it was, if we do not err, the distinguished observer just quoted who first pointed out the tendency of some of these bright regions to increase relatively in brightness as the terminator of the planet was approached.

Observations of more recent date than those just referred to, have, however, made us acquainted with other surface phenomena connected, perhaps, in some way with, but of more importance than, the bright spots, and these are the bright prominences or projections at the terminator.

It must be remembered, nevertheless, that bright projections may be of two kinds, optical and real.

The former is an effect of contrast. It may be brought about by the approach of a very bright spot to the terminator where the adjacent darkness tends to give it the appearance of a projection, or, in other words, it is the result of pure irradiation. As a somewhat parallel example may be mentioned the "drop" seen at the transits of Venus. That numbers of such spots have been seen at various times, can easily be shown by a brief examination of the records. Terby, for instance, in 1888, on several nights watched three such points, which, as they approached the western edge of the disc, became very bright, and before passing behind the planet, projected beyond the edge of the disc, as was the case with the polar cap. At Mount Hamilton, also, numerous similar observations at various times have been made.

The second kind of bright projection is that due to the physical peculiarities at the surface of the Martian globe itself, and may correspond to elevated highly illuminated regions. These were first observed at the Lick Observatory in 1890, at the Observatory at Nice, and at the Arequipa Observatory in 1892. The first prominences observed this year were seen on June 26 at Mount Hamilton, and since then have been more or less constantly watched.

To give the reader an idea of what actually is seen at the telescope when such a projection is under observation, an instance or two may not be out of place.