Englishmen of science; notably, Darwin, Francis Galton, E. B. Tylor, G. J. Romanes, and others. This reputation is sufficient to secure for any production of his pen wide and careful attention, and to make a notice of its contents a serviceable task. The present volume has more about it of the spirit of the compiler of scientific memoirs than of the ingenious experimenter and the popular writer. A very large share of the work is given over to an anatomical description of the sense-organs of the lower forms of life, and to a discussion of their probable mode of functioning. A bibliographical reference-list of 215 numbers shows how diligently the details have been compiled; and yet the general impression with which one comes away from this portion of the work is, that, in spite of all the work and study, our information is extremely vague and defective. Strange as it may seem, in studying the lower forms of sense-organs it becomes difficult to distinguish between an eye and an ear, an organ of taste, smell, and touch. Our own experience with sense-organs so entirely disposes us to think of the sensations of other animals as essentially similar to our own, that it is difficult for us to realize how different they may be. Not alone are there "animals which have eyes on their backs, ears in their legs, and sing through their sides," but the very sensations thus denoted may really be quite other than in ourselves. Between the highest vibration that we can hear as sound and the lowest that we can see as color, there is an immense gap, which may be only partially present to the senses of other animals.

It would be impossible to indicate here the contents of the richly illustrated descriptions of sense-organs, the enormous variety of their nature and development, their peculiar adaptations to the requirements of the environment. Nature has more than one solution for many of her problems; and the different forms of sense-organs form her answers to the problem of adaptation of physiology to physics. The eye, especially, seems to be a very cheap product; the re-action to light being well established in plants, and the forms of optic organs obtaining an enormously complicated variety in insects. Anatomists have discovered much, but physiologists have done little to give meaning to these discoveries. The method promising best results is the comparison of normal individuals with individuals deprived of a presumable sense-organ. Forel, for example, finds, that, while normal ants will always avoid ultra-violet rays, ants with their eyes varnished are no longer able to distinguish between this and other colors.

Following the chapters upon the anatomy of sense-organs and a chapter upon 'Problematical Organs of Sense,' come chapters upon 'Bees and Colors,' upon 'The Limits of Vision in Animals,' upon 'Recognition among Ants,' upon 'The Instincts of Solitary Wasps and Bees,' upon 'The Supposed Sense of Direction,' and upon 'The Intelligence of the Dog.' Much of the matter here treated has already been published in other shape. It is a *résumé* of points upon which experiments have been made rather than a systematic compilation. The accurate distinction of colors by bees, the connection of this color-sense with the fertilization of flowers, are quite familiar. The limits of vision in animals is a point still deeply in dispute. In answer to the question whether the thousands of ants in one nest, always recognizing one of their own number, but remorselessly attacking all strangers, do so by a smell peculiar to the community, or by a password, the observations seem to say that neither explanation gives complete satisfaction, but further experimentation may clear up its mysteries. The peculiar instincts of wasps and bees, now paralyzing an enemy with all the skill that knowledge of its anatomy could give, again providing for the nutrition of its offspring with a foresight apparently mathematical in its exactness, make us marvel and reflect. Nor is our contemplation made clearer when we observe that this same wise bee has not sense enough to fill up a hole made in her honey-cell, but for an entire afternoon, and more, pours in honey at the top, only to have it flow out of the bottom like the vessel of the Danaides. The wonderful sense of direction ascribed to insects proves, upon careful inquiry, to resolve itself into a moderately successful but by no means infallible or direct appreciation of environment. The final topic, the intelligence of the dog, deserves a further word. In it Sir John describes his attempts at teaching his dog, Van, to express his wishes by language. A large number of cards are printed with such words as 'food,' 'tea,' 'water,' 'bone,' 'out,' and so on, upon them; and by a system of rewards Van has learned to associate his desires with the visual shapes of the letters. When he wants water, he brings not only at command, but spontaneously, the placard bearing that word. This certainly is a noble achievement, and opens up vast possibilities. Quite discouraging, on the other hand, are the attempts to teach the dog to bring a colored card to match the color presented to him. This was diligently taught him again and again, but Van seemed never to get a clear notion of what was desired. 'Can Animals Count?' is the last point treated in the volume, and the question largely resolves itself into determining how large a number of objects can be and the withdrawal of one be noticed. Many animals (birds, etc.) can doubtlessly distinguish between four and five, but no more definite statement can be hazarded. A curious observation is that given by Mr. Huggins concerning his dog, which can apparently perform wonderful mathematical calculations by watching the expressions (all unconscious) of his master, — a valuable hint for telepathy.

All in all, then, the present volume is a convenient and well-compiled reference-book on animal psychology, but is destined to be superseded, as our knowledge advances, by one with fewer gaps and fewer confessions of ignorance. It treats of a fertile field the true importance of which has only recently begun to be realized. A rich success awaits him who has the ingenuity to devise, and the patience to carry out, real successful methods for testing the mental powers of the mute creation; who can decipher these animal hieroglyphics, or force the unwilling sphinx to yield up its enigma.

Works of Thomas Hill Green. Vol. III. *Miscellanies and Memoir.* Ed. by R. L. NETTLESHIP. New York, Longmans, Green, & Co. 8°.

THIS is the concluding volume of Green's works, and consists of essays on a variety of topics, with a sketch of his life by the editor. The memoir is well written, and, for philosophical readers, interesting, though the life of such a man is necessarily lacking in the outward incident characteristic of a more stirring career. The editor, therefore, takes occasion to give an account of Green's views on philosophical and practical subjects, and to indicate to a certain extent the sources in his own character and in the writings of others from which they were derived. Green, as is well known, was an Hegelian; and, though he did not accept all of Hegel's views, the familiar catchwords of the Hegelian philosophy perpetually recur in his writings. The present volume, however, is not all, nor even mainly, devoted to philosophical themes, but contains papers, and some of considerable value, on history, education, and other subjects in which the author was interested. The principal philosophical paper is on 'Popular Philosophy in its Relation to Life,' and is a vehement attack on the English school of thought, especially as represented by Hume. It shows an irritability that is to be regretted, and probably most readers will think the author's own views quite as far from the truth as those that he criticises; but, as illustrating a certain phase of current philosophical thought, the paper is of interest. Several of these 'Miscellanies' are on religious themes, and show the attempts that Green made to adapt the Christian dogmas to his own philosophy, — attempts, as it seems to us, but very slightly successful. For instance: his theory of God is one that makes him no God at all in the view of Christianity or of any other existing religion. He expressly says that God is nothing but the ideal self, the possible perfect man that each of us ought to become; and there is no reconciling this doctrine with the teachings of Christianity.

But, however peculiar may have been his religious views, his interest in moral improvement, both personal and social, was deep and strong. Some of the most interesting passages in the volume before us are those in which he shows his sympathy for the poor, and his desire for their moral and intellectual elevation. He was dissatisfied with existing English society, consisting of the educated few and the uneducated many, and he warmly advocated the extension and improvement of the common-school system as the only practicable means of removing the evils he deprecated. He regarded common education as "the true social leveller," and looked for the time when "the sort of education which alone makes the gentleman in any true sense will be within the reach of all." Besides papers on the various subjects above alluded to, this volume contains a series of lectures on the English Revolution of the seven-

teenth century, in which the causes of that event and of the ultimate failure of the Commonwealth are stated with clearness and true historical insight. Indeed, we think most of his readers will agree that he would have done better to have spent more of his time on history and politics, and less on the inculcation of the Hegelian philosophy.

Ancient Rome. By RODOLFO LANCIANI. Boston and New York, Houghton, Mifflin, & Co. 8°. $6.

THE comprehensive description of the results of modern archæological researches in Rome by Professor Lanciani in the beautifully printed and illustrated volume under review is a publication of great interest and value. The author, who is director of excavations for the Italian Government and the municipality of Rome, describes the results of his labors with such vividness and enthusiasm, that he at once imparts to the reader the keenest interest in his subject. In the preface the history of the work that is going on now is sketched. The improvements undertaken in modern Rome, which of course cannot but necessitate the destruction of a few monuments, have been the subject of numerous attacks upon the Roman authorities, which the author refutes one by one, showing that the growth of the large city, and the requirements of the present inhabitants, made sanitary improvements imperative, and that these very improvements have been made in judicious consideration of the interests of archæology, and that they have yielded archæological results of greater importance than were obtained in any previous period. In the first chapter the history of the destruction of ancient and mediæval monuments is traced, illustrated by views of parts of Rome reproduced from old descriptions.

In the second chapter we are led back to the time of the foundation of Rome, which the author proves to have taken place in the bronze period, by shepherds from the Albanese hills. The remains of stone implements, bronze weapons and coins, and rough earthenware, are described. The development of sanitary measures, the building of the aqueduct and drains, is next described, and the author's views are substantiated by the descriptions of the ruined works and by translations of interesting inscriptions.

We cannot follow the author in the details of his great work, which gives a vivid picture of life in ancient Rome in the light of the most recent archæological discoveries. He has selected only the most significant and valuable material from among the rich treasures intrusted to his care, for proving his views and theories. The publishers have spared no expense in order to make the volume as valuable and attractive as possible. The work cannot be excelled as a comprehensive and popular review of the results of archæological studies in Rome.

B. C. 1887. *A Ramble in British Columbia.* By J. A. LEES and W. J. CLUTTERBUCK. London and New York, Longmans, Green, & Co. 12°. $2.25.

IN the present volume the authors describe a hunting-trip from the Canadian to the Northern Pacific, up the Columbia and down the Kootenay Rivers. The book is beautifully printed, and illustrated by excellent photo-engravings reproduced from sketches and photographs of the authors. Those who are interested in angling, hunting, and other sport, and in *menus* of the dinners the travellers enjoyed on various parts of their journey, will find the book very interesting reading; but the illustrations make it valuable also to other readers. The authors succeeded in encountering the most marvellous adventures, particularly when they reached American soil, all of which are illustrative of the low state of culture in which our western Territories, as compared to British Columbia, are. If we take the authors' description *cum grano salis*, it is a good description of what travelling in the Kootenay valley under unfavorable circumstances might be. The good luck of the authors in having many marvellous adventures makes the book very interesting reading, and welcome to lovers of books of travel.

Die Gletscher der Ostalpen. By Dr. E. RICHTER. Stuttgart, J. Engelhorn. 8°. $3.

THE present volume belongs to the series of manuals of German geography published at the instance and under the direction of the commission for studies on the geography of Germany, which also edits the interesting 'Forschungen zur Deutschen Landes- und Volkskunde.' Dr. Richter has compiled a large amount of material on the glaciers of the eastern Alps, his material being principally derived from the map of the Austrian War Department. In an introduction the author discusses the methods of determining the limit of eternal snow, and adopts the principle first applied by Brückner, who collates data on summits which nearly reach the limit of eternal snow, but have no accumulations of snow and ice on exposed slopes, and such data on mountains which have small snow-fields and glaciers. He concludes that the snow-line is intermediate between the heights of the summits of these mountains. Dr. Richter discusses this method very fully, and later on applies it to the eastern Alps. We cannot enter into his interesting descriptions of glaciers and of their advance and retrogression, but call attention to an important result of his investigations, that the central parts of the Alps have a higher level snow-line than the northern and southern portions. Chains of mountains have the same effect upon the height of the snow-line as plateaus have, the line being lower on the outskirts and higher in the central portions.

NOTES AND NEWS.

IN a memorandum prepared by the executive committee of the Dominion Land Surveyors' Association a number of rules are suggested as a remedy in the confusion of the geographical nomenclature and orthography in Canada. The principal feature of these resolutions is the suggestion of the compilation of a complete geographical dictionary of the Dominion by the Department of the Interior, and that all names given by explorers in new tracts of country be submitted to the surveyor-general, and, after approval by him, be entered in the geographical dictionary before being shown on any official maps or plans. Besides this, the rules of the Royal Geographical Society for spelling Indian names are recommended.

— The *Flamme*, the official organ of the Berlin Cremation Society, states that the total number of bodies cremated in the various countries to the 1st of August is as follows: Italy, 998; Gotha, 554; America, 287; Sweden, 39; England, 16; France, 7; Denmark, 1. The members of cremation societies number 3,012 in Sweden, 1,326 in Denmark, 1,326 in Holland, 612 in Germany, 580 in Italy, 438 in Hamburg, and 390 in Switzerland (Zurich). There is a curious disparity between the number of members in Italy and the proportion cremated. It is officially stated that outside of Asia there are but fifty cremation-furnaces in existence. Of these, twenty are in Italy, one in Germany, one in England, one in Switzerland, one in France, and the rest in the United States. From this statement it would appear that cremation has not made the rapid strides which its advocates hoped for.

— Mr. A. Howard Clark, of the Smithsonian Institution, has been appointed by the President to be one of the scientific experts to attend the international exposition in Paris in 1889. Mr. Howard was a member of the executive staff of the United States commissioner to the international fisheries exhibition in London, in 1883.

— Prof. C. V. Riley, of the Agricultural Department, the representative in charge of the exhibit of agricultural products from this country to the Paris exposition, has issued a circular in which he announces that a board has been formed in the Department of Agriculture, consisting of Professor Riley, William Saunders, O. D. LaDow, M. Trimble, and Dr. D. E. Salmon, to decide upon the agricultural exhibit.

— No. 95 of Van Nostrand's Science Series is entitled 'Plate-Girder Construction,' by Isami Hiroi. For railway as well as highway bridges, there is probably no other form of girders that are more extensively used and daily being constructed than plate-girders. The reason for this lies mainly in the simplicity of their construction, and their stiffness as compared with open-girders. That the construction of a plate-girder is simple, is, however, no reason to suppose that the stresses produced in it by external forces are also simple. On the contrary, to determine actual stresses in every part of a plate-girder is one of the most complicated problems that can