

A short history is given in chapter viii. of the general development of triangulation from the time of Snellins to the present day, but it consists mainly in mentioning some of the more striking incidents connected with the subject, such, for instance, as the use of electric light in the work connecting Spain and Algiers.

The question of lateral refraction is gone very fully into, and a table is given showing the mean triangular errors proportional to triangles of different sizes. The deduction is then made that the effect of lateral refraction increases with the mean length of a side of a triangle up to about 90 kilometres, after which it begins to decrease again. This is a particularly interesting problem, and the table, which is taken from a recent triangulation in Germany, certainly confirms the deduction. It is of course assumed that the closing errors of triangles are due in most part to lateral refraction. The usual methods of calculating and computing triangulation are very thoroughly dealt with.

Precise levelling forms the greater part of chapter ix., but an exceedingly full and clear demonstration is given at the beginning of the various formulæ relative to atmospheric refraction and to trigonometrical differences in heights of stations. This is treated in a really very clear manner.

Three chapters are devoted to the theory of probability and its application to geodesy. The theoretical portion has been well demonstrated, and differs but little from the numerous text-books on this subject; but where the attempt is made to apply the method of least squares to a network of triangulation, the want of taking a practical example is at once felt. Clarke, in his "Geodesy," gives numerous examples of how to apply theory to practice, but Signor Pizzetti leaves the student utterly in the dark on this important point.

Perhaps the two most interesting chapters are left to the end. They deal with the subject of projections, which is gone into with every care. There is scarcely any well known projection which is not very fully explained.

Altogether this book is a distinct addition to any geodetic library.

W. J. JOHNSTON.

#### OUR BOOK SHELF.

*The Food Inspector's Handbook.* By Francis Vacher. Fourth edition. Pp. xvi+231; illustrated. (London: The Sanitary Publishing Co., 1905.) Price 3s. 6d. net.

THIS is a pocket volume intended for the use of sanitary and other officers concerned in the inspection of food. It describes, in simple, untechnical language, the naked-eye characters of the various foodstuffs met with in ordinary commerce, and points out the physical signs by which unwholesome food may be detected.

The first sixty pages deal chiefly with the statutory powers by virtue of which the food-supply of the community is supervised. They include a summary, with explanatory comments, of the various enactments—Public Health Act, Sale of Food and Drugs Acts, and so on—bearing upon the control of food from the inspector's point of view. Next follow chapters treat-

ing of meat, poultry, and fish. This is the most important part of the book, and the notes upon the *ante-* and *post-mortem* signs of those diseases which render flesh-food unfit for consumption, or which seriously depreciate its quality, will be especially valuable to sanitary officers who have had no veterinary experience. A subsequent chapter is allotted to fruit and vegetables, and one to milk; the rest of the book gives short descriptions of cereals, dairy products, tea, sugar, spices, and so forth. This section, though of interest to the food inspector, is of less concern to him than the foregoing, the quality of the articles mentioned being generally a matter for decision by analysis, not for condemnation at sight.

The author gives sensible advice, and his little volume should be found very useful to those for whom it is written. The only inaccuracy we have noted is suggested in the statement that "Dutch cheese is below the standard per cent. as regards fat"; this might imply that there is a legal standard, which is not the fact.

C. S.

*Manuale dell'Ingegnere Elettricista.* By Attilio Marro. Pp. xv+689. (Milan: Ulrico Hoepli, 1905.) Price 7.50 lire.

THIS book forms one of the useful series of "Manuali Hoepli," which already comprises over 800 distinct treatises. Its aim is to give to engineers and electrical constructors most of the information and data that they are likely to require in practice. On this account it is not so much a text-book as a classified collection of rules and data; but on account of its containing a large amount of explanatory matter it lies intermediate between a treatise on electrical engineering and a pocket book of electrical rules and tables. The type being small but clear, a very large amount of useful information is collected in a small compass. The numerical data have been obtained principally from recent papers published in the journals of electrical engineering, and are collected in 115 tables. The work is illustrated with 192 cuts and is furnished with a good index. Its size well adapts it to be a handy pocket book of reference, and it is likely to prove of considerable use.

*Poisonous Plants of all Countries.* By A. B. Smith. Pp. xvi+88. (Bristol: J. Wright and Co., 1905.) Price 2s. 6d. net.

THE author has collected a fairly representative list of poisonous plants, which he has arranged according to the action produced and the organs affected, but there is no mention made of the part or parts of the plant which furnish the poison. The descriptions, which form the main part of the text, are sufficient where reference is made to the whole plant, but the majority are too meagre to be diagnostic. The string of vernacular names which is quoted in several cases does not serve any useful purpose, whereas beyond the mere name of the toxic principle information which is much required is not given.

#### LETTERS TO THE EDITOR.

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#### The Constant of Radiation as Calculated from Molecular Data.

IN NATURE, May 18, I gave a calculation of the coefficient of complete radiation at a given absolute temperature for waves of great length on principles laid down in 1900, and it appeared that the result was eight times

as great as that deduced from Planck's formula for this case. In connection with similar work of his own, Mr. Jeans (*Phil. Mag.*, July) has just pointed out that I have introduced a redundant factor 8 by counting negative as well as positive values of my integers  $\xi, \eta, \zeta$ .

I hasten to admit the justice of this correction. But while the precise agreement of results in the case of very long waves is satisfactory so far as it goes, it does not satisfy the wish expressed in my former letter for a comparison of processes. In the application to waves that are not long, there must be some limitation on the principle of equi-partition. Is there any affinity in this respect between the ideas of Prof. Planck and those of Mr. Jeans?

Terling Place, Witham, July 7. RAYLEIGH.

### Proposed Observation of Mercury during the Solar Eclipse.

DURING the eclipse of the sun on August 30 next there will be an opportunity of making a very interesting observation on the planet Mercury, to which I ask permission to direct attention.

Mercury at the time of the eclipse will be very close to the line joining the earth and sun—about  $2^{\circ} 54'$  south and  $2^{\circ} 54'$  preceding the sun—i.e. at an angular distance from the sun's centre of nearly  $4^{\circ} 6'$ . Accordingly, the illuminated part of Mercury will be an excessively thin crescent which, if Mercury have an atmosphere, will have its horns prolonged by atmospheric refraction.

If a sufficiently skilled observer is provided with a telescope upon which he can use a power of 200 without loss of definition, and mounted—probably as an alt-azimuth—so that it can be set beforehand upon Mercury, the apparent size of Mercury will be that which would be presented by a circle one-tenth of an inch across, viewed with the naked eye from a distance of ten inches.

This ought to be sufficient magnification to see whether the horns of the crescent are prolonged, and, if so, it is perhaps not impossible that the light would be sufficient to enable a spectrum of the tips of the crescent to be seen.

If the whole of this programme can be carried out, we should find out whether Mercury has an atmosphere, and possibly learn something as to the constituents of the atmosphere.

G. JOHNSTONE STONEY.

30 Ledbury Road, W., July 10.

### The Planet Uranus.

ASTRONOMICAL amateurs will have an excellent opportunity of identifying Uranus on about July 16 next, for the planet will be in conjunction with the star  $\iota$  Sagittarii (mag. 5.3) on the night following that date.

The position of Uranus at transit (10h. 30m.) will be:—

R.A. 18h. 5m. 58s., Dec. S.  $23^{\circ} 42' 21''$ ,

while that of the star will be (1905.5):—

R.A. 18h. 5m. 57s., Dec. S.  $23^{\circ} 43' 16''$ ,

so that the planet will pass about 1 minute of arc north of the star. The latter may be easily picked up, as it is nearly  $4^{\circ}$  S. of the triple star  $\mu$  or  $\iota_3$  Sagittarii (mag. 4.1).

Unfortunately, the objects will be low in altitude ( $15^{\circ}$ ), and the moon happens to be full on the date of conjunction.

On June 24 and July 8 I found Uranus a little fainter than the star  $\iota$  Sagittarii. I have carefully observed the planet on several nights in a 12 $\frac{1}{2}$ in. Calver reflector, powers 100 to 475. The disc appeared faint with a bluish tinge, and no belts or other markings could be detected, but the telescope is too small to deal effectively with an object of this description.

Bristol, July 9.

W. F. DENNING.

### The Exploration of the Atmosphere above the Atlantic.

A PLAN for systematic work of this kind, which was proposed by the writer in 1901 at the Glasgow meeting of the British Association (Report, p. 724) after he had obtained the first observations with kites flown from a Transatlantic

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steamer, is now being partially realised. Last summer Prof. Hergesell, on board the Prince of Monaco's steam-yacht *Princess Alice*, executed sixteen kite-flights above that part of the Atlantic bounded by Spain, the Canaries and the Azores, but without finding the expected south-west anti-trade, although a height of nearly 15,000 feet was reached (*NATURE*, vol. lxxi. p. 467). The present expedition, which will repeat Prof. Hergesell's investigations and continue them further south, is made possible through the cooperation of our distinguished French colleague, M. Teisserenc de Bort, whose steam-yacht *Otaria*, of 350 tons, with a speed of 11 knots, and fully equipped for aerial exploration, has just sailed from Gibraltar, and, at the joint expense of her owner and the writer, will proceed towards the equator by way of Madeira, Canary and Cape Verde Islands, making frequent soundings with kites through the trade winds and equatorial calms. By means of the self-recording instruments lifted by the kites, it is expected that there will be ascertained the thermal and hygrometric conditions of the various strata traversed, and the depth and force of the trade wind in the different latitudes. If the kites do not reach the south-west return trade, which has been observed on the Peak of Teneriffe, the vertical range of observation may be increased by liberating hydrogen balloons from Madeira and noting their drift.

Mr. Clayton, meteorologist of the Blue Hill Observatory, left Boston on June 3 to join the *Otaria* at Gibraltar. During his voyage to the Azores on the White Star liner *Romanic* he flew kites, with instruments attached, almost daily to the height of from five-eighths to three-quarters of a mile, thus securing the highest observations in mid-Atlantic, and it is interesting that this was done on June 7, the day appointed for the international observations in the upper air here at Blue Hill and in Europe. In general, the temperature was found to decrease with altitude at less than the adiabatic rate, and the relative humidity to decrease also, but in one ascent there was a rise of temperature with altitude, preceding a change of wind from west to south. A new form of folding kite was employed, and it is encouraging to learn that the heights attained were limited by the length and strength of the wire on the hand-reel, which did not permit more than one of these kites to be attached. On the two days when no flights were made, a following wind became too light on board the steamer to lift the kites, whereas, on the yacht, this condition would have been obviated by simply lying-to, or steaming against the wind.

While the cruise of the *Otaria*, which is to last only six weeks, can hardly do more than elucidate certain questions relating to the high atmosphere in the tropics, it will demonstrate the possibilities and difficulties attending the extensive survey that the writer desires to undertake, and which received the endorsement of the International Meteorological Committee at Southport in 1903.

A. LAWRENCE ROTCH.

Blue Hill Meteorological Observatory, Hyde Park, Mass., U.S.A., June 26.

### Ancient Antarctica.

PROF. H. F. OSBORN has said that the demonstration of "the former existence of an Antarctic continent is one of the greatest triumphs of modern science." But even if this be true, everyone must allow that it occurred a very long time ago. This is proved by the great differences that exist between the floras and faunas of the three great southern continents. These differences are much greater than those between the floras and faunas of North America and Eurasia, and consequently the land connections must have been broken up in the south long before they were in the north. We infer the former existence of an Antarctic continent from the existence of granite and foliated schists in South Victoria Land, and evidence that it was formerly connected with northern lands is found in the existence of flightless insects living there in the few patches of mosses and lichens which manage to struggle through the winter. These insects are not flightless through degeneration, but belong to an order which never possessed wings.