If we assume with Heidenhain and others, as most physiologists now do, that urine is produced by a 'vital' activity of the cells of the glomeruli and of the convoluted tubules, we may perhaps express our findings by the statement that morphin increases the 'physiological permeability' of the kidney cells while it decreases the same kind of permeability of the endothelia of the capillaries of other tissues of the body.

[1] Kleiner and Meltzer, *Amer. J. Physiol.*, **33**, 17 (1914); also Kleiner, *J. Exp. Medicine*, **23**, 507 (1916).

THE WORK OF THE AMERICAN METEOR SOCIETY IN 1914 AND 1915

By Charles P. Olivier

LEANDER McCORMICK OBSERVATORY, UNIVERSITY OF VIRGINIA

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The year 1915 saw a very great increase in the interest in the study of meteors, which was evidenced by the large number of observations made by members of the American Meteor Society. This gratifying increase became largely possible on account of a grant to Dr. S. A. Mitchell of the Leander McCormick Observatory from the J. Lawrence Smith fund of the National Academy of Sciences. This appropriation, which was made in April, 1915, permitted the work of the Meteor Society to obtain wider publicity by the publicaion and distribution of bulletins, maps and blanks to prospective members.

As a consequence, it is believed that the largest amount of systematic work ever done in one year in America, was sent in; the results of these observations have been prepared for publication and are now awaiting printing. Briefly, this publication will contain the results from 540 observations made by 4 persons in 1914 and from 5003 observations made by 36 persons in 1915. While most of these 36 persons are amateurs, five have had astronomical training, one is a colonel in the U. S. Army, one is an observer of meteors in the U. S. Weather Bureau of wide experience, three are students in astronomy at the University of Virginia, and several others are trained in various scientific lines which would make their work the more valuable. The observers were stationed in 17 states, 2 provinces of Canada, and one in the Argentine Republic. It might be added that the Meteor Society has members in several foreign countries and several dozen more in America from whom no reports have yet been received, while a week rarely passes without a new person applying for membership.

From the 5543 observations of meteors mentioned, we have been able

to deduce 139 radiants of sufficient accuracy to calculate parabolic orbits for the meteor streams they represent. These orbits are contained in full in one of the tables. Following this is a table containing 81 less certain, but probably existant radiants, for which as yet no orbits are calculated. Other tables contain analyzed data of the distribution of meteors as to magnitudes and average durations of their times of visibility. There is also a table containing a few real heights, which were obtained in August, 1915, between Richmond, Va., University of Virginia, and Washington, D. C. This latter work we hope to repeat, on a larger scale and under better conditions, during the summer of 1916. The text of the publication contains details as to the organization, plans and methods of reduction of the work. It further contains full explanations as to the derivation and use of the figures found in the tables. Actual directions to the members were omitted since these had been printed at great length both in *Popular Astronomy* and also in Bulletins 2–5 of the Meteor Society, which were distributed to all members and applicants.

The present publication and the two similar ones previously prepared by me will bring up the number of results to 440 parabolic orbits of meteor streams, based on about 14,000 meteors. The peculiar value of this contribution lies in the fact that a fairly uniform plan has been followed by all the observers, and that the results were computed and deduced by one person using the methods and care with which other astronomical work is handled in all regular observatories.

It may be of interest to mention the various methods used to reach amateurs who might care to join in the work. At the very organization of this society, the coöperation of the members of the Meteor Section of the Society for Practical Astronomy was secured by the appointment of the writer as director of the latter. Then last spring a number of articles were published by Dr. S. A. Mitchell and myself calling attention to the desirability of coöperation on the part of all amateurs. These articles appeared in the *Scientific American*, *Journal of the Royal Astronomical Society of Canada*, and *Popular Astronomy;* by reprinting them in part or in whole, the press of the country assisted in bringing our work to the notice of amateur observers and, as a result, wide publicity was secured. Not less than 200 people have written letters on the subject to date, over half desiring to join in making observations. It goes without saying that many have never been heard from again, but so many have worked with real enthusiasm and success, that it would seem that the future of meteoric astronomy is brighter at the present time than ever before, so far as America is concerned.

This is peculiarly fortunate at such an epoch when similar societies in Europe must be greatly reduced in membership and activity.

Having secured the approbation and support of the National Academy of Sciences for the coming year, through a further grant from the J. Lawrence Smith fund, it is hoped that the results for 1916 will surpass those for the previous year, and indeed a good start has been made in that direction. We still need and desire the help of other persons interested in such work and a cordial invitation is again extended to them.

THE LIGHT EXCITATION BY SLOW POSITIVE AND NEUTRAL PARTICLES

By A. J. Dempster

RYERSON PHYSICAL LABORATORY, UNIVERSITY OF CHICAGO

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The speed at which an electron begins to excite light, and the character of the light emitted by slow electrons has formed the subject of several recent papers;[1] the corresponding problem for slow positive rays has not been carefully investigated. The only papers on the subject are those by Stark[2] and Wehnelt[3] who detected a luminosity probably due to positive rays with potential differences as low as 50 volts on the tube.

The light excitation by positive and neutral rays of greater energy is included in the many papers on the light emission of canal rays. These particles have energies corresponding to a fall of potential of from 500 volts up, depending on the pressure, the low speeds necessarily being at a relatively high pressure. The Doppler effect in these canal rays in hydrogen shows a dark space between the displaced and undisplaced lines, and this may be explained by assuming that those particles in the rays which have less than a certain speed (corresponding to 50–80 volts fall of potential for the hydrogen atom) are unable to excite light.

The method used in the present experiments was to ionize hydrogen by electrons from a Wehnelt cathode and to allow the positives thus made to pass through a slit in a plate behind the cathode (P in the figures) into a second chamber where their light emission and the deflection of their path by electric fields could be studied undisturbed by the light and the electric fields in the main tube. In one tube (A) a plate was placed in the second chamber at right angles to the beam of rays so that by charging it positively the positive rays could be stopped and turned back; in a second arrangement (B) the rays were allowed to enter an oblique retarding field so that the paths of the positive particles