possessed, and no one knows what forms have disappeared and an unknown form of elk or wapiti which within the memory of our fathers—and of some men still living—inhabited the Alleghany region from North Carolina to the Adirondacks has been wiped off the face of the earth.

C. Hart Merriam.

## THE NATIONAL ACADEMY OF SCIENCES.

### ON THE VARIATION OF LATITUDE.*

At the autumn meeting of the Academy in 1894 the author had presented the numerical theory of the motion of the pole, synthetically derived from the observations from the beginning of the history of the astronomy of precision up to that time, in its complete development, exactly as it stands to-day. Since then he had been interested to compare it with the various series of observations subsequently published, not only for the purpose of verification and improvement of the numerical values of the various constants, but also to detect any additional characteristics which these later data might make apparent. These additional investigations had individually been neither extensive nor important enough to call for separate publication; since their general result has been merely a satisfactory confirmation of the previous deductions as to the nature of the law of these motions, without furnishing material improvement of the numerical elements. But sufficient material has thus been gradually accumulated to make the present communication of some interest.

The new material to be here utilized consists of the various series of observations by Tallcott's method up to the middle of 1896, so far as published, at the following European stations, named in order of longitude: Kasan, Vienna, Prague, Berlin, Potsdam, Karlsruhe and Strassburg. In America we have Doolittle's series at Bethlehem, which was brought to a close in the summer of 1895. He is now carrying forward a new series at Philadelphia of which we may hope soon to see the results. Of the series at Columbia University, by Rees, Jacoby and Davis, begun in the spring of 1893 and still current, there have come to hand the results for the first fourteen months. It is an extremely fortunate circumstance that a portion of this series, yet unreduced, will bridge the gap in Doolittle's work rendered unavoidable by his removal from Lehigh University to the University of Pennsylvania.

The curves of latitude variation from these various series were then exhibited, and compared with the numerical theory. This comparison shows a fidelity of representation eminently satisfactory, the differences between computation and observation being practically within the range of errors of observation.

A determination of the elements of the ellipse of the annual component of the polar motion was then presented, made from the newer observations, independently of the older ones previously used. The resulting elements are practically identical as to form, size and position of this ellipse. This seems to show that the axis of this elongated vibratory motion is stationary on the earth's surface, along a meridian forty-five degrees east of Greenwich. This negative evidence as to any apsidal motion seems to be of extreme importance in its bearing on the theory of the earth's rotation.

A demonstration was then presented of the fact that since 1890 the circular 428-day motion has been diminishing its radius in conformity to the requirements of the numerical theory derived from the observations between 1825 and 1890.

In addition to the above, a discussion was presented of 645 observations of the Pole Star made with the Pulkowa Vertical

*Abstract of a paper presented by Dr. S. C. Chandler.

circle between 1882 and 1891. This series is especially interesting and important in that it covers an interval during which we have very little other information, of an extensive character, as to the variations of latitude. A comparison of the curves of observation and theory thus provided for this decade exhibited a most striking accordance, and seems to leave no possible doubt that Nyrén's inference, that his observations do not betray evidence of the existence of the annual component of the polar motion, is erroneous and attributable to illogical methods in drawing his conclusions.

THE VARIATION OF LATITUDE AT NEW YORK, AND A DETERMINATION OF THE CONSTANT OF ABERRATION FROM OBSERVATIONS AT THE OBSERVATORY OF COLUMBIA UNIVERSITY.*

THE results given in this paper were obtained from 1,774 observations made between May 6, 1893, and June 20, 1894, with an 8-centimetre Wannschaff zenith telescope. The observations were planned for a determination of the constant of aberration by Küstner's method. Four groups of stars were used, having mean right ascensions approximately, as follows:

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|---|---|
| Group I | $6^h$ |
| II | 14 |
| III | 18 |
| IV | 22 |

Each group contained seven pairs of stars, and covered two hours in right ascension. The groups were observed both morning and evening, whenever the weather permitted. The original plan of observations required four observers, but it was unfortunately necessary to reject altogether the work of one observer. This caused considerable gaps in the series, in addition to those due to unfavorable weather conditions.

Only observations obtained during the period when it was possible to observe both evening and morning groups were used in calculating the latitude results employed for the computation of the constant of aberration. The observations of each group were gathered together into periods of about ten days each, in such a manner that the weighted mean of the dates should be the same for both the evening and morning groups. In this way the mean latitudes from the two groups should differ only on account of the difference between the declination systems of the two groups, and on account of any error in the assumed value of the aberration constant. They cannot differ on account of variation of latitude, provided any such variation is uniform during the short time of ten days. The result for the aberration constant is therefore independent of any assumption as to the law of latitude variations.

The constant of aberration was found to be $20''.457 \pm 0''.013$. The mean latitude of the observing station* was 40° 48′ 27″.195. The table of definitive latitudes for every ten days showed the variation of latitude, which was very small. The probable error of a single latitude was $\pm 0''.16$.

Observations have been continued from the date last given to the present time by Professor Rees and Dr. Davis, and will be kept up for some time longer. Reductions of the later series will be finished soon. A series of observations on the same stars has been made and is now being continued at the Royal Observatory at Capodimonte, Naples, by Professor Em. Fergola and two assistants, Messrs. Contarino and Angelitti.

NOTES OF EXPERIMENTS UPON THE RÖNTGEN RAYS.†

IN most investigations hitherto made for testing the question of the refraction of

* Abstract of a paper presented by Professor John K. Rees, Professor Harold Jacoby and Dr. Herman S. Davis.

* The observing station was at the new site of the University, about four miles north of the present University Observatory.

† Abstract of a paper presented by Professor A. W. Wright.

the rays the refracting body has been in the form of a prism. This involves the inconvenience that the absorption of the rays is so much greater toward the thicker portion of the prism as to cause imperfect or unequal definition in the image of the slit or wire used for the test. This has sometimes given rise to the appearance of a deflection of the rays away from the base of the prism instead of towards it, a negative action, implying a refractive index less than unity.

In the present experiments this was avoided by employing for the refracting bodies thick pieces of glass and Iceland spar with parallel sides, which were inclined at an angle of 45° to the path of the rays. The distances traversed by the rays in the two media were about 10 and 14 mm. respectively. The displacement of the image for ordinary light is about 1.5 mm. for the glass, and for the Iceland spar about 1.0 mm. and 1.8 mm. respectively, for the two images due to double refraction. A small platinum wire, stretched so as to be quite straight, rested upon the upper surfaces of the plates, and the rays from the tube were passed through a narrow slit in a copper plate. The slit was parallel with the wire and at a considerable distance from it. A strong and very clearly defined image of the wire was formed upon the photographic plate, showing no displacement by the glass plate or the Iceland spar, and no trace of widening or duplication by the latter, or, in other words, no perceptible effect of refraction, or double refraction.

Other experiments were described, in which very sharply defined images of fine platinum wires produced by the rays upon a photographic plate showed a faint central band, dark in the negative but light in the positive, corresponding to the familiar bright central band behind an opaque wire in the case of luminous rays. The converse effect of a dark central band in the positive from a narrow slit was also observed, but less distinctly. These results offer some support to the idea of true diffraction and the periodic character of the rays, but the matter must be regarded as somewhat uncertain until secondary maxima and mimima are obtained, which would settle the question of diffraction and permit the definite determination of wavelengths.

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*AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.*

A meeting of the Council of the American Association for the Advancement of Science was held at Washington, D. C., on April 12th. Owing to the lamented death of Professor Edward D. Cope, the late President of the Association, Professor Theodore Gill presided as Senior Vice-President. A number of members were elected, and several matters of importance relating to the Detroit meeting were discussed and arranged at this meeting.

Professor Leland O. Howard, of the Department of Agriculture, Washington, D. C., was nominated as Vice-President and Chairman of Section F, to fill the vacancy caused by the death of Professor G. Brown Goode. Professor Howard was requested to prepare an address to be delivered before the Section at the Detroit meeting.

Professor I. C. White, Vice-President and Chairman of Section E, will go to St. Petersburg this summer as one of the delegates to the International Congress of Geologists. He will, however, prepare his Vice-Presidential address to be read before the Section at the Detroit meeting.

On Monday evening, August 9th, at the Detroit meeting, Professor Theodore Gill will deliver a memorial address on the life and work of Professor Cope, at the time and place appointed for the Presidential address, which was to have been given by Professor Cope. In this address Professor Gill will