ple, thanks to its contained arsenic, was long regarded as poisonous, until being produced in a state of purity, its entire harmlessness was demonstrated. There is a general review of the laws regulating the use of poisonous colors, and then, *verbatim*, the enactments of Germany under date of July 5, 1887. In 1888 there were appended to the said enactments regulations as to the examination of colors, fabrics, fruit jellies, liquids, etc., for arsenic and tin, and these Dr. Weyl has given in full. The methods are interesting and exact, though not original. The laws of other countries than Germany are given in some detail, and then we pass to the experimental part, the method to be followed being first described. As it was out of the question to test all, or even the greater portion, of the numberless coal-tar derivatives, Dr. Weyl selected such as were suspicious or had already been regarded as poisonous and endeavored to take those in most general use. Of the nitroso colors, we have dinitrosoresorcinol and naphthol green, B. The nitro colors include picric acid, saffron-substitute, Martins' yellow, naphthol yellow S, brilliant yellow, and aurantia, and of these only the sulphonated colors, naphthol yellow, and Martin's yellow were found to be harmless. The azo- colors are discussed at some length from both a technical and toxicological standpoint, but of the twenty-three colors examined only two, menatil yellow, and orange II., produced distinctly poisonous effects when administered by the stomach. Many, however, developed a slight albuminuria, and one at least was plainly poisonous when introduced into the subcutaneous cellular tissue.

It is highly gratifying to remark the comparative harmlessness of by far the greater number of the coal-tar colors, and even in those colors which are indicated as poisonous such large does are necessary in order to produce toxic effect as to render accidental poisoning from the same a practical impossibility.

Much honor is due Dr. Leffmann for his part in giving to the English-reading public this book, the first on the subject in our language,— but the hearty reception it has met with from chemist, medico-legal expert, and medical practitioner alike, bespeaks sufficiently its worth and opportune appearance.

CHARLES PLATT.

*Alternating Currents.* By FREDERICK BEDELL, Ph.D., and A. C. CREHORE, Ph.D., Instructors in Physics, Cornell University. New York, W. J. Johnson Co.

THE Johnson Co. is to be congratulated upon the appearance and make-up of this volume. The large, clear print, good paper, and well-drawn figures, make it one of the best books, from a mechanical standpoint, which has ever been published. On careful examination there does not appear to be a single misprint, or a single error in the mathematical formulæ, in marked contrast to the slipshod English and errata which disfigure almost every page of Fleming's book. No less are the authors to be congratulated on their work, for this book will probably be for years a standard text-book on the subject. Whatever one may find to criticise, it will not be the manner in which the subject is treated, nor mistakes in the treatment.

The subject is developed in a logical and simple manner. In Part I., which contains the analytical methods, we have, after an introduction on the elementary notions of the magnetic field, current flow, and harmonic motion, the general equation for circuits with resistance and self-induction; then the solution to this equation, and its application to the different cases possible. The constants of the equation are determined in each case, and curves plotted from actual values of the resistance and self-induction. Next in order come the general equations for circuits with capacity and resistance, and circuits with resistance, capacity, and self-induction. These are treated in the same manner. All possible cases are considered, the constants determined and curves drawn to illustrate the solutions.

Chapters xii. and xiii. treat of circuits with distributed capacity and self-induction, a subject of the utmost importance in these days of long-distance telephoning and telegraphy.

Part II. contains the graphical treatment. The analytical results obtained in Part I. are made use of as a foundation for the graphical methods. In addition to the cases considered in Part I. we have cases of circuits, in series and parallel, containing different voltages, resistances, self-inductions and capacities, and the results of variations of the latter in such circuits. At the end of the book is given a table of mechanical and electrical analogies, amplified from that previously given by other writers. The consistent notation used throughout the book gives an added pleasure to its perusal.

There are some things omitted which might have been treated of with advantage. For instance, though the graphical solution of problems concerning divided circuits is given, the analytical is not. If Lord Rayleigh's method were the only one known, there might be a reason for this, but those who are readers of *La Lumiere Electrique* and *L'Electrician*, will call to mind various neat and simple methods of treating the subject, and the latter is too important, practically, to be able to do without any thing which can add to our information.

We understand that the authors have underway a volume on alternating circuits containing iron. With Kennelly's and Steinmetz's laws, we may expect from the analytical treatment much that is new and important with regard to the best size and dimensions of transformers for given efficiency and output, etc.

This work has been adopted as a text-book by a number of American universities, Cornell, Purdue, University of California, and others.

R. A. F.

*Comparative Philology of the Old and New Worlds with Reference to Archaic Speech.* By R. P. GREG, F.S.A., F.G.S., etc. 1 Vol. LXXII. 355 p. Royal 8°. London, Kegan Paul, Trench, Trübner & Co., 1893.

IT it a painful duty for a reviewer to take up a work which is honest in intention and laborious in execution, but hopelessly deficient in method; and such is the one before us. To issue its considerably more than four hundred large pages must have cost the author a great deal of work and of money; yet for all scientific purposes the results he reaches must be estimated as scarcely above zero.

The judgment may seem harsh, but let us see what he sets out to prove and what methods he adopts. He writes to support the hypothesis of an original unity of language, of an original common tongue, an archaic speech of great simplicity, composed of differentiated emotional and imitative utterances, fragments of which can be traced in all the languages of the world, bringing them, therefore, into a genetic relationship. To prove this, he devotes over 350 pages to "Tables of Accordances," lists of words which he believes to be from the same root in the most diverse tongues. The hypothesis is by no means a novel one, nor does he claim it as such, but perhaps it has not before been urged with such abundance of illustration.

Whatever one thinks of the hypothesis, all will agree that a competent knowledge of linguistics should be asked in its supporters, if they claim a hearing before the scientific public; and just here Mr. Greg is strangely deficient. His introduction begins with a survey of American languages, and as these figure largely in the tables, they will serve as a test of his work in general.

His authorities at once awake astonishment. Ignatius Donnelly's "Atlantis," the second-hand reports of Bancroft, Canon Cook, Hyde Clark, and Bradford, the tracts of Professor Campbell, and Vincente Lopez, and a few unimportant and defective vocabularies, such as these of Marcoy and Parry, are the books that figure most prominently in his "list of authorities" What he has learned from them is on a par with their value. He speaks (p. x.) of "the ancient Nahua and Aztec languages of Mexico," unaware that these words are merely different names for the same language. On the same page he refers to the "Californian" language, as if any such existed; and attributes to Schoolcraft (instead of Lieber) the term *holophrastic*, as applied to American idioms. Who "Dr. Daniel Whitney, the well-known American philologist," may be, will certainly puzzle readers, as he is surely not known on this side of the Atlantic.

When it comes to the tables of accordances, all American languages are conveniently divided into northern, central, and

southern. It would go hard with a student if in this broad field he could not find a word somewhat analogous in meaning to any other word in any other language; particularly were the student satisfied as easily as Mr. Greg. For instance, among his "accordances" there are plenty of instances of analogies like the following: Accadian, *shuku*, wheat, American, *mays*, maize; Accadian, *ka*, life, American, *ak*, water; Hebrew, *ben*, son, American, *hua*, son; Thibetan, *sna*, to breathe, American, *cenka*, noise; Indo-Chinese, *petan*, bird, American, *pa-hue*, to fly, etc. Thousands of his "accordances" are no closer than these.

But the unscientific spirit of the book is only too painfully apparent throughout. All such mere phonetic similarities, even where they are real and close, are of absolutely no value and prove nothing whatever concerning the relationship of linguistic stocks. This can only be demonstrated by studying the history and growth of a language, tracing its development and the influences to which it has been subjected, ascertaining the evolution of its grammatical forms and categories, separating the original elements from grafts and accretions, and confining comparisons to the former exclusively, and then only in the forms which existed at the earliest ascertainable epoch. Any such method as that adopted by Mr. Greg, in which these elements of linguistic growth are omitted, and even in which identity of alphabetic value is not attempted, is wholly valueless; and it is most unfortunate that all writers on linguistics have not been educated to recognize this fundamental principle of research.

*An Atlas of Astronomy.* By SIR ROBERT STAWELL BALL, LL.D., F.R.S. New York, D. Appleton & Co.

IN this work Sir Robert Ball has added a handy companion to his "Star Land." The atlas contains a series of seventy-two plates explanatory of the sun, moon, major planets, and fixed stars. The object of the atlas is to put into a convenient form, for the amateur astronomer, those data that will interest in a study of the evening sky. The author has in the introduction given the usual definitions of the coördinates of the position of a heavenly body as seen projected upon the celestial vault. A very neat explanation of the manner in which the orbit of a binary star is computed, is given, and as the process is so simple young astronomers will find in the construction of the orbits of the hundreds of binary stars very interesting instruction. The lunar maps, although upon a small scale, are very complete, giving as they do a representation of some part of the moon's surface throughout the whole lunation. A good selection of telescopic objects, such as interesting double stars, nebulæ, and rich star clusters is also given. The name of each object and its position in the sky are given as well as a short explanatory note describing the object. We note that some of the explanations given by the author are a little abstruse. On page 2, in describing the path of a planet, the words ellipse and orbit seemed to be woefully mixed up, so that it is difficult to follow the meaning of the author. For example, we have the statement that "the line *PA* through the two foci is the axis major of the ellipse. This is immediately followed by the statement that "it is bisected in *O* at the centre of the orbit." An orbit and an ellipse are not the same by any means, and should never be considered as such. A few lines following we have the statement that "the point *P*, nearest the sun, is the perihelion of the orbit. We certainly fail to see the truth of that statement. We should say that *P* was the perihelion point of the object moving in the orbit. The same criticism applies to the point of aphelion. Again, we must question the statement that "the time that the planet takes to go around its orbit is the periodic time." We were not aware that a planet went around its orbit. If it does, what is the name of the path in which the planet itself is moving? Upon the whole, the work has been neatly arranged, and the publishers have made it attractive both in style of printing and in neatness of binding. We would recommend the book to those who are seeking for some popular work that has in a handy form the interesting points in astronomy.

G. A. H.

## CALENDAR OF SOCIETIES.

### Philosophical Society, Washington.

Apr. 29.—Cleveland Abbe, Measurements of the Growth of Plants with the Auxanometer; Henry Farquhar, The Price of Silver; M. H. Doolittle, Is there an Objective Reality?

### Appalachian Mountain Club, Boston.

Apr. 29.—Charles M. Skinner, Across British America.

May 3.—Lemuel C. Barnes, Mount Hermon in April; Charles C. Hall, The Shawangunk Mountains.

### Society of Natural History, Boston.

May 3.—R. T. Jackson, Notes on the Development of Palms.

### Royal Meteorological Society, London, England.

Apr. 19.—"The Direction of the Wind over the British Isles, 1876–80," by Mr. F. C. Bayard, F.R. Met. Soc. This is a reduction on a uniform plan of the observations made twice a day, mostly at 9 A.M. and 9 P.M., at seventy stations during the lustrum 1876–80, and the results are given in tables of monthly and yearly percentages. "Notes on Two Photographs of Lightning Taken at Sydney Observatory, Dec. 7, 1892," by Mr. H. C. Russell, F.R.S. These photographs were taken with a ½-plate view-lens, mounted in a whole-plate camera, and, as a matter of course, there is some distortion at the edges. Both photographs show the gas-lights in the streets as white specks, the specks being circular in the centre and crescent-shaped in other parts of the plate, owing to distortion. The lightning-flashes are also distorted. Mr. Russell believes that this distortion may account for the so-called "ribbon" flashes which are seen in many photographs of lightning. He has also made some measurements of the length and distance of the flashes, and of the intensity of the light. "Notes on Lightning-Discharges in the Neighborhood of Bristol, 1892," by Dr. E. H. Cook. The author gives some particulars concerning two trees in Tyntesfield Park which were struck by lightning, one on June 1 and the other on July 18, and also some notes concerning a flagstaff on the summit of Brandon Hill, which was struck on Oct. 6. "Constructive Errors in Some Hygrometers," by Mr. W. W. Midgley, F.R. Met. Soc. The author, in making an investigation into the hygrometrical condition of a number of cotton mills in the Bolton district, found that the mounting of the thermometers and the position of the water receptacle did not by any means conform to the regulations of the Royal Meteorological Society, and were so arranged that they gave the humidity results much too high. The "Cotton Factories Act" of 1889 prescribes the maximum weight of vapor per cubic foot of air at certain temperatures; and the author points out that, if the instruments for determining the amount present in the mills have an error of 20 per cent against the interests of the manufacturer, it is necessary that the makers of the mill hygrometers should adopt the Royal Meteorological Society's pattern for the purpose.