

Costa mountains is practically the same. They belong to a period of orographic disturbance during which the intrusives were predominantly granitic in distinction from an earlier diabasic and a later dioritic period of igneous activity. This granitic period was post-Carboniferous and pre-Tertiary. To make a finer distinction, many of the granodiorite dikes can be demonstrated to have been formed after the Mariposa slates of late Jurassic age (which they cut), and before the Shasta-Chico shales and sandstones of late Cretaceous age (which lie upon their eroded surface).

An interesting problem yet to be worked out is the relation between the biotite granite of Mt. Courtney and the granodiorite of the mountain country to the eastward. Why two such strongly contrasted granites of apparently about the same age and mode of formation should occur in such close juxtaposition as the Courtney and Catrina batholites on opposite sides of the valley at the head of the south fork of Salmon river, is to me a puzzling problem and one well worth considerable study.

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AMERICAN PSYCHOLOGICAL ASSOCIATION.

THE eighth annual meeting of the Association was held at Yale University, December 27th-29th, in affiliation with the American Society of Naturalists. In point of numbers and activity the meeting was one of the most successful in the history of the Association. Professor John Dewey, of Chicago, the President of the Association, was present in the chair, and on the afternoon of Wednesday, the 27th, read his presidential address on 'Psychology and Social Practice,' in which he discussed the relation of psychology to education considered as a form of social practice with which psychology might be expected to have most immediate concern, and then generalized

the results reached to draw certain conclusions regarding the general value of psychology as a method to be applied in social life. (The address will appear in full in the March number of the *Psychological Review*.)

Following the address a formal discussion on 'How should psychology be taught?' was opened by Professor Fullerton, of Pennsylvania, who laid particular stress upon the question of the adjustment of the relative claims of the so-called 'new' psychology or psychology of the laboratory and the 'old,' which depends largely upon introspective analysis. He emphasized the necessity of both aspects in a general course, as well as the danger of giving undue prominence to either, and particularly, in America, to the experimental, owing to the tendency to extreme specialization in the subject in this country. Professor Fullerton further discussed the attitude which the university should take toward advanced students in the light of their future work. Professor Jastrow, of Wisconsin, continued the discussion and urged the importance of what he termed a 'functional' psychology in teaching, having the student verify facts and principles from his own experience, so far as possible from his own daily mental processes. He showed further the great value which experimental experience has for the introspectionist and agreed with the former speaker in deploring the quasi-antagonism of the two sides, arguing that both experiment and introspection are necessary and that they are complementary and in no way antagonistic. Professor Aikins, of Western Reserve, followed with a statement of the results of his own experience in teaching the subject, and described his method of combining experiment and textbook with collateral conferences. Professor Judd, of New York, closed the formal part of the discussion by calling attention to the peculiar difficulties encountered by the stu-

dent of psychology due to the nature of the subject matter, the difference between observation and interpretation, and his questioning of inferred facts owing to the indirect method of arriving at them. The speaker argued that the difficulty is best avoided by first studying the indirect modes of treating subjective experience, that is, by a study of the physical and physiological conditions of mental life, always keeping in view its relation to the final treatment of mental experience toward which it is aiming. The discussion was continued informally by a number of the members from the floor.

The general program was long and varied. On Wednesday morning Professor E. F. Buchner spoke on 'Volition as a scientific doctrine,' and Professor G. S. Fullerton on 'The criterion of sensation' continuing a discussion developed in a paper on 'The psychological standpoint,' read before a former meeting of the Association, which endeavored to show what is implied in the recognition of psychology as a natural science. This was followed by what proved to be one of the most interesting papers of the session, viz., 'A new arithmetical prodigy with demonstration' by Professors E. H. Lindsay and W. L. Bryan. The subject is a boy, nineteen years old, the son of a stone mason, who has attended school seven years, made a fair record in all his studies and is of good general intelligence. Since the age of three he has shown a passion for numbers and has developed extraordinary powers in calculation. Since November, 1899, he has been under investigation at Indiana University. This investigation has been general and thorough and is still being carried on. The principal results thus far are as follows: In scope and tenacity of memory and in rapidity he ranks among the best recorded cases. He is unique in the large number of methods which he has worked

out, and in the fact that he explains how and when he arrived at these. His rapidity is found to depend upon the great number of number relations committed to memory and upon the reduction in the number of operations through short-cut methods. The boy was present and gave demonstrations of his powers on both Wednesday and Thursday mornings, which were followed with great interest.

Professor W. S. Monroe closed the first session with a paper on 'Moral perceptions of school children,' describing an experimental investigation.

On Thursday morning the Association divided into sections, one for experimental reports and one for papers of more purely philosophical scope. Owing to the length of the program this sectional division was continued up to the end of the meeting. The experimental section on Thursday was opened by Professor E. A. Kirkpatrick on 'Individual tests of school children.'

Dr. T. L. Bolton spoke on 'The Reliability of certain methods for measuring the degree of fatigue in school children,' criticising the method of Griesbach with the æsthesiometer and the application of the ergograph to determine the fatigue value of subjects of the school curriculum. The speaker described experiments of his own, and reached conclusions unfavorable to the methods named. Professor E. F. Buchner described in detail 'A new number form,' and Dr. Robert MacDougall followed with a paper on 'The time values of accented and unaccented elements in rhythm.' Professor Chas. H. Judd described 'A method of securing enlarged records of voice vibrations' on smoked paper by means of an arrangement of two diaphragms. Records made were exhibited, and a detailed analysis of a four-syllable word was reported. Dr. E. W. Scripture reported on 'Researches in experimental phonetics.' Dr. Max Meyer spoke on 'Elements of a psy-

chological theory of music,' criticising sharply the current theories and insisting particularly upon the necessity of the number 7 in a scientific theory of music.

Dr. A. H. Pierce closed the session with a paper 'Is there an independent auditory space?' The speaker argued for the affirmative, basing his conclusion upon the phenomena of 'intra-cranial localization' occurring when two fusing sounds are given simultaneously, one at each ear, the resultant reference to the interior of the head being a genuine auditory phenomenon and not a localization made by the aid of factors borrowed from the visual or tactual space fields.

In the meeting of the philosophical section, held simultaneously with the foregoing, papers were read as follows: Professor E. H. Griffin, 'The natural history point of view in psychology'; Professor J. H. Hyslop, 'Kant's doctrine of apperception and the use of the categories'; Professor William Caldwell, 'Pragmatism'; Professor J. A. Leighton, 'Metaphysical method'; Professor Alexander Meiklejohn, 'The concept of substance.'

On Thursday afternoon the psychologists adjourned to meet with the naturalists for their annual discussion, Professor Jastrow representing the Association.

At the meeting of the experimental section on Friday morning, the first paper was by Mr. Clark Wissler on 'Some experiments on motor diffusion.' Mr. Wissler reported experiments showing the time relation between the primary, voluntary contractions of finger muscles and the accompanying secondary, unintentional contractions of the other arm muscles, the latter being due to a diffusion of the motor discharge. Primary contractions are first in order of time and are followed by secondary contractions in an order corresponding to their distance anatomically from the muscle innervated. Further, training finger muscles trains other

arm muscles and training biceps trains finger muscles. Secondary contractions also take place on opposite side of the body. He argued that transference of practice effect is simply the result of diffused nerve currents.

'The influence of special training in general ability' was the subject of a paper by Drs. E. L. Thorndike and R. S. Woodworth. Experiments were reported in which special abilities were studied as follows: (1) The speed and accuracy of making certain complex observations, *e. g.*, of picking out from a page of print all the verbs or all the words containing both *r* and *e*, etc., etc. (2) The recognition of weights, lengths and sizes. (3) Attention to and retention of names. (4) Discrimination of two complex objects shown successively. In each set of experiments, after training in some one line, the subject was tested for general improvement in the same field. As far as the research has gone, the experiments fail to detect any pronounced influence of special training on general ability except in so far as a person may acquire in a special line of work certain methods and ideals of accuracy and speed which may be of use in other lines.

Professor J. McK. Cattell read a paper 'On relations of time and space in vision.' Experiments were reported showing that a surface moving under a window in a screen appears larger than the window and that if the surface exhibit two colors successively, say green followed by red for $\frac{1}{20}$ sec. each, the observer sees not green followed by red, but the two colors side by side or variously intermingled, the arrangement varying with the observer, but making for perception a spatial continuum. On the other hand, if the line of sight moves over objects, say a row of books on a shelf, each retinal element is successively stimulated but the objects are seen simultaneously, side by side, without fusion, even though the intermittent stimulations be as frequent as 1000 per second.

Thus fusion and indeed all phenomena of color-vision seem to be cerebral rather than retinal.

Professor E. B. Delabarre spoke on 'Conditions affecting the judgment of the direction of lines.' In the judgment of the vertical, besides the factors usually recognized, the following are of especial importance: (1) Attention—fixation does not usually coincide with eye fixation; the latter wanders much though unconsciously, and causes supposedly fixated line to appear constantly changing in degree and direction of inclination; (2) muscle-strains in eye and head also influence the apparent inclination. These same influences affect also other judgments of direction as well as of length and distance. Certain conditions as of illumination, etc., produce definite strains and tendencies to fixation of particular kinds which furnish a fundamental explanation for many forms of geometrical optical illusions.

Professor E. C. Sanford reported briefly upon 'Recent studies in the Clark laboratory,' with the following titles: (1) 'The development in school children of the ability to reproduce rhythms'; (2) 'The rhythm of nursery rhymes'; (3) 'The mental properties of the white rat as tested with the maze.' The first and last of these are portions of more extended studies of the general topics of rhythm and comparative psychology, and all are expected to appear in the *American Journal of Psychology* during the coming year.

Professor Joseph Jastrow discussed 'Pending problems at the Wisconsin laboratory,' and demonstrated various pieces of apparatus, many of them connected with the study of problems in visual perception. The Wood pseudoscope and the reflecting stereoscope were exhibited and explained, and a device for simplifying the demonstration of retinal shadows was shown. The demonstration further included a brief account of experi-

ments in progress on the power of distinguishing in a shadowless light between convex forms varying slightly and regularly in degree of convexity. The sorting apparatus (see *Psychological Review*, May, 1898), was exhibited in its perfected and portable form.

Dr. E. W. Scripture demonstrated several devices in use in the laboratory where this meeting was held, and after some informal contributions and discussion the section adjourned.

In the philosophical section papers were read as follows: 'On practical procedure in inference,' by Professor J. G. Hibben; 'Elements of consciousness,' by Professor Mary Whiton Calkins; 'Choice and nature,' by Dr. E. A. Singer, Jr.; 'Methodology and truth,' by Professor J. E. Creighton; 'The spiritual principle in T. H. Green's philosophy,' by Professor E. B. McGilvary; 'The relation between the moral order and the natural order of the universe,' by Dr. David Irons; 'The development of content in moral judgments,' by Miss Ellen Bliss Talbot; 'The relation of ethics to religion,' by Professor W. G. Everett; 'The contents of religious consciousness,' by Dr. J. H. Leuba; 'Causes of scepticism,' by Professor E. H. Sneath.

At the business meeting Professor Joseph Jastrow, of Wisconsin, was elected President for the ensuing year, and Professors Ladd, of Yale, and Bryan, of Indiana, members of the Council; Professors James and Ladd were elected delegates of the Association to the International Psychological Congress to be held in Paris in 1900, and the Council was empowered to call a meeting of the Association in June in connection with the American Association for the Advancement of Science which will meet at that time at Columbia University.

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