door spiders, pocket-gophers, robber-crabs, squirrels, ants, tree-frogs, weaver birds, scarab beetles, and many others come in turn upon the stage. From the nature of the case, a book that covers so wide a range must be in the main a compilation. But the authors add a good many observations of their own. Moreover—a very great merit this—they investigate the current animal stories before accepting them as true. There is none of the *credo quia mirabile* spirit. They tell us, for instance, that the mole's " fortress " is not the highly elaborated structure which a succession of books on natural history have each in turn still further beautified and complicated, but something much more varying and irregular. Altogether it is a very interesting book. The illustrations, not very numerous, are good.

(5) " Our School Out of Doors " is a book of a very different type. It contains a great deal of correct information on interesting subjects, but it is too miscellaneous, and it suffers from the plan on which it is arranged. Intended for the use of school teachers, it has one or more chapters for each month. This shifting from one subject to another, each very briefly and imperfectly explained, cannot be good for pupil or teacher. In May, Composite flowers are, apparently, to be studied before the pupil has any knowledge of the structure of a common buttercup. In August, five pages are devoted to " watery wonders." It would be far better to study some of the subjects more thoroughly and to neglect others altogether.

OUR BOOK SHELF.

Hints to Travellers, Scientific and General. Edited for the Council of the Royal Geographical Society by E. A. Reeves. Ninth edition, revised and enlarged. Two vols. Vol. i., pp. xi+470; vol. ii., pp. v+286. (London : Royal Geographical Society, 1906.) Price 15s. net.

In editing this ninth edition of the well-known " Hints," Mr. Reeves has taken a point of view somewhat different from that of his predecessor, Mr. John Coles, in the earlier editions. He says :—" As the days of the pioneer explorer of the old type are fast drawing to a close . . . more exact surveys are required than were formerly considered sufficiently accurate for the traveller in unexplored regions." Hence, in the first and larger volume, which is, as before, wholly devoted to surveying and mapping, some of the approximate methods, and the tables connected with them, have been omitted, and a higher standard of accuracy is aimed at throughout. While it seems possible that the effect may be to discourage some travellers who could still do quite useful surveying work from attempting anything at all, and in others to transform a journey in an unexplored region into a surveying expedition pure and simple, it remains unquestionable that Mr. Reeves has produced a condensed treatise on surveying of a high order of excellence.

In the section on instruments, the chief new features are the descriptions of the applications of Mr. Reeves's devices, the " tangent-micrometer " and " endless tangent screw," to the theodolite and sextant. It may be noted that the illustrations of the transit theodolite on pp. 29 and 40 are distinctly inferior to those in the older editions, and are scarcely

sufficiently clear for their purpose. Part iv. of this volume, on geographical surveying and mapping, has been practically re-written ; the main heads dealt with are :—(a) the determination of fixed points, which includes triangulation with the transit theodolite, latitude and azimuth traverses with normals of angles from stations on the route, and latitudes and longitudes ; (b) the filling in of detail and route surveying ; and (c) the determination of heights. The first of these sections contains much new and useful matter relating to interpolation, reduction to centre, and geodetic computations. The fifth division, on astronomical observations, has also been to a great extent re-written ; the methods of determining longitude by means of lunars, moon-culminating stars, and the eclipses of Jupiter's satellites are omitted, and the space devoted to more complete descriptions of the observations for latitude, time, and azimuth, great additional clearness being gained in the computations by the free use of diagrams and formulæ. The only absolute method of determining longitude described is that of occultations.

In the second volume the chief new feature is an extremely valuable section on archæology, by Mr. D. G. Hogarth, which gives general hints on methods of recording, cleaning, temporarily conserving, and conveying monuments and objects of antiquity.

Sechs Vorträge über das thermodynamische Potential, &c. By J. J. van Laar. Pp. viii+119. (Brunswick : Vieweg und Sohn, 1906.) Price 3.50 marks.

This pamphlet of close upon 120 pages really contains eight lectures, the first and second being, as stated in the expanded title, on non-dilute solutions and osmotic pressure respectively. These two introductory lectures are polemical, and attack in a lively manner the position assumed explicitly by some, implicitly by many, that the so-called osmotic pressure is a real pressure due to the molecules of the solute. The author pokes fun at the " dilute school " for pinning their faith to the first term of a diverging series, and for leaving out of account in all their theorising that most essential thing in osmosis, the semi-permeable membrane. He shows that instead of the " osmotic pressure " depending on the solute, it depends fundamentally on the solvent, being mathematically expressible to a first approximation in terms of the difference of the molecular potentials of the two solutions separated by the membrane. He makes an appeal in favour of the use of the thermodynamic potential, which is applicable to all cases, including those of weak solutions, for which alone the method of the osmotic pressure is of any real service. According to his facetious comparison, to explain the accompanying phenomena by an appeal to osmotic pressure is as if one explained an angry man's hasty speech as due to his red face. The anger is the cause of both ; and in like manner the thermodynamic potential forms the basis of the true theory. Then follow the six lectures on the thermodynamic potential and its applications to the problems of chemical equilibrium.

Lecture i. begins with entropy, deduces the usual thermodynamic relations, and finishes with the general conditions for equilibrium. The next lecture contains some simple illustrations leading to the recognition of particular cases of Gibbs's phase rule. This important rule is proved in lecture iii., and more complex cases are considered of mixtures of solids, liquids, and vapours. The fourth lecture discusses the thermodynamic properties of mixtures of ideal gases, deduces Gibbs's dissociation formula, and applies it to certain simple cases. The effects of