respiratory centre. Furthermore, the spreading of the convulsions to the trunk and limbs finds its explanation in the fact that almost all the muscles of the body are at the call of the respiratory mechanism, when such additional strain is necessary in order to succeed in the fight for breath. And the whole series of facts finds a striking corroboration in the experiments of Saltmann, who found that the cortex of young puppies was unexcitable before a certain period, owing to the fact that these higher paths of motor effects had not yet been laid down. Dr. Jackson's view of epilepsy has met with considerable favor; and the modification of it now presented adds to this very suggestive, original, and ingenious interpretation of the facts of cerebral physiology and pathology. J. J.

ASTRONOMY IN APPLETON'S 'ANNUAL CYCLOPAEDIA.'

APPLETON'S 'Annual cyclopaedia' has for several years past included a summary of astronomical progress. These summaries have been so far from satisfactory as to call for some critical attention. They have been lacking in nearly every quality which they should have, — literary form, appropriateness, judicious selection, well-digested conclusions, and freedom from doubtful speculations. That for 1885, which has just been issued, does not show the slightest improvement, unless it is that the scissors are less freely used than formerly. In the qualities of redundancy and deficiency it seems, if possible, worse than its predecessors. As examples of the former, we have a whole column devoted to Dr. Huggins's supposed photographs of the solar corona, mixed up with his opinions of its nature and cause. A column is devoted to the red sunsets, which are not shown to have been more numerous than they always have been since the memory of man. Nearly the same space is devoted to pointless remarks upon eclipses in general and the two eclipses of the year. Not a word is said about the observations of these eclipses, — a deficiency which is perhaps compensated by the information that the next central eclipse visible in New Zealand will occur in 1927. The table of periodic comets has nothing to do with the astronomy of the year, and omits the only element of the slightest popular interest; namely, the times of perihelion passage. For the paragraph on occultations it is hard to imagine a *raison d'ëtre*, unless it was to fill space. No allusion is made to any observations of an occultation during the year. More than a page is devoted to the system of telegraphing astronomical discoveries, which has been in operation for several years, and had, we think, been mentioned in previous volumes of the 'Cyclopaedia.' Any thing more valueless than the paragraph on bibliography it would be difficult to conceive. It concludes by informing us that "the *Sidereal messenger*, the only astronomical journal published on this continent, is issued monthly by Prof. W. W. Payne of Northfield, Minn." This journal so well deserves popular support, that we have no hesitation in repeating the announcement. The unsoundness and inconsistency of the remark on the solar spots are curious. We are first told that there has been no abatement, up to 1885, in their number or magnitude, and that suspicion therefore attaches to the theory of their periodicity. This is followed by several statements fixing the maximum in 1884 or 1885. As a matter of fact, Dr. Wolf fixed the maximum at the end of 1883.

Among subjects omitted may be mentioned, of American origin, Langley's 'Researches on lunar heat;' Hill's 'Contributions to the lunar theory;' Hall's 'Investigation of the satellites of Uranus and Neptune;' the discussion of the astronomical day, which has filled so prominent a place in scientific literature; and the work of Rowland and Pickering in celestial photography. The important foreign works which have been passed over, and which might have well taken the place of the stuffing that forms a third of the article, are too numerous to mention. The only conclusion which can be drawn is, that one-half of the article is better fitted to fill space than to give valuable information about the astronomical progress of the year.

BIMETALLISM IN THE UNITED STATES.

PROFESSOR LAUGHLIN has produced a most valuable book both for study and for reference. It is not only a history, but a critical examination of successive policies in the light of economic theory. It might, perhaps, be objected that the lesson is sometimes a little too obtrusive; but the independent reader who feels under no obligation to accept the author's conclusions may well pardon this fault. The author is a decided monometallist, and presents the arguments from the point of view of his own school. No objection can, however, be made to his statement of facts, and the reader can readily separate his arguments from them. One of the characteristic features of the book is the number, variety, and fulness of its graphic representations, which add greatly to the value of the work, and would have added yet more had they been better planned and arranged.

The history of bimetallism in the United States. By J. LAURENCE LAUGHLIN. New York, *Appleton*, 1886. 8°.

As an example of possible improvement, we may take the charts showing the fluctuations in the relative values of silver and gold. There are four such charts scattered in various parts of the book, without any apparent connecting-link.

The work is altogether so suggestive, that those who agree, as well as those who disagree, with the author's views, will find ample food for thought in reading it. The ground covered is so wide and the treatment so uniform, that it is scarcely possible to select one passage for comment rather than a score of others. It may be remarked, however, that the author's views of the ethical question involved in the monetary change of 1834 coincide more nearly with those of the advocates of free silver coinage at the present time, than we like to see. Up to 1834 our currency was on an almost pure silver basis, as the value of the gold in the gold dollar was a little greater than that of the silver in a silver dollar. In order to bring gold into circulation, it was necessary to change the ratio, which might be done either by increasing the weight of the silver dollar or diminishing that of the gold dollar. The latter course was adopted, on the ground, that, as silver was the standard at the time, the new coinage of gold should be accommodated to it. Professor Laughlin objects to this, that in reality the change in the marked ratio before 1834, which necessitated the new ratio, consisted in a depreciation of the value of silver; and that in consequence it was the silver dollar which should have been made heavier in order to bring it up to the old standard. This is the very argument on which the silver men now sustain their views. They claim that gold has appreciated in value, and that we should go back to the old silver dollar, the value of which they believe to have been more stable than that of the gold dollar. In either case, we think the sound view to be that the standard for the time being should be accepted rather than that of some past time.

GEOLOGY OF ARABIA AND PALESTINE.

IN 1883 the committee of the Palestine exploration fund wisely took advantage of an interruption of its regular work caused by the interference of the Turkish government to send Professor Hull, with a well-selected party, to explore some of the less-known districts of Arabia Petraea and southern Palestine, — regions of interest not merely geologically, but historically as well.

The route of the party extended through the Sinaitic peninsula, and thence into the Wady Arabah and to the southern end of the Dead Sea, then over the Judean hills to Gaza, and from this place to Joppa, Jerusalem, and the Jordan valley. The intention to explore farther north was frustrated by the snow of an unusually severe winter. The exploration was thus somewhat limited in its range; but Professor Hull has supplemented it by references to the works of the numerous geologists who have at various times studied the rocks of the districts traversed, and of the adjacent regions around the eastern end of the Mediterranean, which have many points in common.

Geologically considered, the district in question is part of an extensive region of western Asia and northern Africa, characterized by the wide distribution of cretaceous and eocene marine limestones resting on old and for the most part crystalline rocks, and in part overlaid and margined by very recent deposits.

The old gneisses and schists penetrated by great dikes and masses of intrusive granite and diorite, which constitute the mass of the Sinaitic Mountains, and extend thence along the Gulf of Akabah and the Wady Arabah, are similar in mineral characters to the Laurentian rocks of this continent; and Hull agrees with Oscar Fraas and the writer of this notice in referring them and similar rocks of upper Egypt to that ancient system. Thus we have the interesting fact that the nucleus of the old historic lands of Egypt and Arabia is composed of the same venerable rocks which occupy a similar place in northern Europe and in North America. Flanking these oldest rocks, there seem to be in Arabia, as in Egypt, newer slates and schists and igneous rocks, probably of Huronian or old Cambrian date.

Here, however, there occurs a great gap in the sequence, and we find nothing to represent the Siluro-Cambrian, Silurian, or Devonian systems; the next rocks in ascending order being sandstones, conglomerates, and limestones, the 'desert sandstone' of our author, which hold carboniferous fossils. These beds are not of great thickness or horizontal extent, but afford unequivocal evidence of their age in the fossils of the genera Zaphrentes, Productus, Orthis, etc., which they have afforded. A true lepidodendron has also been obtained from the sandstone.

Until recently these carboniferous rocks were confounded with an overlying sandstone of somewhat similar character, but of much greater thickness, — the Nubian sandstone, which is probably of lower cretaceous age, though it is by no means certain that it may not represent the Jurassic or even the trias. The relations of these sandstones, both in Arabia and Egypt, are somewhat perplex-

Physical geology and geography of Arabia Petraea, Palestine, and adjoining districts. By EDWARD HULL. Adelphi, *Com. Palestine explor. fund*, 1886. 4°.