Mlle. Joteyko made it probable that the nerve centers are much more resistant to fatigue than the peripheral motor organs.

Schuyten reported, from the pedological bureau of the city of Antwerp (a unique institution), a series of tests of the muscular strength (grip) of pupils throughout the school year. In order to eliminate the effects of increase in age, he ascertained the age in months of each child, and tested him only in the month when he had a certain age, viz, 8 years 9 months in one series, 9 years 9 months in another. The results for the two series, and for girls and boys, showed a close parallelism. There was a gradual increase in strength from October to January, a fall from January to March and a rise again to June or July. March was the weakest month, June and July the strongest.

Netchaeff, of St. Petersburg, reported on some tests of the memory of school children for various sorts of impressions: objects seen, objects heard, names recalling visual, auditory or tactile impressions, names of emotions, abstract names and numbers. He found the memory to be best for objects seen, and next best for names of visual impressions; it was poorest, up to the age of 12 or 14, for names of emotions, and beyond that age for numbers and abstract names. The memory for numbers was always about as strong as for abstract names; and the increase in power to remember these two was, from 9 to 18 years of age, rather slight. The increase was greatest in case of objects seen and of words denoting emotions. The rapidity of the growth of memory fell off at puberty. The boys excelled the girls in remembering objects, the girls excelled in remembering names and numbers.

Psychical research was thoroughly ventilated at the Congress. Flournoy presented his observations on the celebrated medium Helen Smith. Myers and others testified to the remarkable revelations made by Mrs. Thompson—who, by the way, was present at the meetings, and certainly did not give one the impression of anything abnormal or uncanny. Encausse described some electrical apparatus for automatically recording the movements of mediums during a trance, so that their movements may be known, without the embarrassing presence of a scientific observer. Baraduc and others expounded queer ideas and demonstrated queerer-seeming facts relating to 'psychic exteriorization,' etc. Finally, a new psychical research society, the *Institut Psychique*, designed to have an international following, was inaugurated.

No great amount of new apparatus was exhibited at the Congress. Sommer presented some ingenious instruments for recording movements in three dimensions of the hand or leg, also for measuring the size of the pupil in reactions to light, emotions, etc. Scripture exhibited some of his color demonstration apparatus. In addition to this, Binet showed us his laboratory at the Sorbonne, equipped largely for the registration of movements, pulse changes, etc.; and Toulouse invited us out to the Asylum at Villejiuf, where he has installed a psychological laboratory equipped with several new forms of apparatus for testing sensations.

All the Parisian psychologists, in fact, were extremely hospitable. The visitors had every opportunity to meet them and each other, and the sociability of the Congress was one of its most successful features.

R. S. Woodworth.

SCIENTIFIC BOOKS.

Éléments de paléobotanique. By R. Zeiller. Paris, 1900. Carré et Naud. 8vo. Pp. 417. Illustrated.

The remarkable increase in accessions to our knowledge of fossil plants, which has taken place within the last two decades, coupled with a similar advance in our knowledge of existing species, and a recognition that a proper correla-

tion of these two lines of botanical study must have an important bearing upon our knowledge of phylogenetic relations, has led botanists to look forward with confidence to the issue of works which would bring paleobotanical research into harmony with botanical knowledge in other directions, and serve to definitely eliminate the many errors and misconceptions consequent upon a copious but scattered literature, much of which had its origin at the hands of investigators who, although well qualified for their task in other respects, nevertheless lacked the essential element of special training and insight as botanists. In his 'Fossil Botany' issued in German in 1887, and reissued in an English edition in 1891, Solms-Laubach first opened the way to this reform, but his admirable work left much ground untouched. The expectations of botanists were more fully and most agreeably met by the issue of the first volume of Seward's 'Fossil Plants' in 1898, a work in thorough accord with the most recent views of botanical relationship and plant development, and which also possesses, among other excellent features, the great merit of having issued from the pen of one who is not only a thoroughly trained botanist, but one who has likewise acquired an intimate knowledge of geological facts. Before the completion of this epoch-making book, we are called upon to welcome another less pretentious, but nevertheless excellent work at the hands of a French author of wide repute. The extended experience as a paleontologist which M. Zeiller has enjoyed for many years, and the great excellence of his well-known publications on fossil plants, will serve to make this latest contribution from his pen a particularly welcome one to botanists.

The 'Éléments de paléobotanique' follows somewhat the same general scheme as Seward's 'Fossil Plants,' but it is much less complete in detail. The plan of treatment embraces a consideration of

1. The mode of preservation of fossil plants.
2. Classification and nomenclature.
3. A systematic treatment of the various groups of plants, commencing with the Thallophytes.
4. The succession of floras and relation to climatic conditions.
5. General considerations bearing upon the evolution of plant forms as indicated by the evidence of fossil plants.

The chapter on classification is devoted chiefly to general considerations and leaves much to be desired in the way of defining the author's position with respect to the relations of the various groups of plants. This is, however, the natural result of approaching the subject from the standpoint of the experienced geologist, rather than from that of the expert botanist, and a clearer conception of his point of view is gained from the subsequent section on a systematic treatment of the various groups, wherein he adopts a plan which, in some respects, can hardly be regarded as in accord with the most recent views of plant relationship. Such defects in systematic treatment, however, are of minor importance and are readily overlooked in considering the excellence of the material which he presents and which in many cases also has the added merit of freshness, practically extending the ground covered by Seward's types.

In the systematic section, the treatment of the algæ is brief, and hardly serves to convey an adequate idea of the extent to which the most delicate and perishable of all the plants found in a fossil state are preserved. A concise statement presents the leading facts relating to *Nematophycus* so far as published results are known—a plant which, while appropriately considered under forms of doubtful or uncertain relationship, is probably to be regarded as representing a generalized type which may eventually be found to include representatives of both the Siphonæ and Laminarieæ, although recently acquired evidence would seem to point to the latter in most cases. The Characeæ is dismissed with a short paragraph which, in spite of the relatively unimportant position which this group occupies among fossil plants, fails to convey an adequate idea of our knowledge concerning them, and entirely ignores their probable occurrence in paleozoic time. The fungi are briefly considered, and they are made to include the myxomycetes, the occurrence of which is very problematical, and the bacteria, of which two excellent illustrations are given—one of *Bacillus vorax* and one of *Micrococcus guignardi*.

The Bryophytes are dismissed with a short chapter which is in harmony with the fact that they constitute one of the least-known groups among fossil plants.

Attention appears to have been concentrated chiefly upon the vascular plants, of which the author presents a well-chosen selection of types and among which he seems well at home. The most noteworthy feature of this section of the work, and one which gives it special prominence in advance of previous publications, is the recognition for the first time, of the recently established Cycadofilicinæ which marks the most important advance in paleobotany within recent years, and at once indicates the nature of the data which a further study of fossil plants may be expected to contribute to our knowledge of the evolution of plant life.

The value of the book is greatly enhanced for the purposes of the working botanist or the student, by the superior character of the illustrations. Taken either by itself or in connection with Seward's more elaborate work, which it largely supplements, it affords a hand book of considerable utility.

D. P. Penhallow.

Montreal, Sept., 1900.

La spéléologie, ou science des cavernes. Par E. A. Martel. I volume, 8 vo., pp. 126, avec 10 figures. Prix 2 francs. Collection Scientia Série Biologique, No. 8. (Georges Carré et C. Naud, Editeurs, 3, rue Racine, Paris.)

A series of small volumes is being issued under the direction of MM. Milne-Edwards, Gaudry, Filhol, Balbiani, and other members of the Institute of France; one of the most recent of them being a hand-book on caverns and their contents. Its title, 'La spéléologie,' is coined from two Greek words, and means the Science of Caverns. This term is an improvement on the German 'Hœhlenkunde,' long in use in Austria, for the reason that the latter does not recognize the scientific claim on which emphasis is now laid; 'kunde' being the synonym of intelligence, or news, rather than of a classified knowledge. La Société de Spéléologie, of which M. Emilé Riviere is now president, and M. Edouard A. Martel the general secretary, is in the sixth year of its existence, numbers many eminent scientists among its members, with its headquarters at No. 7 rue des Grands-Augustins, Paris, whence it issues a regular bulletin telling the latest news from all parts of the known subterranean world, and publishing special contributions of scientific value. Important service has thus been done to geologists, archeologists, zoologists, hydrologists, mining engineers and hygienists. M. Martel has for many years devoted his summers to the exploration of caves in France, Spain, Greece, Switzerland, Austria, Belgium, Great Britain and elsewhere; and no man is better qualified than he to treat of the Science of Caverns, as he has so successfully done in the work under consideration.

'La spéléologie' is divided into sixteen chapters. The first chapter defines terms, corrects certain errors and prejudices, traces the history of under-ground exploration, gives a succinct bibliography of cave literature for a century, and indicates the many ways in which this branch of study has aided mankind. The second chapter deals with the causes producing caverns; which are mainly, first, pre-existing fissures in the rocks, due to earthquakes, volcanic eruptions, and other means by which the earth's crust has been rent asunder; and secondly, rain-water, charged with acids from the atmosphere and the soil, which seeks the fractures, faults and diaclases thus made, and enlarges them by erosion, corrosion, and hydrostatic pressure. This triple process is more fully explained in several successive chapters. Corrosion is exemplified by the destruction of gypsum and rock salt, and other soluble formations. Evidences of erosion abound in marine grottoes and volcanic caves. Columns of water weighing many atmospheres often stand in deep pits, or flow through secret conduits, bringing tremendous pressure upon the rocky strata before which they must yield.

The author deplores the prevalent confusion of nomenclature employed to describe the phenomena and results of aqueous agency. On pages 32 and 33 he spreads before the reader an elaborate table of the names by which pits, chasms, and other exterior and interior openings are designated in different countries of Europe and America; also offering suggestions as to unification or simplification of terms.