Triennial Meeting of the International Astronomical Union

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IN THESE TIMES, when the difficulties of communication and cooperation between eastern European countries and those of western Europe and America are much emphasized, it is worth noting that astronomers from Finland, Russia, Poland, Czechoslovakia, Hungary, Austria, and eastern Germany joined western astronomers in attending the triennial meeting of the International Astronomical Union in Zurich, Switzerland, in August of this year and took an active, but by no means dominating, part in the week-long activities. The Russian astrophysicist, V. A. Ambartsumian, was elected to one of the vice-presidencies of the Union. Th. Banachiewicz, of Cracow, Poland, is the new president of the Commission on the Motion and Figure of the Moon; A. Mikhailov, director of the Pulkowa Observatory (which is now being reconstructed after its complete destruction during the siege of Leningrad), has been made president of the Commission on Astronomical Telegram Service; and B. W. Kukarkin, of Moscow, is the new vice-president of the important Commission on Variable Stars.

The Union assigned to a group at the Moscow Observatory, working under the supervision of an international committee, one of the most important services provided for general use by observers, namely, the cataloguing, ephemeris-computing, and publication of variable stars.

The Academy of Sciences of the USSR, through its astronomical section, invited the Union to hold its next meeting in Leningrad in 1951. An invitation for 1951 was also received from the Mount Wilson and Palomar Observatories.

The Zurich meeting was the seventh since the organization of the Union at the end of World War I. At earlier meetings the Union had worked on problems of cooperation in special fields, such as the variation of latitude, the business of time-keeping, the systematic following of sunspots, and the mapping of the stars on a uniform basis. The present activities of the Union include these among many others. They are handled by nearly 40 international commissions. Because of the large number of active observatories in the United States, the American astronomers are numerous in the personnel of the commissions and were elected to many of the presidencies. The American presidents and their commissions are as follows: Yerkes Observatory—S. Chandrasekhar (constitution of the stars), Otto Struve (interstellar matter); Mount Wilson Observatory—Walter Baade (star clusters), E. P. Hubble (extragalactic nebulae); U.S. Naval Observatory—G. M. Clemence (celestial mechanics), Paul Sollenberger (variation of latitude), C. B. Watts (meridian astronomy); Yale Observatory—Dirk Brouwer (minor planets, comets, satellites); Brown University—Otto Neugebauer (history of astronomy); Bureau of Standards—W. F. Meggers (standard wave lengths); Harvard Observatory—Zdenek Kopal (close binaries), D. H. Menzel (solar eclipses), Harlow Shapley (international observatories), F. L. Whipple (meteors).

The new president of the International Astronomical Union is Bertil Lindblad, director of the Stockholm Observatory, and the general secretary is Bengt Strömgren, director of the Royal Observatory of Denmark.

Among the activities of particular interest at the Zurich meeting were the following:

(1) A new commission on microwave astronomy was set up. Much interest has developed during and since the war in the use for astronomical exploration of the radio waves in the interval from 1 cm up to 15 m in length. The astronomical applications include the recording of meteors in daylight and in any kind of weather through the use of radio echoes; the bouncing of radio waves off the moon; the newly discovered solar "noise"; and the cosmic static which appears to be registering both the Milky Way (especially the nucleus) and some strange "hot spots" in space. The Australian, English, and Canadian astronomers and physicists have taken the lead in this field, and an Australian, Richard Woolley, is the president of the new microwave commission.

(2) The report by the director of the International Bureau on the Variation of Latitude, Luigi Carnera, of Italy, contained an analysis of the wanderings of the poles of the earth during the past two decades. The results were derived from observations provided by an international group of stations located on the same latitude circle in Russia, Japan, Italy, Maryland, and California. Apparently only the Russian and Japanese stations were uninterrupted during the war.

(3) Bernard Lyot, the distinguished French astrophysicist who invented the coronagraph, brought to

the meeting and displayed effectively a new device for the detailed study of the surface of the sun. It is a birefringent light-filter, similar to those in use at Harvard's station at Climax, Colorado, but with a narrower transmission band (0.8 A) which permits the high resolution of solar features and the study of finer details.

(4) Grants-in-aid were made for a dozen international projects in Poland, Denmark, Italy, France, England, and the United States. (The Union's expenses are borne by levies on the participating member-nations.) The three grants to Americans were made to assist in (1) publication of a table of wave lengths prepared at the National Bureau of Standards, (2) revision and publication of the Yale Catalogue of Stellar Parallaxes, and (3) operation of a bureau in the Cincinnati Observatory for special studies on the minor planets.

The most serious difficulty in holding such international meetings at the present time is associated with monetary exchanges. Swiss francs could not be obtained by many members who otherwise would have attended. Thanks to a grant from UNESCO and to private gifts, mostly from American astronomers, a number of German and Austrian astronomers were able to attend. More than 50 Americans were present.

TECHNICAL PAPERS

Variation Induced by Uranium Nitrate in Corn Smut and the Cultivated Mushroom

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The addition of uranium nitrate, $UO_2(NO_3)_2 \cdot 6H_2O$, to potato-dextrose agar at the rate of 0.5–1.0 gm/liter has stimulated mutation in the cultivated mushroom, *Agaricus campestris*, and both mutation and an unusual type of dissociation in the ordinary corn smut fungus, *Ustilago zeae*.

The experiments on *Ustilago zeae* were made with two monosporidial haploid lines, designated as 10A4 and 17D4, and with several monosporidial diploid lines resulting from crosses between the two and designated as 410qq and 410n. Line 10A4 is very stable under a normal range of conditions, and 17D4 is moderately mutable. As these lines are haploid and unisexual, neither will cause infection when inoculated singly into corn plants. When corn is inoculated with a combination of the two, however, infection results, and galls containing morphologically normal chlamydospores are formed. On germination, however, a high percentage of the promycelia produced by the chlamydospores undergo partial or complete autolysis at various stages of development because 10A4 carries a dominant factor for this character, which is associated with a tendency for sporidia to be diploid instead of haploid.

Monosporidial diploid lines, like haploid lines, can be propagated on artificial media but can cause normal infection when inoculated singly into corn plants, with consequent production of normal galls and chlamydospores. The diplophase may persist for several successive chlamydospore generations and usually has persisted indefinitely when diploid lines are grown on artificial media. Numerous attempts to induce reduction division or dissociation into haploid parental types on artificial media had failed until uranium nitrate was added to the medium.

Diploid line 410qq, intermediate in cultural characters between its parents, 10A4 and 17D4, but resembling the unstable 17D4 somewhat more closely, produced an unusually large number of mutants when grown on potato-dextrose agar containing 1 gm/liter of uranium nitrate. This was true of 17D4 also. Some of the mutants of 410qq resembled 17D4 and some of its mutants closely in cultural characters; they failed to cause infection when inoculated singly into corn plants but caused normal infection when combined with 10A4. It appears, therefore, that uranium nitrate induced reduction division or some other type of nuclear change that resulted in the dissociation of the 17D4 factors for cultural characters, sex, and pathogenicity from their combination with those of 10A4. No lines were obtained that resembled the 10A4 parent closely. The results are definite, but precise explanation for them is lacking.

Extensive experiments were then made on the effects of uranium nitrate on frequency of mutation in 10A4, 17D4, and diploid lines 410n, which resembles 10A4 in cultural characters, and 410qq, which resembles 17D4. In the relatively unstable lines 17D4 and 410qq, 3–9 times as many mutants appeared on the medium containing uranium nitrate as on that without it, the ratio varying with the line of smut, the concentration of uranium nitrate, and the temperature at which the cultures were grown. With the relatively stable lines 10A4 and 410n, the effect of uranium nitrate was even more pronounced, although their mutants have not yet been studied thoroughly. There is evidence also that the number of mutants produced in liquid media containing uranium nitrate may be even greater than on agar.

Primary and secondary mutants of 17D4 have been studied extensively, primary mutants being those derived directly from 17D4 and secondary ones, those