

## CONCLUDING DISCUSSION



*G. A. Chebotarev:* IAU Symposium No. 45, on 'The Motion, Evolution of Orbits, and Origin of Comets', is almost over. It is, of course, quite impossible for me to make on the spot a proper summary of the scientific results of the Symposium. I can only state that the reports delivered have contributed greatly to the further advance of cometary astronomy.

Of extreme importance also are the personal scientific contacts among the astronomers working in this field, and we sincerely hope that these contacts will be maintained in the future.

A number of the papers presented have raised and formulated new problems for investigation. We shall be able to discuss plans for further international cooperation on cometary matters a fortnight hence in Brighton, at the session of IAU Commission 20 devoted to comets, and also by direct correspondence between the individuals involved.

*E. I. Kazimirchak-Polonskaya:* I should first like to say how sorry I am that Dr E. Roemer, that indefatigable cometary observer, has not been able to participate in this Symposium.

In my introductory comments I spoke of the necessity for closer contacts between observers and theoreticians. The same idea was expressed later by Candy, Chernykh, and others. Theories of cometary motion cannot be completed unless positional observations are available. Observations are often published a very long time after they have been made. It is most desirable that observers make their observations available to the theoreticians as quickly as possible.

*B. G. Marsden:* In defence of some of the observers I must point out that the production of positions from plates taken with long-focus reflectors can be a very time-consuming business. In the easiest case the reduction can be made using the *Astrographic Catalogue*, but this is not at all the same straightforward matter as using the AGK<sub>2</sub>, the Yale zones, or the *S.A.O. Catalogue*, and further, one frequently runs into problems involving reference stars with unknown, but evidently quite large, proper motions. Field plates could be taken, but this requires use of another telescope, and it is only proper that the observer should put his greatest effort into making the maximum use of the long-focus instrument, with which he is able to record comets when they are extremely faint.

*S. K. Vsekhsvyatskij:* At the Prague meetings in 1967 a committee was set up to consider the compilation of a new cometography. On behalf of the Soviet investigators on both the physics and the motions of comets I have proposed to Marsden, the Chairman of that committee, that the cometography should be supplemented with two additional volumes, one containing a completely revised catalogue of cometary orbits, with all the appropriate information from the primary sources, and the other consisting

of ephemeris data for all cometary apparitions. I ascertained that the Institute for Theoretical Astronomy would be willing and able to participate in this monumental work. I should like to emphasize the great need for the volume of ephemeris data, for it will enable us to study again all the ancient comets and the results hitherto obtained; and this would be most valuable, not only as far as the individual comets are concerned, but as it involves all the important problems of cometary cosmogony.

*B. G. Marsden:* It was indeed the consensus of the cometography committee that the principal effort should be put toward the preparation of reliable orbital and ephemeris data. We have even considered the possibility of recalculating the orbits of all the comets anew. Bielicki and Sitarski have proposed a method for the uniform treatment of observations, and this could certainly be valuable in this connection. As I see it, the main drawback at present is that we do not know enough about the nongravitational effects on comets. This lack of knowledge influences, not only the preparation of a new orbit catalogue, but also the investigations on the orbital evolution of comets. I wish to urge all those concerned with studying the motions of comets to pay particular attention to the matter, making such numerical experiments as are necessary, and collaborating with astronomers involved in the physical study of comets, in the hope that we may eventually come up with a standard, physically meaningful procedure for handling the nongravitational effects.

Concerning the cometography proper, the complete observational account of all the comets ever observed, my feeling is that the main task is the collection and correction of errors in the existing compilations, such as those by Holetschek, Vsekhsvyatskij, and the annual reports of the Royal Astronomical Society. This work could sometimes be facilitated by calculating accurate ephemerides, for there are several instances where somebody has erroneously reported the recovery of a comet or a positional observation made long after everyone else has ceased observing it, and such a report can obviously give a very misleading impression of the comet's absolute brightness.

*E. I. Kazimirchak-Polonskaya:* I certainly don't insist that the new cometography should be compiled immediately. I merely wish to state our willingness at the Institute for Theoretical Astronomy to take an active part in the venture.

*S. K. Vsekhsvyatskij:* For more than a week now we have often heard in this room the name of the celebrated Polish astronomer Michael Kamiński; and a large number of his pupils are among those present here. I should like to propose to IAU Commission 20 that periodic comet Wolf, also known as Wolf 1, on which Kamiński has worked so extensively since the very earliest years of this century, should in future be given the name Wolf-Kamiński.

*G. A. Chebotarev:* We are not authorized to approve such matters here, but the proposal will be put to Commission 20 in Brighton.\*

*M. Bielicki:* I wish to thank Professor Chebotarev and all those who have contributed to the success and superb organization of this Symposium. My very special

\* At the meeting in Brighton the proposal was tabled. Although the Commission highly appreciated Kamiński's splendid work on the orbit of this comet, it was felt that the renaming of the comet would be at variance with the practice generally adopted and might represent an undesirable precedent for the future.

thanks are due to Dr Kazimirchak-Polonskaya for her selfless labour to the benefit of the Symposium and to us all. I leave for home, and I hope that others do too, newly inspired to continue cometary research. Comets continue to hold many secrets, but ultimately we shall know whence they originated and how they survive.

*G. A. Chebotarev*: Thank you. I declare our final session closed. Dear guests, I wish a happy journey to you all!