and mercantile activities are grouped in propinquity. The street railways make possible the centralization of the retail trade, and widen the range of recreation and amusement of most people. Yet they have not reached their limits of usefulness to the artisan and the well-to-do. Too much of the time of these users is consumed on street railways and the charge is as yet too high, the average cost of carrying a passenger in the United States being 2.9 cents, not counting profits.

Discussions. The following participated in the discussion of one or more of the above papers: Lee Meriwether, St. Louis; W. M. Bryant, St. Louis High School; J. H. Scarborough, Warrensburg (Mo.) Normal School; Joseph A. Wright, St. Louis; Frederick N. Crunden, St. Louis; Carroll D. Wright, Washington, D. C.; William H. Lynch, Mountain Grove, Mo.

JOHN FRANKLIN CROWELL,
Secretary.

WASHINGTON, D. C.

THE ASTRONOMICAL AND ASTROPHYSICAL SOCIETY OF AMERICA.

THE fifth meeting of this society was held in St. Louis, Mo., during convocation week, in affiliation with the American Association for the Advancement of Science. All the sessions were held at the Central High School, where rooms were occupied conjointly with Section A.

The first session of the society was held on Tuesday afternoon, December 29, at which officers were nominated to be voted for at the annual election the next day.

On Wednesday morning a joint session was held with Section A, for the reading of papers, and on Wednesday afternoon the reading of papers was finished and the annual election of officers held.

The members of the society were served lunch at the High School by the local committee on both Tuesday and Wednesday at noon.

The meeting was the smallest ever held by the society, there being less than twenty members present. Ten new members were elected.

The officers elected were:

For 1904.

President—Simon Newcomb.
First Vice-President—Geo. E. Hale.
Second Vice-President—W. W. Campbell.
Treasurer—C. L. Doolittle.

For 1904–5.

Councilors—E. C. Pickering, R. S. Woodward.

Geo. C. Comstock and W. S. Eichelberger were elected members of the Council of the American Association for the Advancement of Science from the Astronomical and Astrophysical Society of America.

PAPERS PRESENTED.

G. W. HOUGH: 'The Prediction of Occultations of Stars by the Moon.'

W. W. CAMPBELL: 'The D. O. Mills Expedition.'

G. C. COMSTOCK: 'The Sun's Motion Relative to a Group of Faint Stars.'

F. W. VERY: 'The Absorption of Solar Radiation by the Sun's Atmosphere.'

SEBASTIAN ALBRECHT: 'Borelly's Comet.'

W. S. EICHELBERGER: 'The Pivots of the nine-inch Transit Circle of the U. S. Naval Observatory.'

M. S. BRENNAN: 'A Short Sketch of the Progress of Astronomy in the United States.'

H. C. WILSON: 'The Eros Parallax Photographs at the Goodsell Observatory.'

ABSTRACTS OF PAPERS.

The D. O. Mills, Expedition: W. W. CAMPBELL.

The observing station of the D. O. Mills expedition from the Lick Observatory to the Southern Hemisphere was completed in October. It is located on the summit of San Cristobal in the northeastern suburbs of Santiago, Chile. Its elevation above the city is about 950 feet, the altitude of Santiago above sea level being 1,800 feet. The distance from the center of the city is about two miles.

The expedition is in charge of acting as-

tronomer W. H. Wright, who is assisted by Dr. H. K. Palmer.

The unfortunate delays encountered in completing the mirrors for the reflecting telescope made it unavoidable that the expedition should reach Chile at the beginning of the southern winter—the rainy season. San Cristobal was selected as the site early in June. The expedition reached Chile just a few days before the breaking out of very serious labor troubles. This and the storms of winter made the construction of the observatory on the summit one of considerable difficulty. The requirements for erecting the Warner and Swasey steel dome, the reflecting telescope, the electric power line from the valley to the summit, etc., could not be met by skilled labor obtainable in Chile, and the astronomers were called upon to supply this almost entirely themselves.

Up to October 9 spectrograms had been secured for determining the speeds of twenty stars, and ere this the number is undoubtedly much greater. At the time of writing, photographs of the dome, office building and general surroundings have not been received.

The completion of the extensive installation in the four winter months, in spite of lack of skilled assistance and the frequent interruptions by storms, together with the securing of a considerable number of spectrograms, is sufficient testimony that numerous and valuable results will be secured in the time assigned for the work.

The Sun's Motion Relative to a Group of Faint Stars: GEORGE C. COMSTOCK.

A year ago the author presented to this society a set of proper motions of faint stars (ninth to twelfth magnitude, distributed throughout the twenty-four hours of right ascension) determined from micrometric observations extending over a period of about half a century. During the past year the author derived from these proper motions a determination of the direction and magnitude of the sun's motion, using Airy's method for the formation of the necessary equations. This method requires that some assumption shall be made with regard to the distance of each star employed, and for this purpose the author used an extrapolation of Kapteyn's formula, which represents this distance as a function of the proper motion and stellar magnitude.

The author has thus derived from absolutely new data, no one of the proper motions employed having entered into any previous investigation, the following coordinates of the apex of the solar motion:

$$\text{R. A.} = 297°, \quad \text{Dec.} = +28°.$$

The mean result of previous determinations from brighter stars is

$$\text{R. A.} = 275°, \quad \text{Dec.} = +30°.$$

The present solution furnishes as the linear velocity of the sun's motion 4.8 radii of the earth's orbit per annum, which, compared with Campbell's spectroscopic result, 4.2 radii per annum, indicates that the assumed parallaxes of the stars are not greatly in error. Adjusting the assumed distances so that the resulting solar velocity shall agree with the spectroscopic determination, the author finds for the average parallax of 67 stars included between the ninth and twelfth magnitudes, $\pi = 0''.0051$.

This number, 67 stars, represents the entire amount of data at the author's disposal, no proper motion having been rejected in the discussion, but it is doubtless too small a basis for a determination of the elements of the solar motion and, at least provisionally, the author prefers to interpret the results noted above, as evidence that the proper motions obtained for these faint stars are real quantities and that the methods employed for their derivation may with advantage receive wider

application. The author has now in hand a similar determination of proper motions of all stars fainter than the eighth magnitude for which suitable data can be obtained from the earlier double star observations of the Struves.

Photographs of Comet 1903 c (Borelly): SEBASTIAN ALBRECHT.

This paper gave a preliminary account of results obtained from thirty-seven photographs of the comet taken at the Lick Observatory. The photographs show that the comet had two distinct types of tails—one very much curved and short, never much exceeding a degree and a half in length, the other long, and in its general direction straight. Measures of the long tail show that its average lag behind the radius vector was less than two degrees.

The period from the 22d to the 26th of July was one of unusual activity in the comet. The plates of July 23, 24 and 26 show detached portions of the main tail, indicating changes in the emission of cometary matter from the head. From a comparison of the Lick plate of July 24 with two plates of the same date taken at the Yerkes Observatory and one taken at Nanterre, an average recession from the head of thirty-five miles per second was obtained for a detached section of the main tail. This is equivalent to thirteen miles per second relative to the sun.

The paper was accompanied by slides showing the principal features of the comet.

A more complete account of results will be published in a Bulletin of the Lick Observatory.

The Eros Parallax Photographs at the Goodsell Observatory: H. C. WILSON.

Some of the results of the measurements of photographs taken with the eight-inch photographic telescope at the Goodsell Observatory were exhibited. A rough solution of the equations derived from the best situated plates gives for the solar parallax 8″.799. Similar equations from the published results from photographs taken at the Bordeaux and Paris Observatories give for the parallax 8″.798 and 8″.794 respectively.

W. S. EICHELBERGER,
For the Council.

SCIENTIFIC BOOKS.

L'Année psychologique. 9me Année, 1902. Publiée par ALFRED BINET. Paris, Schleicher Frères et Cie. 1903. Pp. 666.

This ninth number of the yearly publication issued from the psychological laboratory of the Sorbonne is rendered especially notable by the clear and acute analysis which M. Binet gives of the oldest of the problems of experimental psychology. His conclusions are at variance with all the prevailing ideas concerning the measurement of the threshold for the discrimination of sensations of contact. Since Weber first introduced the problem, it has been believed, and the researches of numberless experimenters have seemed to confirm the belief, that this threshold of tactile sensibility could be definitely determined, and that it was uniformly lowered by practise. M. Binet asserts that what has been measured is not the acuteness of tactile discrimination, but a manner of judging, of interpreting; that the threshold itself practically can not be determined; and that in all probability practise does not alter its real position.

The original articles in this number, of which there are three besides that just mentioned, cover 252 pages. They are followed by 255 pages of bibliographical analyses of nearly 80 books and articles; and by the international Bibliographical Index for the year 1902. Analysis of the original articles follows.

(1) P. Malapert: 'Inquiry Concerning the Feeling of Anger in Children' (pp. 1–40). This is a presentation of the results of a questionnaire sent out in 1900 by the newly founded Société libre pour l'étude psychologique de l'enfant. The author remarks upon the ambiguity of some of the questions, the