but the explanations of the methods of determining them are very meagre. Thus, on p. 22 the declination compass is described, and the explanation given for its use is simply that "the telescope is set in the plane of the geographical meridian, and, as the needle sets in the plane of the magnetic meridian, the angle between the telescope, which always lies over 0° to 180° on the circle, and the needle, is the declination." Again, referring to the determination of dip, it is simply stated "that when the instrument is arranged with the circle in the plane of the magnetic meridian, the angle of inclination can be read off on the circle" (p. 26). We fear that very few students would succeed in getting even approximate values with only these brief statements to guide them if the instruments were put into their hands.

One chapter is devoted to "Examples on Formulæ," which will, no doubt, be of great service to students, although the title is rather suggestive of cramming. The examples given are not less numerous than useful, no less than 52 out of 144 pages being devoted to them. Several of the papers set at previous Matriculation, Science and Art, and other examinations are given.

The book is well illustrated throughout, and although it is more of an epitome of the chief laws and experiments than a text-book, it will, no doubt, be of great service to those for whom it is primarily intended.

Heat and Light. By Edward Aveling, D.Sc. (London: Chapman and Hall, 1889.)

THIS is another text-book of the series referred to in the preceding notice, and follows on the same lines. It is characterized by the same bare outline, the explanations of the methods of determining the various data generally including no suggestion whatever as to difficulties and corrections. This is especially noticeable in the account of Joule's classical experiment (p. 26), in which no mention whatever is made of the corrections for loss of heat due to radiation or for the velocity of the weight on falling. The diagram, too, is seriously wrong, since it simply shows a set of vanes revolving in a vessel of water; without the pierced partitions necessary to prevent the rotation of the water, the experiment is, of course, useless.

The chapter on the composition of white light and the spectrum is perhaps the least satisfactory in the book. The merest outline of the subject is given, and there are two or three very obvious slips. On p. 165, for instance, the electric light and the lime-light are quoted as examples of monochromatic light, and again on p. 166 it is stated that "glowing gases yield spectra with *dark* lines." The idea that the actinic rays are confined to the violet part of the spectrum is rather old-fashioned, and is scarcely likely to be credited by a student who may have happened to experiment in the direction of orthochromatic photography.

Like its predecessor, the book contains numerous examples and illustrations.

The Encyclopædia Britannica. Ninth Edition. Index. (Edinburgh: Adam and Charles Black, 1889.)

THE publication of this volume (of 500 pages) marks the completion of one of the greatest literary undertakings of the present age. As to the necessity for an index there can be no doubt, since, as the editor explains, the plan of the "Encyclopædia Britannica" was that subjects rather than words should be dealt with, and that large subjects should be discussed in a connected way, under general headings, so that the book might be used not only for occasional reference, but for systematic study. This plan was adhered to, and the result is that "many things which a reader may wish to understand are explained, not under their own names, but in the course of a larger discussion." In such cases reference must be made to the index; and this is so full and so accurate that no one who may have occasion to consult it will ever have the slightest difficulty in at once finding what he wants. The index has been compiled by Mr. William Cairns, and arranged and revised by the Rev. George M'Arthur, with the assistance of Miss Emily Stevenson and Mr. J. T. Bealby. The volume contains also a complete list of contributors, with a key to the initial letters affixed to the longer articles. A glance over this list, which includes almost all the foremost writers of the day, suffices to explain the high character of the work as a whole.

Blackie's Modern Cyclopædia of Universal Information. Edited by Charles Annandale, M.A., LL.D. Vol. I. (London: Blackie and Son, 1889.)

IT is intended that the work of which this is the opening volume shall serve as "a convenient work of reference for readers of all classes—comprehensive in scope, handy in size, moderate in price, and generally adapted to the needs of the day." Of course no one who may want to obtain a thorough knowledge of any subject will think of seeking for it in such a work as this; but the editor does not place before himself too high an object of ambition when he expresses a hope that the new Cyclopædia may prove useful to persons who have little time for acquiring information from books in general, though they take an interest in many topics lying outside their own pursuits. The present volume deals with words beginning with the letter A, and with many of those beginning with B. The articles are short but clear, and, so far as they go, accurate. Especial attention has been given to matters which are of living interest in our own day, and we are glad to see that many scientific articles have been written or revised by specialists. The volume contains some good maps and many interesting pictorial illustrations.

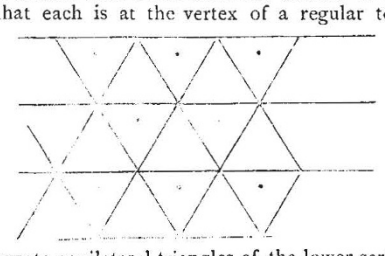
LETTERS TO THE EDITOR.

[*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.*]

Spherical Eggs.

A BIOLOGICAL friend lately asked me for a solution of the problem, How many spherical eggs, 0·03 millimetre in diameter, can be contained in a cubic millimetre?, the whole space occupied by the eggs being large compared with a millimetre. Assuming the eggs as closely packed as possible in a horizontal stratum, their centres will lie at the angular points of a series of equilateral triangles whose sides are equal to a diameter. The number of spheres in this stratum corresponding to a unit of area will thus, on an average, be $\frac{2}{d^2\sqrt{3}}$, d being the diameter.

The next stratum above will have the centres of the spheres placed so that each is at the vertex of a regular tetrahedron,



having alternate equilateral triangles of the lower series as base. Evidently, in a volume of the slice between the two planes of centres, having a unit of area for its base, there will be, on an average, $\frac{2}{d^2\sqrt{3}}$ spheres. But the thickness of the slice is $d\sqrt{\frac{2}{3}}$. Hence, in a unit volume, on an average, there will be $\frac{\sqrt{2}}{d^3}$ spheres, *i.e.* $\sqrt{2}$ times, or about $\frac{7}{5}$, as many as would be contained, assuming their centres at the corners of cubes.