the neurasthenic and sea-sick, with whom emotion is a desire of death rather than life. But we do not think that these and other instances (*e. g.*, play, p. 281) interfere with the general theory that the origin and development of normal emotion is by its life significance. He identifies the voluntarist with the intellectualist theory. "Un organe tend à être, c'était en réalité dire: il y a une pensée dans cet organe qui le veut tel ou tel: l'être qui tend à être est toujours une pensée. Les sentiments indécomposables, irreductibles à toute explication physiologique ou intellectualiste—qui en un sens existent, comme nous l'avons pu conclure de ce qui précède, comme nous le verrons mieux dans le chapitre suivant—impliquent eux-mêmes une traduction intellectualiste." In the next chapter here alluded to he treats of emotion as special, *sui generis*, indecomposable facts of consciousness. He regards 'sentiments proprement dits' as those which are either unanalyzable or whose quality cannot be determined from their component parts. Such emotions are love, friendship, etc., but which are to be studied both from the organic and intellectual points of view. M. Rauh's general conclusion is that analysis is the indispensable preliminary in the study of emotion. This should be followed by tracing them to their organic and intellectual causes and learning the mode of causal action, or, when emotions are unanalyzable, their causal action should be traced. But in all this we must remember that psycho-physiology can only show the body as limit, but not as real cause or even always as measure of emotion. Psychology, here as elsewhere, seeks not unity, but actual practical previson.

While M. Rauh's work appears to us too cursory and discursive, covering too wide a field and reaching too vague and eclectic conclusions, yet it shows considerable thought, and ought to be suggestive to the student of Emotion.

Hiram M. Stanley.

BOOKS RECEIVED.

Talks to Teachers on Psychology; and to the Students on some of Life's Ideals. William James. New York, Henry Holt & Co. 1899. Pp. xi + 3-1.

Defective Eyesight. D. B. St. John Roosa, M.D. New York and London, The Macmillan Company. 1899. Pp. ix + 186.

Le Climat de la Belgique en 1897. A. Lancaster. Brussels, Hayez. 1898. Pp. 202.

La Specificité Cellulaire. L. Bard. Paris, G. Carré and C. Naud. 1899. Pp. 100.

La Sexualité. F. Le Dantec. Paris, G. Carré and C. Naud. 1899. Pp. ix + 98.

La Théorie de Maxwell et les oscillations Hertziennes. H. Poincaré. Paris, G. Carré and C Naud. Pp. iv + 80.

SOCIETIES AND ACADEMIES.

AMERICAN MATHEMATICAL SOCIETY.

In the month of April the American Mathematical Society held two meetings. On Saturday, April 1st, the Chicago Section of the Society held its spring meeting at Northwestern University, Evanston, Ill., and on Saturday, April 29th, the regular April meeting of the Society was held at Columbia University, New York City. At the latter meeting, guarantees of support having been received from a large number of universities, the final steps were taken for the publication of the *Transactions* of the Society. The Board of Editors appointed by the Council consists of Professors E. H. Moore, E. W. Brown and Thomas S. Fiske. The first number of the *Transactions* will appear in January, 1900. The *Bulletin* of the Society will hereafter be devoted more exclusively to the publication of critical and historical material and to very short original articles, especially such as present in concise form results of general interest or importance.

At the meeting of the Chicago Section the following papers were read:

(1) Dr. Harris Hancock: 'Primary functions.'

(2) Professor E. W. Davis: 'The group of the trigonometric functions.'

(3) Professor H. Maschke: 'On the continuation of a power series.'

(4) Dr. Kurt Laves: 'Lagrange's differential equations for a solid of variable form derived from Hamilton's principle.'

(5) Professor E. H. Moore: 'The decomposition of modular systems connected with the doubly generalized Fermat theorem (second communication).'

(6) Professor James B. Shaw: 'Some generalizations in multiple algebra and matrices.'

(7) Professor J. W. A. Young: 'On the first presentations of the fundamental principles of the calculus.'

(8) PROFESSOR A. S. HATHAWAY: 'A new method of presenting the principles of the calculus.'
(9) PROFESSOR E. H. MOORE: 'On the subgroups of abelian groups.'
(10) MR. CARL C. ENGBERG: 'A modification of the theory of the characteristics of evolutes (preliminary communication).'
(11) DR. L. E. DICKSON: 'Certain universal invariants of linear modular groups.'
(12) DR. L. E. DICKSON: 'Concerning the four known simple groups of order 25,920.'

The following is a list of papers read at the New York meeting of the Society:

(1) DR. J. I. HUTCHINSON: 'The asymptotic lines of the Kummer surface.'
(2) DR. L. E. DICKSON: 'The known finite simple groups.'
(3) MR. E. B. WILSON: 'Note on functions satisfying the equation

$$\phi(x)\,\phi(y) = \phi(x+y).$$'

(4) DR. A. S. CHESSIN: 'On the differential equation of dynamics.'
(5) PROFESSOR CHARLOTTE ANGAS SCOTT: 'A proof of Noether's fundamental theorem.'
(6) DR. G. P. STARKWEATHER: 'Non-quaternion systems containing no skew units.'
(7) PROFESSOR E. GOURSAT: 'Sur la définition générale des fonctions analytiques d'après Cauchy.'
(8) PEOFESSOR F. MORLEY: 'The value of

$$\int_0^{\frac{\pi}{2}} (log\ 2\ cos\ \phi)^m \varphi^n d\phi.'$$

(9) PROFESSOR E. W. BROWN: 'An elementary illustration of the connection between the current and the height of the water in a tidal estuary.'
(10) DR. W. M. STRONG: 'The determination of non-quaternion systems in six units.'
(11) PROFESSOR E O. LOVETT: 'Curves of multiple curvature.'
(12) PROFESSOR JAMES PIERPONT: 'Elliptic functions.'
(13) MR C. J. KEYSER: 'On a definitive property of the covariant.'

The summer meeting of the Society will be held at the State University of Ohio, Columbus, Ohio, on Friday and Saturday, August 25th and 26th, in affiliation with the meeting of the American Association.

F. N. COLE,
Secretary.

COLUMBIA UNIVERSITY.

THE NEW YORK ACADEMY OF SCIENCES—SUBSECTION OF ANTHROPOLOGY AND PSYCHOLOGY.

A REGULAR meeting of the sub-section was held April 24th, in association with the Anthropological Club.

The first paper was read by E. A. Gerrard, and gave methods for the study of emotional expression as found in literary compositions. The relative emotional values of the different parts of speech, of different sentence lengths, and other variations in the kind of language used and in its arrangement, were discussed and illustrated by curves derived from a number of writings.

S. I. Franz presented some results of experimental investigations of visual after-images. The latent period increases as the area of stimulation decreases, but decreases as the intensity and duration of stimulation increases. The duration of the after image increases with any increase in the intensity, duration and area of the stimulation. The after-image of the colors in the middle of the spectrum is not more intense than that of the extreme colors if the intensity of the colors is first equalized. The degree of attention is of the first importance in determining the duration of the after-image. Retinal transference is not real; its apparent reality is due to the impossibility of distinguishing the fields of vision of the two eyes.

J. R. Swanton discussed the structure of the Chinook language. Discourse in this language shows great lack of subordination, its short sentences following each other without connectives. The verbs are aggregations of many pronouns added to a short stem. They serve in this way to epitomize the whole sentence, object and indirect object, as well as subject.

Stansbury Hagar read a paper on the Astronomical Cosmogony of the Peruvians. The paper aimed to show the large amount of astronomical knowledge possessed by the Peruvians and the intimate relations between their ritual and political life and their astronomy.

CHARLES H. JUDD,
Secretary.

PHILOSOPHICAL SOCIETY OF WASHINGTON.

THE 501st meeting of the Philosophical Society of Washington was held at the Cosmos Club on April 29th. An informal communication was first made by the Secretary on Recent Geodetic Operations in Spain, special attention being given to the Base of Madridejos and to the Triangulation connecting Spain and Algiers. The results from the Base Measurement showed it to be one of extreme accuracy. The manner in which the work was carried out threw new light on the most desirable lengths of Base Lines in general, inasmuch as it was shown that greater economy with equal accuracy can be attained by measuring short lines and expanding them by careful triangulation. The geodetic connection across the Mediterranean was made the occasion to demonstrate that longitudes may be determined by means of optical signals quite as accurately as by the electric telegraph.

The first regular paper of the evening was by Mr. J. F. Hayford. The author made a statement of a new treatment of refraction in trigonometric-height computations recently used by the Coast and Geodetic Survey in connection with triangulation in Colorado, Utah and Nevada, involving lines of sight from 100 to 182 miles long. The term of the strict formula (See Wright's Adjustments, p. 387), which involves the square of the distance and the difference of the refraction coefficients at the two ends of the line, and which is usually neglected, was here retained with marked improvement in the results. It was assumed that the refraction coefficient is a linear function of the height of a station above sea level and of the air temperature at the station.

The second paper was by Dr. H. S. Pritchett, on 'An estimate of the population of the United States in 1900 derived from an empirical formula.' Dr. Pritchett first called attention to the general form of the curve defining the relation between the population and the time. The data now at hand enabled the author to write eleven conditional equations of the form

$$p = A + Bt + Ct^2 + Dt^3$$

where p represents the population (the unit being one million), t is the time counted from 1840 the epoch of the sixth census results and A B C and D are constants to be determined. The solution of the normal equations led to the following empirical formula

$$p = 17.4841 + 5.102t + 0.63t^2 + 0.030t^3.$$

Attention was called to the very close agreement between the curve and the actual population at the time of taking the census, the two largest discrepancies being in 1860 and 1870. Both these values were abnormal, partly because of the exceptional conditions then existing, the Civil War, lack of immigration, etc., and partly on account of inaccurate census results in one or both cases.

The differentiation of the formula brought out the fact that the rate of increase is continually growing less, having fallen off from 32% per decade in 1790 to 24% in 1890.

The result of the investigation was that the best value for the population of the United States in 1900, based on its growth since 1790 is 77,472,000 with a probable error of about 250,000. As a matter of curiosity the author added that if the same law holds good in the future we would have in 1990 a population of 339 billions, in the year 2500 nearly 12 trillions and at the epoch 2900 this already appalling figure will have grown to such an extent that there will, on the average, be 11,000 inhabitants to the square mile.

The third paper by Professor J. H. Gore, on 'Geodetic Work in Spitsbergen,' was not given on account of lack of time. Professor Gore, however, showed a number of interesting lantern slides illustrating his recent visit and scientific work in that country. The paper will be given at a subsequent meeting of the Society.

E. D. PRESTON,
Secretary.

DISCUSSION AND CORRESPONDENCE.

PROFESSOR JAMES ON TELEPATHY.

TO THE EDITOR OF SCIENCE: It is evident that Professor James and I have been writing at cross purposes. On the point that Lehmann has not 'established' his explanation of the Sidgwick results I am heartily at one with James, Sidgwick, Parish and Lehmann himself. But Professor James need not have awaited the return mail from Copenhagen to wrest this