of varieties established, agricultural botany may prove of much value to the farmer, gardener, and seedsman. Until then it belongs in the category of hopeful experiments.

MINOR BOOK NOTICES.

A treatise on the adjustment of observations, with applications to geodetic work and other measures of precision. By T. W. WRIGHT, B.A., late assistant engineer U. S. lake-survey. New York, *Van Nostrand*, 1884. 437 p. 8°.

THE student of the method of least squares often fails to grasp the true meaning and significance of the method, from the want of illustration and well-chosen applications. The chief merit of Mr. Wright's book is in the collection of examples which have been drawn from the records of actual work in which the author has been engaged. Besides the application of the methods of least squares to the results of triangulation and of levelling, a chapter is devoted to these methods in relation to line-measures in general, and to the calibration of thermometers.

There are some observers who are tempted to believe in the infallibility of certain criteria proposed by different writers for the determination of the weight of observations. There are others who reject the mathematical criteria, and prefer graphical methods as guides to a correct judgment. Mr. Wright is one of those who prefer to look at observations from the practical observer's point of view. His treatise will therefore be of interest to the mathematician who desires to frame criteria which will represent more closely the results of experience, and will prove of great utility to the practical man.

Recent progress in dynamo-electric machines, being a supplement to dynamo-electric machinery. By Prof. SYLVANUS P. THOMPSON. New York, *Van Nostrand*, 1884. (Van Nostrand sc. ser., No. 75.) 113 p., illustr. 24°.

THE writers who rapidly assimilate the advances in electrical engineering, and present their knowledge to the public in an intelligible way, are doing very useful work. The treatises of Professor Thompson are increasing upon the electrician's book-shelf. The time has not arrived for a standard treatise on electrical engineering, on account of the rapid changes and development of the subject. Until we can have such a standard treatise, we must rely upon brochures like this latest production of Professor Thompson.

The reader will find in it an account of Mr. Hopkinson's modification of the Edison dynamo, and also a description of the latest modifications of the Gülcher machine, and also of the Thomson-Ferranti machine.

Wonders and curiosities of the railway; or, Stories of the locomotive in every land. By WILLIAM SLOANE KENNEDY. Chicago, *Griggs*, 1884. 16+254 p. 12°.

ONE is a little startled, on opening this book, to find mentioned the "huge, ample-shadowed foundry; the peculiar fragrance of burnt earth and iron; . . . the boy controlling the huge steam-hammer; . . . and, finally, the great crane that lifts up the monster in chains, and carries it to the doorway, and sets it down in all the resplendence of its polish and paint, ready to begin its thirty years of toil," with nothing predicated of them; but is relieved immediately by the statement that 'this is the building of the locomotive.' This introductory chapter, in which 'our old Homeric poet Whitman' receives praise, and which may have been written by him, should not, however, deter the reader from going deeper into the book. From chapter ii. on, the writer tells the anecdotes he has collected in regard to the railway, and has succeeded in bringing together a most entertaining collection. The account given of the Quincy railway must change the impression that many have of that so-called 'first American railroad.' The chapter on the 'locomotive in slippers' is devoted to the history of the railway in the east, and at times is especially amusing. The author also touches upon the 'vertical railway' (the elevator), upon the various mountain railways, and upon the recent attempts to use electricity as a transmitter of power.

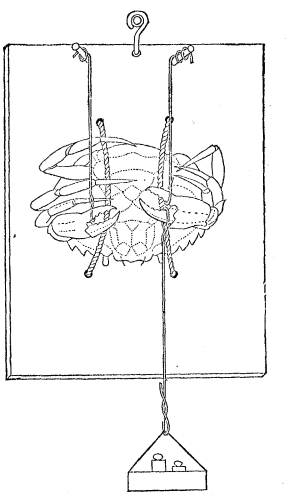
NOTES AND NEWS.

A CONFERENCE to formulate plans for the systematic observation and discussion of earthquakes was recently held in the rooms of the U. S. geological survey in Washington, at which there were present Messrs. Powell, Dutton, and Gilbert, of the survey, Abbé and Marvin of the signal-service, Paul of the naval observatory, Rockwood of Princeton, and Davis of Harvard college. It was decided that three classes of observations should be attempted; the first class consisting of those made by self-registering seismometers of approved pattern, upon which Messrs. Paul, Rockwood, and Marvin are to report at an early date. The second-class observations will be chiefly to determine the time of shock, probably by means of a

seismograph of relatively moderate cost. The third class will include ordinary non-instrumental observations according to a system to be prepared by Professor Rockwood. It is expected that a considerable number of the first and second class instruments will be maintained by co-operation of public institutions and government bureaus, at observatories, physical laboratories, army arsenals and signal-service stations, and navy-yards; while the instructions for the general observations will be sent to all the regular and volunteer observers of the signal-service, the members of the state weather services, and to all others who desire to aid in the work. In order to concentrate work on the most profitable districts, a chart of recorded shocks will be prepared by Professor Rockwood; and the selection of stations will then be discussed by Messrs. Rockwood, Abbe, and Davis. Further studies will be undertaken on the matters of bibliography, previous observations, and instruments; the whole work being under the direction of the geological survey.

— The recent works of the U.S. geological survey, and especially the remarkable report of Capt. Dutton, have given an opportunity to Professor Trautschold of Moscow to draw a parallel between the geological structure of Colorado and that of European Russia, which appears in the bulletin of the Moscow society of naturalists. In Russia the Silurian, Devonian, carboniferous limestone, and lower Permian series are marine deposits, while the upper Permian is of fresh-water or terrestrial origin. The trias and lower Jurassic rocks are also continental deposits, or seem to be so to a great extent, while the upper Jurassic groups are again of marine origin, as is also the chalk, which contains only islands with land vegetation. Three parts of the tertiary series consist of terrestrial and fresh-water deposits, marine deposits appearing only in the south; and the quaternary is also a continental formation. Such being, according to Professor Trautschold, the structure of Russia, he had already concluded that in the northern hemisphere there was a general retreat of the sea during paleozoic times, and a growth of continents, upon which the carboniferous and then the Permian floras largely increased; European Russia being, during the triassic and the first half of the Jurassic periods, a continent with nearly the same outlines as now. During the second half of the Jurassic period, another subsidence of the continent, and an advance by it into the northern hemisphere, again took place; without reaching, however, the same level that it had had during the paleozoic period, the sea remaining shallow. A second retreat of the water took place during the tertiary and quaternary periods. Similar oscillations might well explain, in Professor Trautschold's opinion, the structure of the Grand Cañon district, where the connection between the Jurassic and triassic is as close as in Russia.

— From recent experiments to determine the absolute force of the flexor muscles of decapod crustaceans, Professor Felix Plateau of Gand, Belgium, concludes that the absolute or static force of the muscles of the claws of crabs is relatively weak, and that while the adductor muscles of some lamellibranchs are comparable with those of mammals, and others with the more powerful muscles of the frog, the muscles of the claws of crustaceans can be compared only with the weakest muscles of the frog. The relation between the absolute force of the muscles of man and the greatest power Plateau had observed in the crustaceans, convinced him that the contractile force of the muscular fibre is not the same in all animals. Arthropods are inferior in this respect to mammals and to lamellibranchs. Crustaceans, like insects, have in proportion to their weight much greater power than the vertebrates. When experimented on, as in the figure given, he found that common crabs could raise from one to two and a half kilograms, representing a force which he thought clearly explained the mishaps undergone by these animals.



— The women medical students of Paris have presented a petition to the authorities for permission to walk the hospitals, and become house-surgeons therein. The petition is supported by a considerable number of physicians and surgeons.

— The ship Occidental, at San Francisco, Nov. 14, reports, "At six P.M., Nov. 4, a hundred and fifty miles off Mendocino, Cal., had three shocks of earthquake, and a few hours later two more heavy ones."

— Mr. E. Knipping, meteorologist of the Imperial meteorological observatory at Tokio, describes in the September number of the *Mittheilungen der deutschen gesellschaft für natur- und völkerkunde Ostasiens*, the rapid development of weather telegraphy in Japan. There are now twenty-four stations in the empire connected by telegraph; and on the basis of their observations, supplemented by despatches from China, three daily synoptical maps are published in Japanese and English characters. Observations are taken at six A.M., and two and nine P.M., 'Japan' time, which is about that of the Kioto meridian; so that the evening observation corresponds to eight o'clock 'China coast' time, six o'clock 'Bengal' time, four o'clock 'Persian' time, one o'clock 'German' time, and noon in 'English' (Greenwich) time. The director of the service is Mr. I. Arai; and the observers, telegraphers, draughtsmen, and printers are all Japanese. The first weather-map was printed on March 1, 1883, and the tri-daily issue began a month later. The chief

need of the service at present is the addition of the fifty-six lighthouses to the other stations, and the construction of a submarine cable to the Liukiu (Loo Choo) Islands.

— The first part of the Atlas of the western-middle anthracite coal-field has lately been issued by the Second geological survey of Pennsylvania, the work being in charge of Mr. C. A. Ashburner. It comprises the district between Ashland and Mahanoy City, and is in the same style of construction as the atlas of the Panther-creek basin, of which mention has already been made in *Science* (i. 309). The new maps fully maintain the high standard of accuracy, and the careful distinction between observation and inference that characterized the earlier number of this important contribution to practical geology. The atlas includes four mine-sheets (1:9,600, with underground fifty-foot contours of mammoth coal-bed), three topographical sheets (1:19,200, with surface form in ten-foot contours), and four cross-section sheets (scale, 1:4,800). The reference-lines, marking out squares of two thousand feet on a side, are now properly adjusted to the true meridian, instead of to the local and temporary magnetic north, as before; and the ground-colors representing the geological subdivisions are changed to tints of rather more agreeable tone. The full indication of the known facts on the basis of which the area and altitude of the coal-beds are represented, and their careful separation from hypothetical lines of outcrop and dip, make it possible for both the practical and the theoretical geologist to use these sheets with as little effect as possible from the personal equations of those who made the maps. Besides being issued, folded in the octavo atlas, the sheets can be bought, unfolded and singly, at simple cost of printing, — about fifteen cents apiece.

— In a recent lecture upon the languages of the American aborigines before the Lowell institute in Boston, Prof. D. G. Brinton endeavored to show the general characteristics of the American languages to be *synthesis*, or the blending of a number of words into one; *incorporation*, or the absorption by the verb of both subject and object; and the peculiar use of pronouns. Other features were described and illustrated, such as the absence of grammatical gender and of the true substantive verb, the rarity of numerals and of the true adjective, and the difference in the speech of the two sexes and of different ages and classes. In spite, however, of the absence of all etymology, these languages are very interesting. While they lack in parts of speech, they are rich in themes and ideas. They were shown to compare favorably with European languages in respect to their vocabularies and their ability to express abstract ideas, but to be deficient in respect to sentence-building. The lecturer claimed, however, that the importance of any language depended upon the use that was made of it. After showing that unwritten language is not necessarily liable to the greatest changes and fluctuations, and that language forms a satisfactory basis for studying the laws of ethnology, the characteristic features of the principal aboriginal tribes of North America were briefly sketched, and the peculiarities of their language described. The Narwatal language of Mexico was asserted to be the only aboriginal American language for which a regular professorship had been established in any university. The literature which survives, of the native languages of Mexico and Central America, was described. The lecturer closed by urging those who wished to study the American languages to do so at once, as the time was not far distant when these languages would have entirely disappeared.

— Professor Liversidge of the Sydney university, says *Nature*, sends to the local press a suggestive communication, in connection with the recent meeting of the British association in Montreal and the invitation forwarded by the Victorian premier to visit Melbourne next year. Feeling how insurmountable, for the present, are the obstacles to such a visit, the writer proposes what appears to be a very wise alternative. Instead of looking forward to a near visit from the association, he suggests as a preliminary step a federation of the various scientific societies in Australia, Tasmania, and New Zealand, into an Australasian association for the advancement of science, on the lines of the British association. A first meeting of the new association might be held in Sydney on the hundredth anniversary of the colony; which, with the combined attractions of an international exhibition, might induce a fair number of scientific visitors from England to take part in the proceedings. After the first meeting, gatherings could take place annually, or every two or three years, as might be agreed upon by the members, in various parts of Australasia. The writer concludes with the remark, which few will gainsay, that such an association would tend greatly to advance the sciences in the colonies, and in many ways materially favor their progress elsewhere.

— Dr. Kollmann announces a law of correlation governing the form of the face of European man. Two modern Swiss skulls from the collection at Basle, which may be duplicated in any collection of European crania, represent two types existing in the present population of Europe, — the broad-faced (chamaeprosope of the craniologist), and the narrow-faced (leptoprosope of craniology). The broad-faced variety is wide between the eyes, with broad low orbits, short nose with low bridge, wide nostrils, and broad mouth. The narrow-faced variety has slender features, round open orbits with eyes set near together, long nose with high bridge, narrow nostrils, and small mouth. Either variety, if pure, will present its characteristic features, while, if crossed, the degree of mixture may be determined by the number of features varying, and the amount of variation from the general type.

— Professor Haynes requests us to state that the closing sentence of his letter on p. 469 should read, —

"There is no doubt whatsoever that it is the relics of men very like those first found by Europeans on this continent, which Mr. Jacob Messikommer will help any one, as he did the writer, to disinter from the peat-moor of Robenhausen."