begin. Lastly, the apex or crowning stone of the pyramid was no other than the antitype of that stone of stumbling and rock of offence, rejected by builders who knew not its true use, until it was finally placed as the chief stone of the corner. Whence, naturally, 'Whosoever shall fall upon it' — that is, upon the pyramid religion — 'shall be broken; but on whomsoever it shall fall, it will grind him to powder.'"

It would require all the space of this number of SCIENCE to print in full array the evidence on which these conclusions are rested. At every step the able astronomer royal of Scotland has fortified his conclusions by careful measurements of the Great Pyramid. His method of working is as follows: having found that the unit of measurement is a certain length, about an inch, which he terms the 'pyramid inch,' he seeks, in the various measurements of the structure, for correspondences in number of these units with natural and historic units, the distance of the sun, the radius of the earth, etc. Finding a correspondence, or *a close approximation to a correspondence*, he assumes that this ratio was intended by the builders to be a statement of this truth. At first sight, the number and accuracy of these correspondences is simply astounding: they look like insuperable facts. Moreover, the measurement of the sun's distance, and perhaps some other ratios from the Great Pyramid, may turn out in the end to be closer to the truth from the pyramid revelation than they are to our present measurements.

After a sagacious review of the principal coincidences, and an effort to show their generally unintended nature, Mr. Proctor proceeds to develop his own view, which is, in effect, that the pyramids were built for astrological observatories, designed for the casting of the horoscopes of the successive kings. He shows clearly, and we believe was the first to show, that early astronomy was astrological in its aims, and that the pyramid, when it had been carried up to half of its height, would afford the best possible structure for astronomical work of that time. His ingenious, and we must say convincing, argument requires us to assume a much more advanced state of astronomical and geodetic science in those days than many would be willing to admit. Still, the old Semitic civilization is a vast unexplored realm: it is a vain fancy that we yet know what it contained. It is easier to give to it any thing in the way of learning than to accept the monstrous scheme of bungling prophecy that the pyramidalists offer in its stead.

The student of science may have something beyond the entertainment that all readers will find in this book, and the literature of which it will form an important part. He may find in the controversy a suggestion of certain dangers that await all work of a theoretic kind. All the work of extending our conceptions of natural phenomena, all the work of true science, must be carried on by the method of coincidences. A fact, or series of facts, is compared with other facts or series, and, from their observed identities, relations are inferred. The use of this method, under rigorous scrutiny, has given us our modern science, and must give us all that is truly scientific in the time to come. The incident of the Great Pyramid inquiry may well lead us to notice certain dangers in this method. A large part of the facts with which the naturalist has to deal has for him the danger that the Pyramid of Cheops has for the mathematician. Between the thing in hand and other things, there is a practically infinite number of relations. If he sets out on his inquiry with a mind to find resemblances of a certain kind, this liberal nature is sure to gratify him. Nothing but the most rigorous correction of the reasons for an opinion by the reasons against it will keep him safely on his way.

The more fixed the opinion that guides the student in his work, the surer he is to find in the infinite that any object offers the facts to support his views. This is the great danger that lies in the way of many who are seeking to advance the development hypothesis in biology. Having become possessed with the conviction that certain things are to be found, they will see them as Smyth sees revelation in the stones at Ghizeh.

There are some faults to be found with the *making* of this book. More than one-third of it consists of separate essays on the origin of the week, — Saturn, and the sabbath of the Jews; astronomy and Jewish festivals; the history of Sunday; and astrology, — all very interesting in their way, but they are not represented in the title. There is no proper table of contents, and no index. The British seem determined to leave this work of opening their modern literature to students, altogether in the hands of the Index society.

The book is written in the admirable didactic English of which the author is a master.

MINOR BOOK NOTICES.

Man before metals. By N. JOLY. New York, 1883. (International science series, no. 45.) 8+365 p., illustr. 8°.

THE author of this attractive volume, unlike many European writers on archeology, gives but little space to the subject of North-American antiquities; and, of the one hundred and

forty-eight illustrations, not one represents a characteristic stone implement of this country. The little that our author finds to say under the comprehensive title of 'Prehistoric man in America' is included in twelve pages, constituting chapter vii., and is mainly a review of Squier and Davis's Ancient monuments of the Mississippi valley, with brief reference to certain discoveries recorded so long ago as the publication of Gliddon and Nott's Types of mankind. Mr. Joly might readily have done far better. No mention is made of the vast amount of material gathered within the last decade, that bears so strongly upon the vexed question of man's antiquity on this continent. The scores of publications of the Smithsonian institution, the invaluable reports of the Peabody museum, and the transactions of our learned societies generally, have been quite overlooked; and a vain attempt has been made, in lieu thereof, to bolster up the claim of antiquity of America's earliest people by reference to the mounds of the Ohio valley, many of which have recently lost their claim to a pre-Indian origin, and others, doubtless, will yet be shown to have been erected by the ancestors of our modern redskin. As a *résumé* of European archeology, it is valuable, but not otherwise. To the American students of the science it will prove disappointing.

Hydraulic tables for the calculation of the discharge through sewers, pipes, and conduits; based on Kutter's formula. By P. J. FLYNN. New York, *D. Van Nostrand*, 1883. (Van Nostrand's science series, no. 67.) 135 p. 24°.

KUTTER'S formula for determining the velocity of flow of water is one of the class which has the general form $v = c\sqrt{rs}$, where r is the ratio of the cross-section a to the wetted perimeter, and s is the sine of the slope; but the coefficient c is of such a complex form, that the application of the formula to definite problems in water-supply and sewerage is somewhat tedious. This collection of tables is designed to facilitate the work, and gives values of r, $c\sqrt{r}$, and $ac\sqrt{r}$, for circular and egg-shaped sections, and of s and $\sqrt{s}$ for different slopes. The coefficient of roughness or friction used is .015, and a number of examples make clear the use of the tables. Engineers who have such work in their practice will find these tables convenient.

Chemical problems, with brief statements of the principles involved. By JAMES C. FOYE. New York, *Van Nostrand*, 1883. (Van Nostrand science series, no. 69.) 6+141 p. 24°.

THE value of chemical problems as a practical illustration of the rules of stochiometry is recognized by every teacher of chemistry. A thorough knowledge of chemical arithmetic is constantly required in the laboratory, and it can only be gained by actual practice in the solution of problems. The convenience of having a collection of examples at hand will therefore be appreciated by teachers; and this book will doubtless supply a deficiency to those who prefer the problems arranged independently of the text-book. A great variety of examples are presented, with very full illustrations of the relations which exist between the factors and products of chemical reactions, beside calculations of atomic and molecular weights, specific and latent heat, specific gravity and vapor density. Examples are also introduced on the metric system of weights and measures, thermometric scales, and the laws of Mariotte and Charles.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Origin of the lines A and B in the spectrum. — M. Egoroff, by experiments at the physical laboratory of the University of St. Petersburg, has shown that the lines of the solar spectrum known as *A* and *B* are due to the oxygen of our atmosphere. He employed a tube twenty metres in length, closed with glass plates, in which tube the gas under investigation could be condensed under pressures of fifteen atmospheres or less, proper care being taken to dry it thoroughly. The telluric character of these lines has been generally admitted, but has of late been called in question by Mr. Abney, who suggested that they might be due to cosmical hydrocarbon gas of some kind, diffused through space in accordance with Siemens's theory. M. Egoroff sets this question at rest, having determined by direct experiment that none of several different hydrocarbons tried gives any such bands, while oxygen unmistakably does give them. — (*Comptes rendus*, Aug. 27.) C. A. Y. [327

On the assumption of a solar electric potential. — Werner Siemens discusses the hypothesis proposed by his brother (Sir W. Siemens), that the sun has a high electric potential, due to the friction of the dissociated matter which, according to his