Comet Wilson 1961d — Mount Wilson and Palomar Observatories

IAU NEWS BULLETIN

1 — Tuesday, August 15, 1961

Berkeley, California

OUR BRIGHT SUMMER COMET

A 3rd-magnitude object in the morning sky, with a long broad tail that presented a beautiful sight in the dawn, was Comet 1961d. The earliest known definite sighting was by A. Stewart Wilson, on July 23rd while navigating a Boeing 707 jet airplane from Honolulu to Seattle. The officers in the cockpit noticed what at first seemed a searchlight beam extending upward from the eastern horizon in Gemini and Auriga. As the comet's head rose, Mr. Wilson realized the importance of the observation, and made careful magnitude and position estimates. The next observation was by U.S. Air Force Sergeant Paul W. Bailey, who was stationed near Seville, Spain.

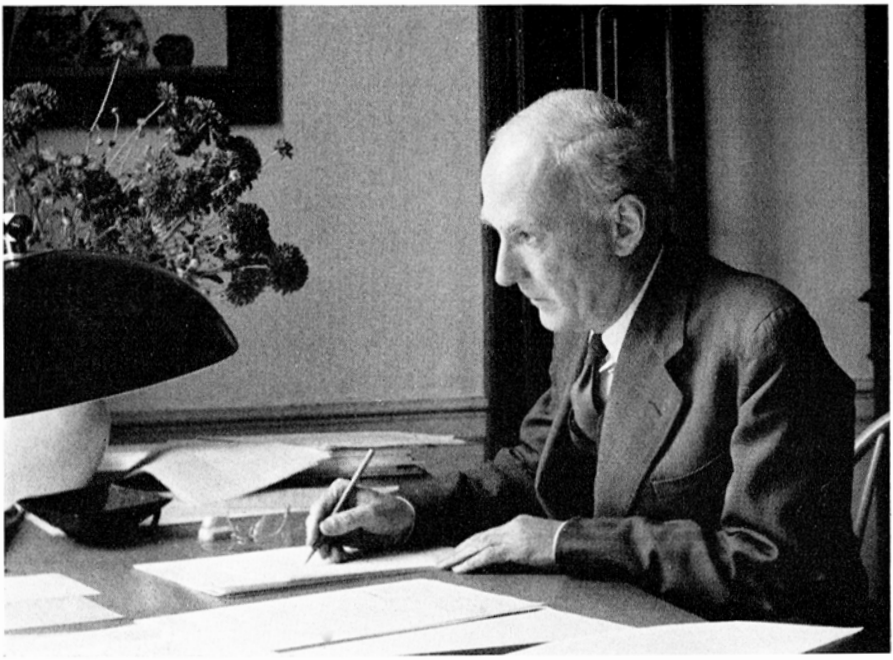
In the next two days half a dozen other independent discoveries were made, one at McDonald Observatory by W. Hubbard, one at Palomar Mountain by Armin Deutsch, who was taking a turn around the catwalk of the 200-inch while his last coude spectrogram of the night was being exposed. He has kindly provided the cover photograph of Comet Wilson, taken with the 48-inch Schmidt telescope by Byron Hill, a 30-minute exposure. On the morning of the 25th, the tail was estimated as 20 to 25 degrees in length, by several observers, and a sunward tail was three or four degrees long.

Preliminary orbit computations by M. P. Candy and by F. Stienon indicate that perihelion passage occurred approximately a week before discovery. Comet Wilson is fading rapidly as it travels northward and westward across Auriga. It is now an inconspicuous object between Alpha and Beta Aurigae.

Echo Communications Satellite

The Echo balloon satellite can be seen as a 1st-magnitude object as it passes over Berkeley this evening. The times of meridian passage are $22^h\ 35$ (10:35 p.m. Pacific daylight time) and $0^h\ 39$ (12:39 a.m.). If the sky is clear, the satellite will be seen in the west about 10 minutes before it crosses the meridian. Echo will disappear into the earth's shadow before it completes its passage across the sky.

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.



Dr. J. H. Oort, of the Netherlands, president of the International Astronomical Union.

A Message from the President:

As president of the International Astronomical Union, I extend a hearty welcome to all the members and invited participants at this General Assembly. You have come together from many parts of the earth to consider problems of common interest, to strengthen once more the contacts with colleagues working in the same domains, and to obtain in a direct way impressions of what new phenomena and theories astronomers in other branches are concerned with.

There hardly seems to be a more appropriate place for such a gathering than under the blue skies of California, the land from which modern giant telescopes first penetrated into the outermost parts of the universe.

I hope that this 11th General Assembly will once more confirm the long-established conviction of astronomers that it is only by forgetting about their own personal interests, their local prides, and the boundaries of their nations, that they can efficiently surmount the boundaries of their present knowledge.

J. H. OORT

Comme président de l'Union Astronomique Internationale, je voudrais souhaiter la bienvenue à tous les membres et à tous ceux qui ont été invités à participer à cette assemblés générale. Vous êtes venus de tous les coins du monde pour

étudier des problèmes qui présentent un intérêt commun, pour fortifier le lien qui vous unit à ceux de vos collègues qui travaillent dans le même domaine et pour obtenir une impression concrète des nouvelles théories et des nouveau phénomènes qui captivent l'intérêt des astronomes dans d'autres branches.

Où pourrait-on trouver un endroit plus propice à une telle rencontre que la Californie et son ciel bleu, le pays ou les telescopes géants modernes ont pour la premiere fois pénêtré dans les espaces les plus distants de l'univers?

J'espère que cette onzième assemblée générale contribuera à confirmer l'ancienne tradition des astronomes que c'est seulement en oubliant leurs intéres personnels, leur fièrté locale et les frontières de leur nations qu'ils pourront dépasser avec succes les limites de leurs connaissances actuelles.

J. H. OORT

General Events Today

$10^h\ 00^m$ — The Opening Ceremony. The Eleventh General Assembly will be formally opened at $10^h\ 15^m$. All should be seated by $10^h\ 00^m$.

La Cérémonie d'Ouverture. La Onzième Assemblée Générale sera ouvert à $10^h\ 15^m$. Les places doivent être occupés avant $10^h\ 00^m$.

$14^h\ 00^m$ — The first session of the General Assembly will commence at $14^h\ 15^m$ in the main auditorium of Wheeler Hall. Participants should be seated by $14^h\ 00^m$.

La première séance de l'Assemblée Générale aura lieu à $14^h\ 15^m$ dans la grande salle de Wheeler Hall. Les participants doivent prendre place avant $14^h\ 00^m$.

SYMPOSIUM on Visual Double Stars

W. S. Finsen of South Africa, an expert on interferometric techniques, participated in the symposium.

The IAU's 17th symposium, devoted to visual double stars, was held in Sproul Hall last Friday and Saturday. Twenty-nine specialists from 10 nations were present by invitation of chairman P. van de Kamp, of Sproul Observatory. Their purpose was not to read papers but to discuss the present and future of this branch of astronomy.

Many different astronomical disciplines were represented by the participants. Some, such as G. Van Biesbroeck (USA) and W. H. van den Bos (South Africa) are veteran micrometer users; others, including E. Hertzsprung (Denmark) and K. Strand (USA) are specialists in photographic methods; R. M. Petrie (Canada) is a radial velocity observer; while A. Deutsch and W. Bidelman are American astrophysicists who make much use of double-star data. This is only a small sampling of the special skills that were present at the symposium.

All participants agreed that there is a continuing need for measurements of visual pairs. Such double stars are of the utmost value in determining stellar masses, but their importance is by no means confined to this. For example, valuable information can be gained about a peculiar star that has a physical companion. A wide pair whose components travel through space together allows the astrophysicist to compare two stars of the same age that may have evolved at different rates. Furthermore, as P. Kulikovsky (USSR) pointed out, probably more stars are members of double or multiple systems than are single, and isolated stars may even be in the minority.

A very small group of observers carries out the actual work of measuring double stars, and some of the most active of these astronomers are near or past retirement age. Dr. Van Biesbroeck made his first practice observations 70 years ago. Unless more young observers enter the field, a disastrous manpower shortage may result as far as visual double star observing is concerned. Dr. Hertzsprung recommended that university observatories require all astronomy students to try

their hands at a little micrometer work. In this way, a special aptitude for this type of observing could be recognized.

The great suitability of large modern reflecting telescopes for visual double-star measurements has been known for years. According to Dr. van den Bos, similar performance is given by a refractor and by a reflector of 50 per cent greater aperture. Hence a good reflector larger than 60 inches should outperform any existing refractor. If experienced double star observers could make some use of very large reflectors, there would result a substantial increase in the number of reliably known orbits for short-period, close pairs.

Along these same lines, W. S. Finsen (South Africa) recommended that interferometers be used with big reflectors to measure close doubles. Such telescopes should prove much more effective than the relatively small refractors that most interferometer workers have used.

Highlighting the symposium were two reports of promising experiments with image tubes in photographic observations of close doubles. John Hall (USA) explained how, with the 24-inch Lowell Observatory refractor, use of an image tube increased the speed by a factor of 100. Many very short exposures are made on motion picture film, the frames with good seeing resolving pairs as close as 0.5 second of arc. At Pic du Midi Observatory, J. Rösch has used a Lallemand camera to get good photographs of 37 Pegasi, Castor, Xi Ursae Majoris, and similar doubles.

The symposium welcomed the announcement of completion of the Jeffers-van den Bos *Index Catalogue* of all 45,000 double stars known up to 1961.0. Dr. H. Jeffers also stated that their *Observation Catalogue*, containing on punched cards all measures of these doubles, is very nearly complete. This enormous collection is too extensive to publish in book form, but to prevent its possible loss several duplicate sets of cards will be deposited at astronomical institutions in various countries.

The two-day gathering conveyed a very strong impression of how closely double-star astronomy is nowadays linked to astrophysics, to parallax and radial velocity studies, and to the problems of cosmogony.

Changes and Corrections

	Commission	*Formerly meeting at*	*New meeting time*
29	Stellar spectra (Spectres stellaires)	Wednesday 16 Aug, $14^h\ 00^m$	Friday 18 Aug, $9^h\ 00^m$
9*b*	Quality of images (Qualité des images)	Friday 18 Aug, $9^h\ 00^m$	Saturday 19 Aug, $11^h\ 00^m$
22	Meteors and Meteorites	New acting president: Dr. L. Kresak	

Convention News and Notes

Adlai E. Stevenson, United States ambassador to the United Nations, will deliver the major address at the convocation of the 11th General Assembly of the International Astronomical Union August 15th on the plaza in front of Dwinelle Hall. His address, drawing on considerable legal and international experience, is expected to concern the necessity of law and order in space.

Late Monday afternoon some 7,500 seats had been set up on Dwinelle Plaza, in expectation of a large public turnout for the opening ceremony. Among the speakers are Dr. Howard P. Robertson, foreign secretary of the U.S. National Academy of Sciences; Dr. Donald H. McLaughlin, regent of the University of California; and Dr. Oort. Dr. Leo Goldberg, vice president of the IAU and chairman of the U.S. National Committee, will preside, while the University's concert band, conducted by Douglas Leedy, will provide musical selections.

International co-operation in astronomy has been a tradition since the

A moment of relative quiet in the registration room yesterday afternoon. All phases of this operation have run unusually well, thanks to careful planning by the organizing committee, whose chairman, Dr. C. D. Shane, is seen left of center in this picture.

eighteenth century that was climaxed with the founding of the IAU and its first general assembly in Rome in 1922. Since then, assemblies have been convened in Great Britain, the Netherlands, France, Sweden, Switzerland, Eire, and the Soviet Union. The last United States meeting was in Cambridge, Massachusetts, almost 30 years ago.

Automobiles from Pennsylvania and Massachusetts and airplanes from all over the world have brought members and guests of the IAU to the University of

Among the members and guests gathering for registration and informal visiting prior to the opening of the General Assembly were Australian radio astronomer B. Y. Mills (left) and A. R. Hogg, of Mt. Stromlo Observatory.

California's Berkeley campus for this year's meeting. Some 1,100 persons are scheduled to appear at the Registration and Information Office located in University residence halls at 2650 Haste Street. Of these, about half are United States' participants, while Great Britain, the Soviet Union, France, and Germany are all represented by sizable delegations. Observing and theoretical notes are being compared by astronomers from Finland and Chile, China and the Vatican, the Netherlands and India, Turkey and the United Arab Republic. After a nine-hour flight from London, Great Britain's astronomers are not yet used to the California schedule; when they landed at $2^h\ 00^m$ Monday morning, it was midmorning in London.

Under the direction of Cincinnati's Paul Herget a system for indicating languages spoken by the registered guests has been put into effect, colored dots being pasted to the name tags. Dr. Herget reports that the two languages most widely spoken next to English are French and German. Two astronomers are displaying all six colors: Fritz Zwicky and Luigi Jacchia.

Invitations to join the various expeditions and field trips to Lick Observatory, San Francisco, and the Muir Woods should be exchanged for tickets as promptly as possible. There are still quite a few vacancies on all trips with the exception of that to the Muir Woods on Wednesday afternoon, August 23rd. If for any reason

a ticket for a particular date cannot be used, it should be exchanged for another.

The Napa Valley winery trip will start at $10^h\ 00^m$ on Sunday, August 20th, instead of its originally scheduled time of $13^h\ 00^m$. Since there is a waiting list, those persons who are unable to make the trip should inform the Registration Office, so that substitutions may be made. The barbecue dinner will be held at $15^h\ 00^m$ at the Charles Krug Winery, just north of St. Helena, about 1½ hours drive from Berkeley. Persons taking their own cars should go directly there, and they will be shown through the winery before eating.

The University of California is entertaining the 300 ladies registered for the meeting today at $15^h\ 30^m$ at University House. The building is opposite Dwinelle Hall, and guests will be received by Mrs. Edward Strong. Wednesday and Thursday morning, 27 coffee hours are part of the special ladies program sponsored by citizens of Berkeley. Transportation will be provided at $9^h\ 30^m$ from Davis and Cunningham Halls.

Families with small children who need cribs or blankets are most welcome to call Mrs. David Williams at TH 8-3903 or Mrs. Carl Sagan, OL 4-7013. They are also reminded of the baby care service, details of which are available at the Information Desk.

All mail for persons living in residence halls may be picked up in the mail room for Unit 2, 2650 Haste Street, from $8^h\ 00^m$ to midnight.

Commission on Solar-Terrestrial Relationships

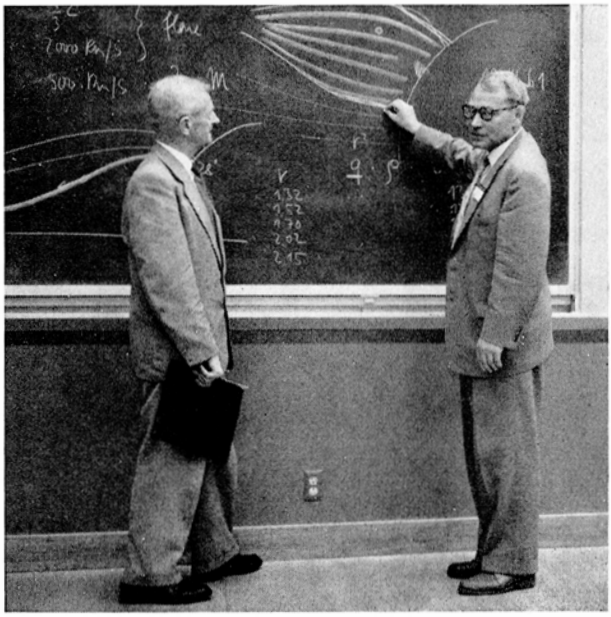
A new inter-union commission on solar-terrestrial relationships was organized Monday under the chairmanship of Prof. C. W. Allen. Formed jointly under the IAU, URSI and IUGG, the new commission will concern itself primarily with the influence of variations in solar electromagnetic radiation and ionized particle (plasma) radiation on the terrestrial and planetary atmospheres. This commission replaces the former IAU commission.

A major purpose of the the new inter-union commission will be to sponsor symposia under the auspices of the various parent bodies. The discussion favored symposia that would include both invited review papers and short contributed papers. Another activity will be to continue the trienniel review report on work in the field of solar-terrestrial relationships. Depending on the favorable action of Commission 10 on Solar Activity, the new inter-union commission would also serve as advisor to the *Quarterly Bulletin of Solar Activity*.

Discussion at the Monday session favored sending the commission secretary,

Dr. D. K. Bailey, as a reporter to the organizing meeting next spring of the International Quiet Sun Year, which will resemble a minor IGY and is scheduled for 1964-65.

The new inter-union commission on solar-terrestrial relationships consists of the following 12 members: (representing the IAU) C. W. Allen (UK), J. F. Denisse (France), R. Giovanelli (Australia), E. R. Mustel (USSR); (representing IUGG) J. Bartels (Germany), B. Haurwitz (USA), F. Link (Czechoslovakia), M. Nicolet (Belgium); (representing URSI) G. M. Allcock (New Zealand), D. K. Bailey (USA), R. Coutrez (Belgium), A. H. Shapley (USA). In addition to these members, an informal roster has been assembled of active research workers who have published in this field.



A speaker at the meeting of the new commission was M. Waldmeier (right), of the Swiss Federal Observatory. He gave optical evidence from the solar prominence of March 18, 1961, that the long stable coronal streamers visible during eclipses are actually particle trajectories. He is discussing this subject with Sydney Chapman (left) of Great Britain.

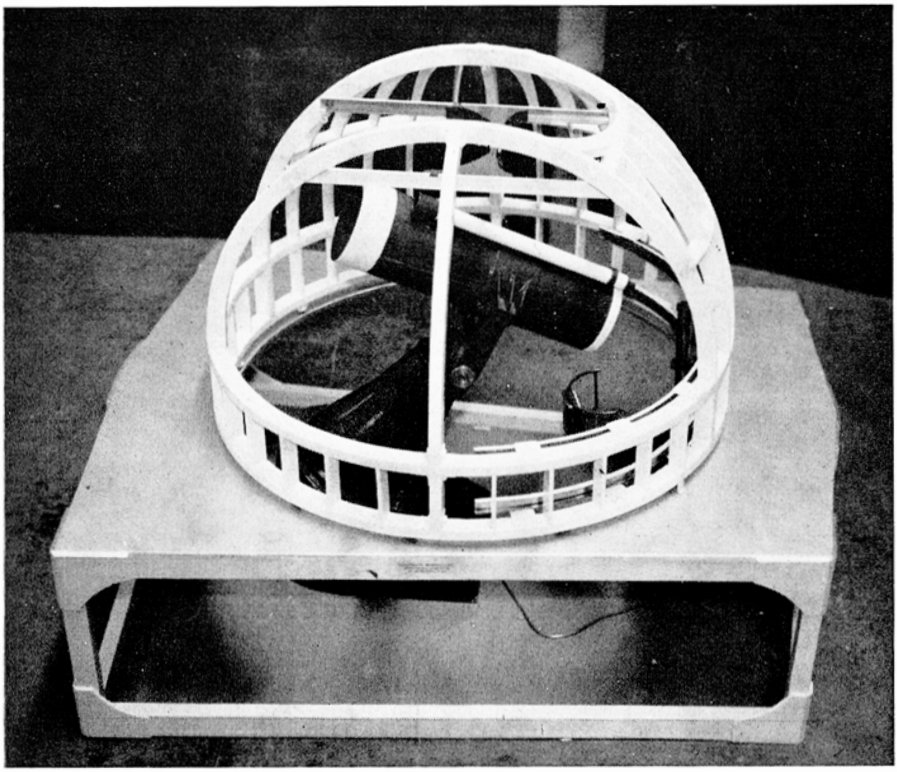
With the Exhibits

On exhibit in Room 100, Wheeler Hall, is a 1/12-scale model of the 37-inch Cassegrain-Schmidt telescope now in the advanced stages of assembly at the University Observatory, St. Andrews, Scotland.

Like the observatory's existing 18-inch Schmidt, the new telescope follows a suggestion of E. Findlay-Freundlich to overcome disadvantages of the classical form of the Schmidt telescope with its curved and inaccessible field. A secondary convex mirror not only makes the focus readily available but flattens the focal surface. The introduction of auxiliary equipment at or near the focal plane is facilitated, and flat glass plates may be used for direct photography.

However, adding the secondary convex mirror introduces technical difficulties in designing both the tube and mounting. It has been standard practice to allow compensating deflection of both ends of the tube, but if a second mirror is added to the system at some point other than the tube extremities, this system of compensation will not perform satisfactorily.

To solve this problem the Cassegrain-Schmidt system employs an extension



A model of the 37-inch telescope of St. Andrews University Observatory.

of the classical method of mirror flotation. Two concentric tubes are used, the outer one carrying the main mass of the optical train, and the inner maintaining positions of the individual optical elements. The inner tube is not subjected to the normal bending moment and therefore has no deflection. Its base is fastened as close to the primary mirror as possible, while its upper end is floated radially near the Schmidt plate. Such an arrangement is damped against oscillations due to wind or other causes, since the inertia of the tube opposes that the annular balance system that radially supports it.

The guiding telescope is attached to the inner defining tube at the upper end. In this way, the normal deflections of the outer tube are not transmitted to this telescope.

The usual fork type of equatorial mounting for Schmidt telescopes was not felt to be adequate for the St. Andrews instrument. Such a mounting would not provide enough clearance at the Cassegrain focus for auxiliary equipment without using abnormally long fork arms.

With the *compensated fork mounting* evolved at St. Andrews the arms are shortened. The declination axis is more stable, with its very robust shaft supported by ample and widely separated bearings. It was felt that in wide-field high-resolution work special attention should be given to obtaining a well-defined declination axis.

The optical system was designed by Dr. E. H. Linfoot of the Cambridge Observatories. The Schmidt plate and primary mirror are both 37 inches in diameter. The working aperture can be varied between 30 and 37 inches, depending on the area of the field required and the amount of vignetting that can be tolerated. The angular field is 4° 22′ and the linear field is 8 inches square. With an equivalent focal length of 105 inches, the focal ratio of the telescope will be about f/3.3.

Experimental tests on the complete optical system indicate that it contains only fifth and higher-order astigmatism and coma. By deliberately figuring the system to reduce slightly the quality on axis, the off-axis performance has been improved to the point where the image size of a point source is less than 0.002 inch and remarkably uniform over the entire field. This is the same order as the size of the tremor disk for average seeing condition in St. Andrews.

The telescope will be in operation toward the end of this year. Initially it will be used for surface photometry of galactic nebulosities and galaxies. If a detailed study of the stellar images indicates a quality high enough, the telescope may be used for astrometric purposes.

Adlai E. Stevenson at IAU opening ceremony

IAU NEWS BULLETIN

2 — Wednesday, August 16, 1961

Berkeley, California

A TELEGRAM TO THE IAU

Dr. J. H. Oort
President, International Astronomical Union
University of California
Berkeley, California

I would like to extend my greetings to all of the delegates to the 11th General Assembly of the International Astronomical Union. It is a privilege for the United States to be host to this distinguished meeting and to welcome the assembly once again to our shores.

Astronomy is an ancient art, and from the earliest times has known no national boundaries. Today, American astronomers work with their colleagues in observatories all over the world. I hope that tomorrow this collaboration will extend to observatories in outer space.

The breadth and freedom of scientific exchange among astronomers sets a high example for other disciplines. I know that this exchange will continue, even as man's curiosity about the structure and history of the universe continues.

My very best wishes for a successful meeting.

JOHN F. KENNEDY
President of the United States

Satellite-Ballon Echo

On pourra voir le satellite-ballon Echo, comme un objet de 1^{ere} magnitude à son passage au-dessus de Berkeley, ce soir. Les instants de passage du meridien sont $21^h\ 56^m$ (heure d'été locale et $24^h\ 00^m$). Si le ciel est clair, le satellite sera visible à l'ouest, 10 minutes environ avant son passage au meridien. Echo disparaîtra dans l'ombre de la Terre avant d'avoir parcouru tout le ciel.

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.

Dr. Leo Goldberg opens the morning convocation.

THE OPENING CEREMONY

Upwards of 10,000 people witnessed the convocation of this 11th General Assembly, held yesterday morning on Dwinelle Plaza. In a scene dominated by the flags of our adhering member nations, marked by the efficiency of the loudspeaker system, and warmed by increasing sunshine, the large crowd of astronomers, University staff and students, and Berkeley townspeople applauded equally the scientific and political portions of the speeches.

Chairman Leo Goldberg read the telegram of welcome from President John F. Kennedy, and Dr. Donald H. Menzel spoke on behalf of Dr. Howard P. Robertson of the National Academy of Sciences. He characterized the broad organization of scientific endeavors as constituting a "republic of science."

Dr. J. H. Oort, IAU president, gave his address first in English and then in French. Pointing out the contribution of California telescopes to our knowledge of exterior galaxies, he said:

"If you look through the *Hubble Atlas of Galaxies*, which has just been completed by A. R. Sandage, and which you will certainly find on display, you will be particularly struck by two things: in the first place by the great variety of forms, in the second place by the fact that the majority of galaxies have structures that cannot possibly be in equilibrium. Those galaxies seem to be midway between a curious kind of chaos and a stage in which they would become well mixed and regular. Those galaxies clearly bear the imprint of their birth in a past and quite different phase of the universe."

After reviewing the rapid growth of both optical and radio astronomy, the Netherlands astronomer posed the question of the IAU's present meteoric expansion, saying, "Though the general assemblies of the Union continue to fulfill a most useful purpose in bringing together representatives from all different

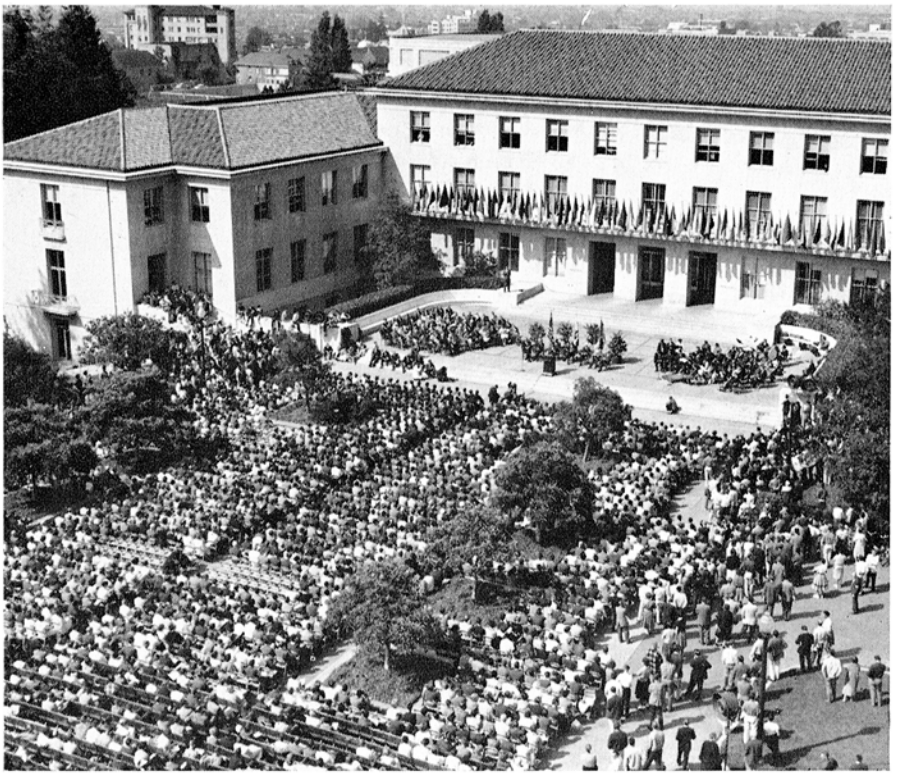
branches of astronomy, thus helping to develop these branches in such a way that they are most useful to one another, and though they continue to be a fruitful meeting place for old and young astronomers from all nations and vocations, we must nevertheless ask seriously whether or not we should continue in this way. I must confess that I feel quite uneasy about this. We must not run the risk that by an unwieldy size of our meetings the possibility of forming close ties and friendships is lost, or that some of our best astronomers refrain from attending because of disappointment about the too large meetings. The Union should, in time, take steps to ensure that the fine tradition of international co-operation is preserved. But what should be the steps? Is the only way out to arrange for separate assemblies for different subjects, for instance, the planetary system, the sun, stars, and galaxies?

"For the present we still have all subjects of astronomy united. And we must enjoy this meeting to its fullest extent. I cannot doubt of the result now that we have come together in a state that has been named after a fabulous island described by the 16th-century author Ordonez de Montalvo as being *near* to paradise, and which for astronomers is the paradise."

The speech by Adlai Stevenson dwelt on a variety of subjects. He pointed out that only after a new scientific product is fully built and functioning do men outside of science begin to think of its human and political implications, so that "we are forever running today to catch up tomorrow with what [science] made necessary yesterday." He said further:

"This gap must be closed—this disruptive and dangerous lag between scientific discovery and the political adaptation to it. . . . The natural scientist and the

Dr. Jan H. Oort addressing the delegates at yesterday's opening session. In the background are Ambassador Adlai E. Stevenson (center) and Dr. Leo Goldberg (right).



View of Dwinelle Plaza from atop Wheeler Hall.

political practitioner must enter into a new communion of early and constant intercommunication, so that the world's institutions can more nearly keep up with the incessant march of science. . . .

"Technology will not wait long far an answer. In just a few years there will be rocket boosters, in more than one country, big enough to launch whole teams of men on journeys to the nearest planets. Shall this too, at huge and wasteful expense, be a race for military or psychological advantage? Or shall it be the occasion for teamwork, ignoring ideological lines? We haven't much time left in which to decide—it is a fork in the road which soon must be passed. . . .

"Just last week I was happy to read the remark of the eminent Soviet astronomer, A. A. Mikhailov, at a meeting in Pasadena on the astronomy of the space age. 'Science is international,' he said, 'My hope is for the United States and Russia to share in space projects and in many other fields of human endeavor.' I am glad Professor Mikhailov is here this morning, because I would like to tell him how much I agree with him!"

On the following two pages is a view of the opening ceremony with Wheeler Hall in the background. Ambassador Stevenson is speaking.

With the Exhibits

On display in Room 100, Wheeler Hall, is a 1/12-scale model of the 36-inch reflecting telescope to be flown by balloon next year by Princeton University Observatory astronomers under the leadership of Prof. Martin Schwarzschild. This project, named Stratoscope II, is a sequel to the Stratoscope I ascents in 1957 and 1959, when a 12-inch telescope was used for solar photography at 80,000 feet.

The flying telescope, under construction by the Perkin-Elmer Corp., has been designed to resolve 0.1 second of arc on an hour exposure. An electronic-optical servo system will automatically provide precise guiding.

Observations from 80,000 feet, well above the turbulent lower atmosphere, will permit photographs of a clarity impossible to attain from the earth's surface. Among the first Stratoscope II observations is a study of the divisions in Saturn's rings. A careful examination of Venus is proposed to search for possible breaks in the cloud cover. There will also be detailed observations of density fluctuations in the Orion and planetary nebulae.

The 36-inch f/4 primary mirror is of fused silica; a Gregorian secondary and two enlarging lenses raise the effective focal ratio to f/100. Images will be recorded on 70-mm. film, up to 1,000 frames being exposed by ground control. A pair of attached television cameras will enable scientists on the ground also to control the setting of the instrument.

About 4,500 pounds of equipment have required the development of a new especially large balloon made of Mylar plastic reinforced with Dacron mesh. In flight, the telescope assembly, parachute, and balloon will measure over 500 feet high. To insure a soft landing for the instruments, a helicopter is to capture the descending balloon and payload.

During the early part of the week, M. Schwarzschild was photographed while preparing the scale model of the Stratoscope II for display. The project is being carried on by Princeton University Observatory astronomers with National Science Foundation aid.

TODAY'S COMMISSION MEETINGS

Presidents of commissions are responsible for the programs of the meetings of their commissions; the agendas and subjects for discussion for some commissions have been given in the *Agenda and Draft Reports*. More details are given separately; only a general indication of the type of meeting is given below.

Wednesday, 16 August 1961

(All meeting rooms in Dwinelle Hall, unless otherwise stated)

MORNING

Comm.	*Time*	*Room*	*Remarks*
4	$09^h\ 00^m$	117	Business. Draft report.
9a	09 00	145	Business and scientific reports of new work.
12	09 00	111	Administrative and scientific. Co-operative observational programs.
14	09 00	146	Administrative and scientific. Reorganization wave-length standards.
22	09 00	182	
24	09 00	127	Administrative. Draft report.
27	09 00	155	Scientific. Observations of secondary periods and beat phenomena.
34	09 00	142	Administrative and scientific. Interstellar matter.
8	11 00	160	Business and scientific. Fundamental star catalogues and astrolabe programs.
9	11 00	111	
28	11 00	188	Business. Reorganization.

AFTERNOON

Comm.	*Time*	*Room*	*Remarks*
5	$14^h\ 00^m$	109	Administrative. Internal organization and working program.
7	14 00	127	
10	14 00	155	Scientific. New observational techniques and new research results.
14a	14 00	146	
15	14 00	117	Administrative. Internal organization.
33	14 00	145	Business. Proposal to incorporate 33a into 33. Future of 33b.
42	14 00	111	Business.

GENERAL ASSEMBLY — First Session

The first of the general business meetings of the IAU was held in the auditorium of Wheeler Hall yesterday afternoon, with J. H. Oort presiding, ably assisted by general secretary D. H. Sadler. Official interpreters were appointed, and matters of organization settled. Most important of these was announcement of the individuals representing each adhering country. A revised set of statutes and by-laws, already published in the *Agenda and Draft Reports*, was formally adopted.

Most controversial item of business was the question of the status of Taiwan. The island country had been admitted to the Union by the Executive Committee on September 8, 1959. Thereupon the People's Republic of China resigned from the IAU. Prior to the Berkeley assembly, the Czechoslovak and USSR national committees of astronomy had filed resolutions that Taiwan's admission be revoked.

When the problem reached the floor Tuesday, the Czechoslovak and USSR delegates combined their resolutions into one, which was presented by Dr. Sadler at their request. Dr. Oort then briefly outlined the background of the situation, pointing out that the Taiwan application was in regulation form; he then raised a motion that the Czechoslovak-Soviet resolution be turned down. The vote by countries was 24 in favor, 5 against, with 4 abstentions. The status of Taiwan thus remains unchanged. A telegram will be sent to the astronomers of the People's Republic of China, regretting their absence from the meeting and expressing best wishes for their work.

Dr. D. H. Sadler at the rostrum, with an interpreter beside him.

Convention News and Notes

Although still more formally dressed than native Berkeleyites by several powers of 10, IAU delegates nevertheless succumbed to the fair skies and mild temperatures of central California, appearing in shirt sleeves, sport shirts, and even Bermuda shorts. The General Assembly is calling for physical as well as mental exercise from its participants, regular walks being required from dormitories to campus and back.

Mrs. C. D. Shane and her capable staff behind the Registration and Information Desk have been kept busy by the lines of persons signing up for various field trips to San Francisco and vicinity. The two afternoon boat trips around San Francisco Bay scheduled for Thursday, August 17th, and Tuesday the 22nd are filled, but there are still places in the morning excursions on those same days. Again, a plea goes out to those who are registered for the $10^h\,00^m$ Sunday morning Napa Valley trip but are unable to attend. Will these persons please cancel their reservations at the Information Desk as soon as possible, for there are 80 on the waiting list.

The first Lick Observatory trip was quite a success, although on the ascent many riders began to feel a bit uneasy as the busses wound around the mountain's hairpin curves. As the second bus prepared to depart from the observa-

At the Registration Desk, hosts Harold F. Weaver (left) and his wife greet a delegate who is traveling around the world, visiting observatories on the way. He is Bart J. Bok, director of Mount Stromlo Observatory in Australia.

tory, Dr. G. W. Preston of Lick rushed up with the news that a landslide on Mount Hamilton had blocked the trail and there would be a slight delay while a bulldozer cleared the road. About half an hour later the route was clear, and the bus descended smoothly.

Beginning today an information booth will be open in Dwinelle Hall supplying many of the services of the main Registration and Information Desk. Invitations for field trips and expeditions may be exchanged for tickets at this new booth.

Transportation for this evening's reception under the auspices of the University of California will leave from in front of the Unit II Residence Halls around $20^h\ 00^m$. The Claremont Hotel, where the reception is to be held, is located at the head of Claremont Avenue, south of the campus.

Women attending the assembly were guests of Mrs. Clark Kerr, Mrs. Edward Strong (wife of the University's chancellor) and Mrs. Shane at University House yesterday afternoon. About 275 ladies have registered for the meeting and are enjoying many activities planned especially for them.

On Bancroft Way just opposite Sather Gate are two tobacco stores that carry foreign cigarettes—Whelan's Cigar Store and the Campus Smoke Shop. Tobaccos from at least 25 countries are carried by the latter.

Those who have not yet found where to buy stamps may purchase them at the Registration and Information Desk. A conveniently located post office is on Durant Ave. just east of Telegraph Ave.

In addition to Drs. L. G. Jacchia and F. Zwicky, mentioned yesterday, Dr. Edith Müller has a badge displaying all six language dots.

Errata: Did you notice the editor's error in yesterday's *Bulletin?* On page 2 the exposure time for the picture of Comet Wilson 1961d should have been given as 30 seconds, not 30 minutes, as it was taken with the very fast 48-inch Schmidt camera.

Morning coffee hours prove very popular with the ladies.

IAU NEWS BULLETIN

3 — Thursday, August 17, 1961

Berkeley, California

A New List of Terms for Meteoric Astronomy

At its meeting in Room 142 Dwinelle Hall at 4 p.m. today, Subcommission 22b is planning to discuss a new list of terms to be used in meteoric astronomy. After a polling of the members of the subcommission, a list of 20 standard terms was published in the draft report. This first list is restricted to words about which there seems to be fairly general agreement at the present time. Furthermore, the definitions were chosen with the hope of making them independent of specialized knowledge, yet clear and concise.

Since most meteoric literature is published in one of four languages, English, French, Russian, and German, these were considered carefully in choosing the words to be used. The major problem is that some terms that are quite distinct in one language may be very similar or even the same in another. For example, *train* and *trail* are the same word in Russian, hence they could not be used to distinguish between a meteor's light and the dust left along its trajectory. A system of basic terms must also be free of words that are commonly used with a different meaning in another scientific discipline.

The subcommission's president, Dr. Peter M. Millman, welcomes suggestions and comments from any member of the IAU.

Extra Sunday Trip

The Napa Valley trip has been fully subscribed. In order not to disappoint many persons, a trip has been organized to the Monterey Peninsula, one of the most interesting and beautiful regions on the Pacific Coast. The Spindrift Restaurant has been reserved for lunch for the IAU group. The tour will include the famous 17-Mile Drive and picturesque Carmel. Napa Valley invitations may be exchanged for tickets for this trip. Busses will leave the Residence Halls at $10^h\ 00^m$ Sunday morning, August 20th.

Echo Communications Satellite

Meridian passages for the Echo balloon satellite will occur at $21^h\ 17^m$ and $23^h\ 22^m$ (Pacific daylight time). The altitudes of the two passes will be 47° and 85°, respectively. These predictions have been prepared especially for the IAU meetings by the Smithsonian Astrophysical Observatory, Cambridge, Mass.

COVER: Ladies of the IAU were treated to the hospitality of many Berkeley residents yesterday. Waiting in the living room of Cunningham Hall for transportation to morning coffee at Mrs. M. W. Gardner's home were (left to right) Mrs. Gardner, Mrs. R. H. Stoy, Mrs. A. H. Joy, and Mrs. W. S. Plakidis. The three guests are from South Africa, the United States, and Greece, respectively. More coffee hours are being held this morning. (See page 10.)

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.

INVITED DISCOURSE

The Earth's Radiation Belts

James A. Van Allen is noted for his discovery of extensive belts of charged particles surrounding the earth.

Yesterday afternoon, James A. Van Allen, State University of Iowa, lectured on the "Dynamics, Composition and Origin of the Geomagnetically Trapped Corpuscular Radiation," in the first of the IAU series of invited discourses.

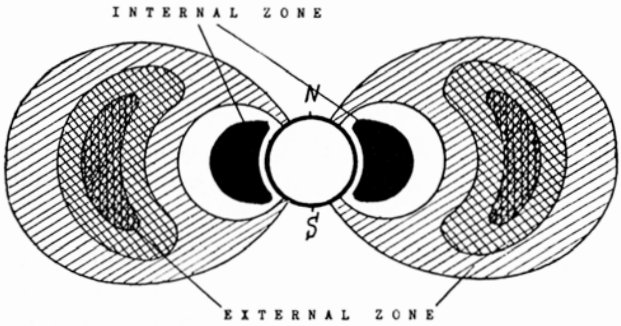
The story of the radiation belts engirdling the earth can be traced back to the year 1896, when K. Birkeland began a laboratory study of how cathode rays moved under the influence of a relatively isolated magnetic pole, then of a magnetic dipole. The experimental phenomena were suggestive of the aurora, and led C. Störmer to make a detailed theoretical study of the motions of electrically charged particles in a magnetic dipole field.

Actually, the Störmer theory describes fairly completely the trapping of charged particles, with some simplifying assumptions. Extended computations can give the motion of a particle to any desired degree of detail. More recently, H. Alfvén furnished an approximate theory that greatly facilitates computation of many special cases.

As Dr. Van Allen pointed out to his audience, the motion of a geomagnetically trapped particle may be regarded as the composite of three cyclic motions. The first of these, characterized by the Larmor period, is the circular motion of the particle around its guiding center. The second is the cyclic motion of the guiding center between mirror points, and the third is the longitudinal drift of the guiding center around the earth. In his discussion of these motions, the speaker called attention to their interesting mathematical properties, in particular their three invariants.

The first observational indications of trapped radiation, apart from auroral

phenomena, were large electron fluxes measured during rocket experiments in the early 1950's. But the first conclusive evidence for the existence of significant intensities of geomagnetically trapped particles was obtained in early 1958 by Dr. Van Allen and his students, using Geiger tubes flown in the artificial satellites Explorers I and III. General confirmation came quickly from apparatus in Sputnik III, which was launched on May 15, 1958.



A schematic view of the Van Allen radiation belts that were discovered in 1958. This was one of the many illustrations used by Dr. Van Allen in his talk.

Varied methods have now given us a large body of observational knowledge concerning the corpuscular radiation belts surrounding the earth. The radiation region appears to be divided into two distinct zones, with a gap between them known as the "slot." Of these two zones, the inner, relatively stable one is populated by particles believed to result from the action of cosmic rays on the earth. The outer zone is located in the weak outer reaches of the geomagnetic field. It is variable in size and density, as solar activity changes.

The source of the charged particles in the outer zone was discussed at length by the Iowa physicist. This region is noteworthy for an almost complete lack of high-energy protons. He believes the present evidence points strongly to the outer zone being due to solar plasma, and to local magnetic accelerating processes. "There remains a wide variety of fascinating problems associated with the origin and dynamics of the outer zone," said Dr. Van Allen, "and with the relationship of the outer zone to aurorae, airglow, geomagnetic activity, and atmospheric heating."

NO BULLETIN SATURDAY

The *IAU News Bulletin* will not be published either Saturday or Sunday, so Friday's magazine will contain the next day's events as well. Those desiring to announce activities on either of those two days should bring their news to the editorial offices in Room 20, Wheeler Hall on Thursday. Announcements for Monday should be submitted Friday.

Commission Announcements

Commission 8: F. P. Scott, president. Program: S. Slaucitajs, status of the La Plata-La Leona meridian circles; Tavastsherna, reduction of the Melbourne observations; J. Lévy, remarks; A. N. Adams, digitalization of micrometer screws; and a discussion of the advisability of organizing a central collection of star lists recommended in resolution 17.

Commission 10a: W. O. Roberts, president. Program: flare film; reports on the intercomparison of simultaneous coronal intensity data from different stations, the centralization and exchange of solar data, and the stations currently participating in filmed co-operative solar flare patrols.

Commission 23: P. Sémirot, acting president. Discussion of constants and corrections employed in the Carte du Ciel, and the necessity and means of remaking an atlas.

Commission 29: L. H. Aller, president. Discussion of reprinting the Henry Draper catalogue, dividing the Commission into high- and low-dispersion study groups, and the creation of working committees on plate-calibration information, spectra loans, and availability and description of analyzing equipment.

Commission 43: H. Alfvén, president. Discussion of measurements of interplanetary electromagnetic conditions from space probes—E. R. Mustel, Soviet measurements, and Sonnet, USA measurements.

Newly Scheduled Sessions

A heretofore unlisted joint meeting of Commissions 25 (Stellar Photometry) and 29 (Stellar Spectra) to discuss photometric and spectro-photometric stellar standards between declinations $+15^\circ$ and -15° will be held at $16^h\ 00^m$ on Friday, August 18th.

Commission 9 (Instruments) will meet Monday, August 21st at $9^h\ 00^m$ for an informal discussion of the problems connected with coude spectrographs. Both photographic and photoelectric detectors will be covered.

On Monday, August 21st, at $14^h\ 00^m$ will be held a previously unannounced joint session of Commissions 28 (Extragalactic Nebulae) and 40 (Radio Astronomy). The program will concern astronomical problems requiring radio observations of high sensitivity and resolution: J. H. Oort, problems requiring resolution to one minute of arc; F. J. Kerr, new radio results on structure and motions in the Magellanic Clouds; L. Volders, 21-cm. galactic radiation; T. A. Matthews, radio sources—identification, structure, and diameters; R. Minkowski, radio source luminosity functions; M. Ryle, the radio luminosity function and the numbered flux density relationship; and G. C. McVittie, value of high-resolution radio observations in cosmology.

This recent picture shows work presently under way at the

With the Exhibits

A new 74-inch reflector will join the ranks of the world's great telescopes within the coming year. Located at Kattamia, Egypt, the new instrument will be a powerful addition to the Helwan Observatory. The view above shows the initial construction at the remote desert site midway between Cairo and the Suez.

The large reflector, under construction by Grubb-Parsons, will closely resemble the instrument now in use at Mount Stromlo Observatory in Australia. It will have Cassegrainian and coude spectrographs and will be equipped for direct photography at the Newtonian focus.

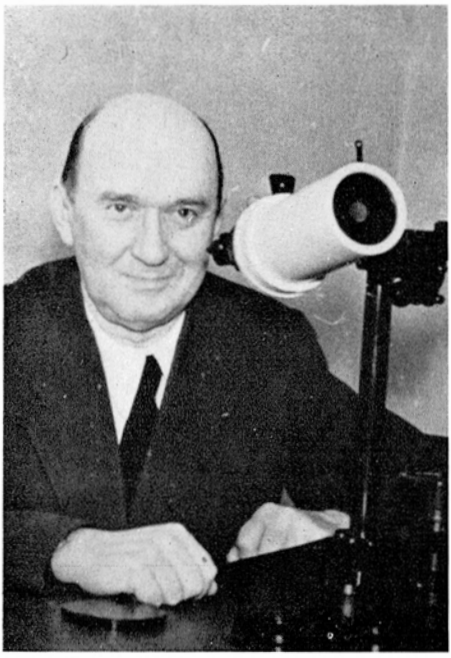
The selection of a suitable site proved troublesome. Along the narrow Nile Valley, where supplies would be readily available, it is difficult to get away from city lights. At the desert location finally chosen, all oil and water must be brought in. The access road alone cost £100,000. Another £250,000 have been required for the telescope and buildings.

Dr. Abdel-Hamid Samaha, director of Helwan Observatory, hopes that the forthcoming 74-inch telescope will be a powerful impetus to scientific and astronomical research in Egypt. He expects good observing conditions will prevail on not less than 200 nights at the Kattamia site.

Several other pictures of the construction area are on display in the exhibit area in 100 Wheeler Hall. In addition to these photographs, Dr. M. Khairy Aly, Helwan's deputy director, is displaying sections of the *Atlas of the Solar Corona*.

new 74-inch telescope of the United Arab Republic.

This atlas, in preparation by the Helwan and Sacramento Peak observatories, presents the spectrum of the inner corona during the total eclipse at Khartoum in 1952, photographed by Dr. Aly and the late French astronomer Bernard Lyot.



At the left is a photograph of D. D. Maksutov, the noted creator of many optical instruments. It is one of 70 pictures, diagrams, and facsimiles in the exhibit of the USSR. Next to Maksutov's portrait is a diagram depicting nine of his meniscus-lens reflectors. Other portraits are of Jacob Bruce, L. Euler, A. P. Gansky, Mikhail Lomonosov, G. N. Neujmin, G. A. Shajn, and W. Struve.

Featured is an eight-picture display showing the 15th-century observatory built by Ulugh Beg at Samarkand. From the Georgian State Museum are original and facsimile pages of an 11th-century astronomical manuscript.

Large pictures show the 1-meter Schmidt telescope of Burakan Observatory, and there are views of the Crimean Astrophysical Observatory.

Some New Astronomical Facilities in the USSR

The Soviet Union is engaged in enlarging and decentralizing its network of astronomical observing stations, according to delegates to this General Assembly. New or improved facilities are being provided in the Azerbaydzhan, Lithuanian, Turkmen, Latvian, Estonian, and Kazakh SSR's, and elsewhere in the USSR.

One major installation, the Azerbaydzhan Astrophysical Observatory, has been under construction for several years, completion of the main building being scheduled for 1961. Already several smaller instruments are in place, and a 2-meter (79-inch) reflector is being manufactured in East Germany. Located at an altitude of over 4,500 feet on Mt. Pirkuli, near Baku, the observatory site is climatically very favorable. Solar work will be emphasized, but there will be a broad program of astrophysical research, together with space-vehicle observations. The cost of this observatory has been estimated at 43 million rubles.

A large new astronomical center is being set up near Vilnyus, site of the Vilnyus State University, Lithuania, where an observatory had been founded as early as 1753. The new institution will conduct both optical and radio observations. The Latvian SSR claims a new observatory nearly complete on Rickstu Hill, near the Baldona health resort, about 20 miles from Riga. Already installed are a large radio telescope and a refractor; plans call for a 1.5-meter (58-inch) optical reflector, and a large radio interferometer cross. This Latvian observatory will emphasize studies of the sun and variable stars.

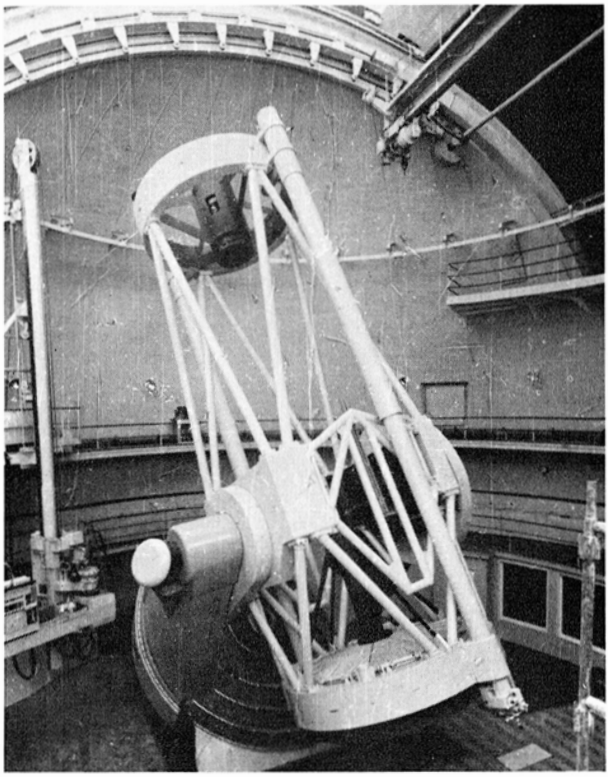
In 1957 the Estonian Academy of Sciences appropriated 17 million rubles for a large new observatory in the town of Elva, near Tartu. It will supplement the old Tartu (Dorpat) Observatory, founded 150 years ago, where F. W. Struve observed double stars. In all, 22 structures are to be erected for the new Institute of Astronomy and Atmospheric Physics, which is expected to be substantially complete in 1961. In the Turkmen SSR of central Asia, a new astrophysical observatory is active near Ashkhabad in the foothills of the Kopet Mountains.

The first part of the mountain observatory of the Alma Ata Institute of Astrophysics was completed in 1955; it consists of instrument shelters, laboratories, and houses for personnel. Plans for the second section were approved in 1959 by the Kazakh Academy of Sciences. Major instruments are to include a 1.5-meter (58-inch) reflector, and 12- and 16-meter (39- and 52-foot) parabolic dishes for radio work. Estimated cost of the new improvements is 22 million rubles. The enlarged research program at the Alma Ata complex will include studies of the sun, moon, stars, and interstellar matter, as well as tracking and photography of artificial satellites and space probes.

Since 1959 the Sternberg Astronomical Institute of Moscow State University

has been constructing a southern station near Simferopol in the Crimea. Already in operation are a 40-cm. refractor and a 70-cm. reflector. Soon to be added are a 1.25-meter (49-inch) reflector and other instruments. The new site provides much better observing conditions than Moscow, and will significantly strengthen the research and training facilities of the Sternberg Institute.

Part of the policy of decentralization involves erection of astronomical stations in Siberia. Some now being erected and others planned, they will be



The 102-inch reflector of the Crimean Astrophysical Observatory resembles the Lick 120-inch.

centers for optical and radio astronomical work, as well as upper-atmosphere research.

Well known to all delegates is the recently completed 2.6-meter (102-inch) reflector at the Crimean Astrophysical Observatory. The excellent new Soviet telescope is the world's third largest, exceeded in size only by the 200-inch on Palomar Mountain and the new 120-inch of the Lick Observatory here in California.

Convention News and Notes

Several citizens of Berkeley are opening their homes for morning coffees to the ladies attending the assembly, the first of these occurring yesterday morning. Groups of about 10 women, from almost as many countries, are called for in the living room of Cunningham Hall at $9^h\ 30^m$ and from there driven to their hostesses' homes. Conversation and refreshments bring about the inevitable comparisons of climates and observatories. A remarkable number of astronomers' wives have lived all over the world as their husbands worked at various institutions. Commenting on the ladies' program at the recent conference in Pasadena, Mrs. H. Friedman said that the title "baby sitter" was soon earned by two men assigned by Douglas Aircraft Corp. to shepherd the ladies around each day.

While 22 IAU commissions meet today, a number of expeditions by bus and boat are scheduled for the environs of Berkeley. The starting point for all trips is in front of Unit II of the Residence Halls, 2650 Haste Street, and please be there promptly. Morning and afternoon boat trips around San Francisco Bay leave at $9^h\ 00^m$ and $13^h\ 00^m$. The all-day ladies' expedition to Palo Alto and Stanford University, which includes tours of old Spanish buildings and gardens, leaves at $9^h\ 30^m$. Luncheon will cost $2.00. Trip number 2 to Lick Observatory departs from in front of the dormitory at $13^h\ 00^m$, and will include supper.

Left to right: Mrs. D. Lindblad and Mrs. B. Edlén, Sweden; Mrs. L. Gratton, Italy; and Mrs. L. Ivanova, USSR.

Becoming acquainted in Cunningham Hall living room are (left to right) Mrs. F. M. Bonanomi, Switzerland; Mrs. J. L. Pawsey, Australia; and Mrs. N. L. Watts, United States.

The first musical event of the assembly was a Tuesday evening program of folk songs by Sam Hinton, who in his spare time is a senior zoologist at the Scripps Institution of Oceanography in La Jolla. Accompanying himself on the guitar, Mr. Hinton selected songs representing various parts of the United States, and the audience, showing its musical talent, joined in the choruses. This evening's concert by a string ensemble under the direction of Sidney Griller begins at $20^h\ 30^m$ in Hertz Auditorium. The program will include two concertos, for viola and strings and for violin and strings, by astronomer Sir William Herschel. Admission is free for wearers of the IAU badge.

To those whose IAU badges display all six language dots must be added Dr. William Markowitz of the U.S. Naval Observatory.

Mrs. H. L. Mavridis of Greece (left) and Miss Nancy Irwin, United States.

TODAY'S COMMISSION MEETINGS

Thursday, 17 August 1961

(Meeting rooms in Dwinelle Hall, unless labeled *W* for Wheeler Hall)

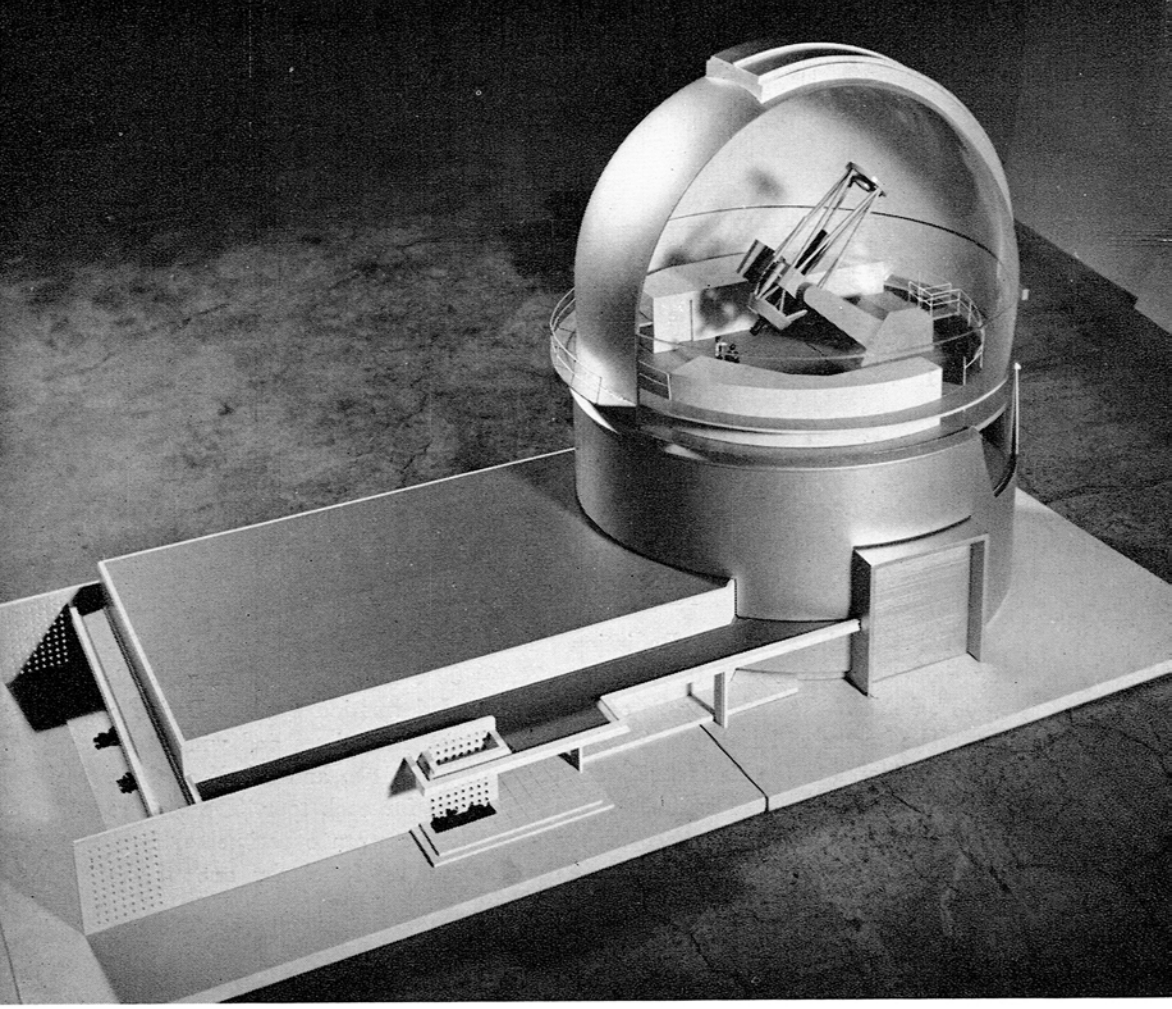
MORNING

Commission		*Time*	*Room*	*Remarks*
9b	Image Qual.	9-11	142	Report of site testing.
10a	Solar Ciné	9-11	145	Current work and flare film.
14b	Mol. Spec.			*Meeting Cancelled.*
17	Moon	9-11	117	Organization. New communications.
22a	Meteorites	9-11	127	Organization, co-operative programs.
23	Carte Ciel	9-11	188	Administrative (see separate program).
30	Rad. Vel.	9-10	111	Administrative and scientific.
34	Interstellar	9-11	155	Scientific.
38	Exchanges	9-11	109	Administrative and org.
30a	Fund. Vel.	*10-11	111	Scientific and administrative. Standard velocity stars. Co-operative observing.
3	Notations	11-12	284	
12a	Solar Ecl.	11-12	146	Business and scientific. Principal speakers: Athay, Houtgast, Suemoto.
16	Planet Phys.	11-12	160	Business. Lunar cartography.
29c	Star Class.	11-12	182	Administrative and scientific.
31	Time	11-12	120*W*	Business. Resolutions.

*Formerly 11-12.

AFTERNOON

Commission		*Time*	*Room*	*Remarks*
8	Positions	14-15	127	Administrative. Reference stars.
29	Star Spec.	14-16	155	
37	Clusters	14-16	145	Business and scientific. Motions. "Recent Observations of Clusters."
41	History	14-16	117	
43	Mag.-Hydro.	14-17	311*W*	Business and scientific. Future plans.
6	Telegrams	16-17	146	Administrative. Future of Telegram Bureau.
22b	Met. Term.	16-17	142	Business. Meteoric terminology.



A model of the U.S. Naval Observatory 60-inch astrometric reflector and its housing

IAU NEWS BULLETIN

4 — Friday, August 18, 1961

Berkeley, California

Films of Previous IAU and Other Meetings

About 15 minutes after the second invited discourse this evening, Dr. P. van de Kamp will show some films of previous meetings of the IAU (and of some other meetings) in the auditorium of Wheeler Hall. The scheduled time is $21^h\ 15^m$.

New Tour Added

Tours of the Lawrence Radiation Laboratory will be held at the following times: August 19, $9^h\ 00^m$; August 21, $9^h\ 00^m$, $13^h\ 30^m$; and August 22, $9^h\ 00^m$, $13^h\ 30^m$. Tickets may be obtained at the Information Desk in Dwinelle Hall. The busses will leave from the plaza there at these times and will return the participants to the Residence Halls, Unit II, about two and a half or three hours later. The number is limited to 120 persons for each tour. The visitors will be shown the bevatron accelerator area, the bevatron experimental area, and the 88-inch cyclotron. They will be given a brief talk by one of the physicists.

Satellite-Ballon Echo

Les passages au meridien du satellite-ballon Echo auront lieu à $20^h\ 39^m$ et $22^h\ 43^m$ (heure d'été locale) aujourd'hui. La hauteur au-dessus l'horizon des deux passages sera 44° et 74°, respectivement. Les temps et altitudes pour les passages de samedi seront $22^h\ 05^m$, 65°, et $0^h\ 08^m$, 52°; et pour dimanche, $21^h\ 26^m$, 57°, et $23^h\ 30^m$, 63°. Le satellite entrerá dans l'ombre de la terre avant de parvenir au meridien lors du second passage de samedi et de dimanche. Ces prèvisions ont été préparées spécialement pour l'assemblée de UAI par le Smithsonian Astrophysical Observatory, Cambridge, Mass.

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.

With the Exhibits

Dr. K. A. Strand, president of Commission 24, is in charge of the 60-inch astrometric reflector project.

Depicted on the front cover of this *Bulletin* is a 1/48-scale model of the new building for the U.S. Naval Observatory's Flagstaff station in Arizona. The exhibit is on display in Room 100, Wheeler Hall.

The telescope has been designed to meet the exacting requirements of such astrometric programs as trigonometric parallaxes of stars of low apparent and intrinsic brightness. The reflector has a parabolic primary mirror 62 inches in diameter and of 50-foot focus. The secondary is a 36-inch optical flat that reflects the light from the primary through the latter's central perforation to the focus behind the mirror cell. Because of the large (f/10) focal ratio, a 4-inch-diameter field with a scale value of 1 mm. = 13″ will be essentially free from coma. A special Ross corrector will be incorporated when an 8-inch coma-free field is desired.

An unique feature of this telescope is that both mirrors are of fused silica, which has a coefficient of expansion only one-sixth that of pyrex. Both mirror blanks were manufactured by Corning Glass Works; the primary, weighing over 3,000 pounds, is the largest fused-silica blank ever cast.

This instrument has been designed to have minimum flexure in the fork-type equatorial mounting and in the tubular structure of the mirror-support system. The polar axis rotates on an oil-pad system that "floats" the telescope on a film of oil 0.002 inch thick.

The optical arrangement includes a collimation system for checking and aligning. A photoelectric guider with a manual override will make adjustments directly on the polar and declination drives.

To avoid poor seeing near the ground, the observing floor is elevated 40 feet. The dome is 65 feet in diameter and has double walls separated by an air space with insulation, in the same manner as the buildings of the 120- and

200-inch telescopes. The walls are concrete, and have an aluminum heat shield six inches from them on the outside.

Architectural and engineering design of the telescope and building have been carried out by C. W. Jones, Inc., of Los Angeles, according to specifications of Dr. K. A. Strand. The building is now under construction five miles from Flagstaff, close to the present site of the 40-inch reflector. The work is being done by Murray J. Schiff and Co. of Tucson, Arizona, under U.S. Navy supervision. It is expected that the contract for construction of the telescope will be let in the middle of September, and completion of the installation is expected in July, 1963.

Commission Announcements

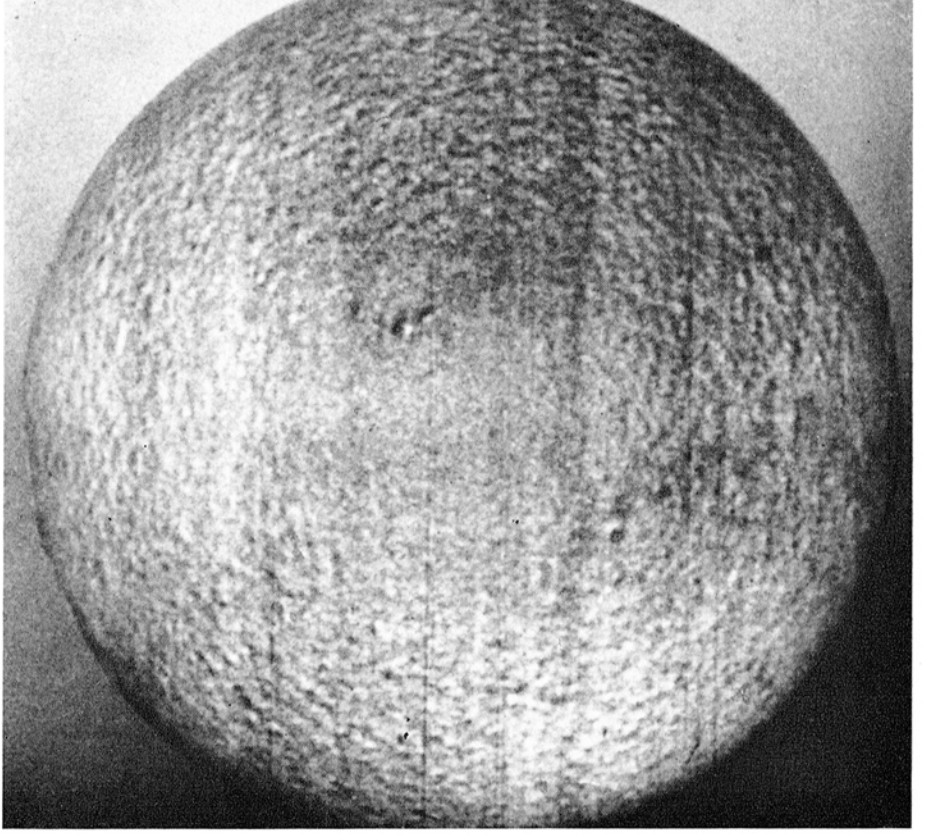
Commission 12: J. W. Evans, president. Program: J. Rösch and M. Schwarzschild, continuum studies of granulation; N. V. Steshenko and O. C. Mohler, spectral line studies of granulation; R. B. Leighton, oscillations in the solar atmosphere; J. W. Evans and R. Michard, oscillatory motion in the upper photosphere; K. H. Böhm, photospheric models incorporating granulation data.

Commission 21: F. Roach, acting president. Technical discussions: D. Barbier, status of 6300 studies; L. Wallace, OH studies; F. Roach, IGY book of airglow observations; H. Elsasser, integrated starlight; H. F. Siedentopf, zodiacal light and gegenschein studies.

Commission 25: R. H. Stoy, president. Topics: reduction to standard $U–B$ colors; conversion difficulties for supergiants and Cepheids; constancy of standards; strengthening of north-south tie-ins; standard areas with reddened stars; instrumental advances; photographically reproducible R, I magnitudes; R, G, U system; faint standards in restricted areas; general catalogue of stellar magnitudes; extinction; catalogue of polarization standards.

Commission 29: L. H. Aller, president. Scientific presentations: H. G. Kienle, absolute energy distributions; J. L. Greenstein, spectra of intrinsically faint stars; H. W. Babcock, stellar magnetic fields.

Commission 29a: C. de Jager, president. Program: report of working group on astronomical nomenclature (chairman, M. Rudkjöbing); report of working group on co-operation with electronic computers (chairman, M. Wrubel).



This "spectroheliogram" by R. B. Leighton will be shown during his talk at today's meeting of Commission 12.

Motions in the Solar Atmosphere

The photograph reproduced here was taken by Prof. R. B. Leighton of California Institute of Technology using the 60-foot solar tower on Mount Wilson. It is a "spectroheliogram" showing the line-of-sight components of local velocity obtained by an adaptation of a technique previously used for studying magnetic fields.

In many instances bright and dark areas appear close together—the dark showing material moving away, the light indicating approach. These areas are indistinct in the central part of the disk, where the motions are probably mostly horizontal. This interpretation is confirmed farther toward the limb, where the bright and dark pairs stand out strongly, with the dark part almost always nearer the limb. The region of each pair thus seems to have solar matter expanding outward from its center.

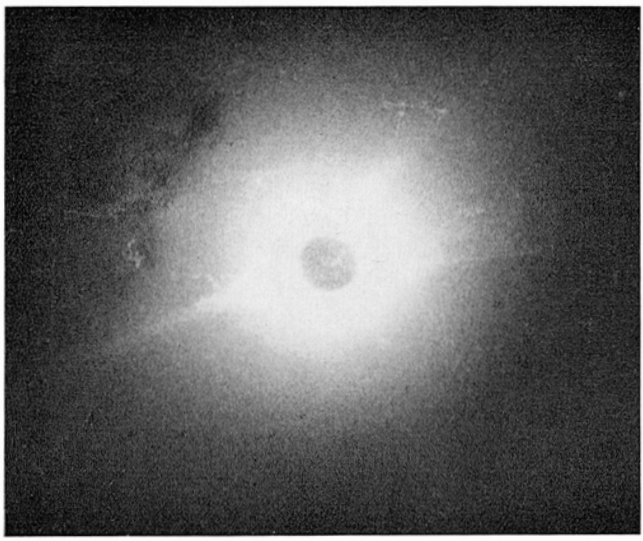
The mean diameter of such cells is about 1.5×10^4 kilometers, typical velocities being about 0.5 kilometer per second. There are about 5,000 of these local centers on the whole sun, with lifetimes of many hours. They may constitute a "super-granulation" system of convection currents originating at considerable depths within the sun.

A SOLAR EXPERT

S. K. Vsekhsvyatsky, Kiev University Observatory astronomer, as he appeared at a recent interview in the Claremont Hotel.

Prof. S. K. Vsekhsvyatsky, head of the astronomy department at the Kiev University, is one of the leading experts on solar studies in the USSR. At the Cloudcroft symposium (which will follow the IAU meetings), he will present a review of his studies on coronal structure and the solar wind.

Beginning with the eclipse of 1936, this scientist and his students have analyzed the structural details of the corona. He has estimated the loss of elements into the solar wind, and has studied the coronal heating. The Kiev astronomer believes that changes in the general as well as local magnetic fields on the sun



This unusual photograph of the February 25, 1952, eclipse, showing the large globular outer corona as well as the extensive streamers, is among those being studied by S. K. Vsekhsvyatsky. This 120-second exposure was taken with a 12-cm. lens from the mountains not far from Ashkhabad, Turkmen SSR.

account for the high temperature of the matter that forms the sun's corona.

"I was pleased that Prof. Waldmeier, in the Commission on Solar-Terrestrial Relationships, announced conclusions very similar to those we have previously found," Prof. Vsekhsvyatsky said, "but I regret that American and some European astronomers are apparently unaware of our articles on this subject published in the Soviet journals."

In addition to his interests in solar astronomy, this astronomer is investigating comets and asteroids. and has just published a book discussing the origin of the planetary system.

FRENCH ASTRONOMER

Vladimir Kourganoff, who is leaving the University of Lille after nine years of work as editor of the "Astronomical News Letter."

With this meeting of the IAU, Prof. Vladimir Kourganoff completes his nine-year assignment as editor of the *Astronomical News Letter*. This publication, founded by Bart J. Bok and Otto Struve to disseminate astronomical information during wartime conditions, became the vehicle for summaries and translations of Russian articles in the late 1940's. Beginning in 1952, Dr. Kourganoff served as editor, administrator, and principal translator. He has been assisted by A. N. Vyssotsky, M. J. Minnaert, D. Beloritzky, N. M. Stoyko, Z. Kopal, L. Jacchia, and others. Now that western language summaries are again given in the principal Russian journals, and since the *Astronomical Journal* of the USSR is regularly being translated into English, the *Astronomical News Letter* will cease publication, as decided at Commission 5.

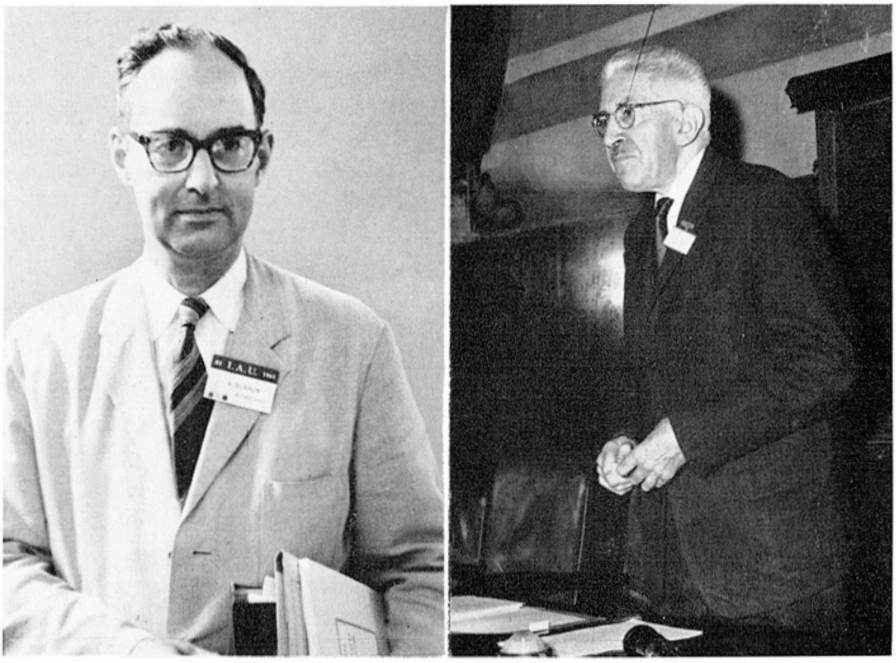
This fall Dr. Kourganoff will become professor of astronomy at the University of Paris (Centre d'Orsay), leaving the University of Lille, the scene of his activities with the *ANL*. Next month will see publication of his *Astronomie Fondamentale Elementaire*, the text for one of the courses he will give at the Sorbonne. His *La Recherche Scientifique* has recently appeared in its second edition, and his *Les Paradoxes de la Relativité* will be published shortly. In Paris he may investigate transfer problems in nuclear physics, with applications to the internal structure of stars.

Today's Joint Discussion

Two scientific high points in the program of the 11th General Assembly are scheduled for this afternoon in Dwinelle Hall. Joint Discussion No. 1, in Room 155, is to emphasize the need for observational data in certain specific problems in galactic structure and dynamics. The speakers are: W. Gliese, motions of the nearest stars; F. K. Edmondson, solar motion for different types of stars; J. H. Oort, the constants of differential galactic rotation; and A. Blaauw, the accuracy of the base of the distance scale.

Workers in the principal current programs of proper motions and radial velocities will review their work briefly: revision of the GC catalogue and data to be provided by the AGK3 (W. Fricke, W. Gliese), programs of absolute proper motions with respect to extragalactic nebulae (A. N. Deutsch, S. Vasilevskis, D. Brouwer), the use of faint blue stars as possible reference objects for absolute proper motions (W. J. Luyten), and current radial velocity programs for bright and faint stars (R. M. Petrie, C. Fehrenbach). Subsequent discussion is to concentrate on the question, "Will these programs indeed provide the data required for tackling the problem?" A. Blaauw will chair the session.

The sun's magnetic field is the subject of Joint Discussion No. 2, which will



At left is Dr. A. Blaauw, president of Commission 33, and at the right Dr. M. G. J. Minnaert, president of Commissions 14a and 38.

meet in Room 145 of Dwinelle Hall, under the chairmanship of M. Minnaert. The program comprises: H. W. Babcock, the topology of the solar magnetic field and the 22-year cycle; A. Severny, magnetically active regions on the sun; A. Hewish, the sun's magnetic field from radio observations; M. Waldmeier, the variation of the solar magnetic field around sunspot minimum; H. Alfvén, filamentary currents and the magnetic conditions on the sun; M. A. Ellison, cosmic ray flares and chromospheric magnetic fields; R. Leighton, the magnetic fields in active chromospheric regions; A. Dollfus, champs magnetiques transversaux autour des tâches solaires; H. Zirin, magnetic fields connected with prominences at the limb; V. Bumba and J. Kleczek, sunspot magnetic fields and loop prominences; A. P. Molchanov, magnetic fields from radio spectra of local sources during eclipses.

Meteor and Meteorite Subcommission Disbands

After careful discussion of a dozen proposals for furthering the study of meteors and meteorites, Subcommission 22a adjourned for the last time. The members recognized the vital importance of meteorite studies to space sciences, and stressed that the increased number of investigators places an extreme demand upon existing co-ordination agencies. They also considered the difficulties involved in getting meteoric material for analysis.

An extensive network of observing stations in Canada has been organized to accelerate reports of unusually bright meteors and detonating bolides that might yield meteoritic materials. The USSR has a similar program. Other countries, particularly the United States and Japan, were encouraged to do the same.

The subcommission called upon museum directors and curators to assist scientists in procuring samples of material for studies of such properties as composition and age. Since the interests and policies of university departments may change, the most satisfactory locations for preservation of meteorites appear to be museums. It was therefore felt that they could make an extremely valuable contribution to science by not only acting as depositories but also by keeping careful histories of the samples.

For example, a specimen that was once dipped in oil for a density determination will yield "evidence" of life in outer space if some subsequent investigator does not know that the oil test has contaminated it. The subcommission members stressed that although museums must take precautions to preserve their meteoritic samples, this should not mean that qualified scientists be denied opportunity to use small fractions for study.

Convention News and Notes

Soft lights and rhythm in the Garden Room of the palatial Claremont Hotel were conducive to social and scientific conversations as about a thousand astronomers gathered for a cocktail or two and a turn about the dance floor Wednesday evening. Under the auspices of the University of California, IAU members were received by Dr. and Mrs. F. L. Whipple, Dr. and Mrs. C. M. Huffer, Chancellor and Mrs. Edward Strong, Dr. and Mrs. J. H. Oort, and Dr. and Mrs. L. Goldberg. Regaled at the long buffet table with hot and cold hors d'oeuvres and well-mixed beverages, the astronomers and their wives were entertained by colored animated fountains at the far end of the hall. Although officially concluded when the band left at $23^h\ 00^m$, the dancing was kept alive by P. van de Kamp's piano, until the hotel staff began turning out the lights.

At $9^h\ 00^m$ on Friday the first Three Bridges tour departs from 2650 Haste Street. This trip circles San Francisco Bay, stopping 45 minutes at the Muir Woods, a fine stand of California redwoods. At $13^h\ 00^m$ the ladies are invited to assemble for a tour of several Berkeley homes of particular architectural interest.

The guests enjoy refreshments at Wednesday's evening reception.

Sunday's expeditions to the Napa Valley wineries and the beautiful Monterey Peninsula bring a change of pace from the round of astronomical sessions. Those who are registered for the winery trip but would prefer to see Monterey should exchange their tickets at the Information Desk as soon as possible. *Prière de rapeler que cettes expéditions commencent à* $10^h\ 00^m$.

Other announcements: All Palo Alto Allied Arts tour reservations must be made by noon today. These trips are scheduled for the first three days of next week; the cost is $2.00 for lunch. Banquet reservations for Wednesday evening may now be made at $5.00 per person.

A French and a Russian typewriter are available in Room 286, Dwinelle Hall. A typing and packaging room is provided in the Residence Halls; inquire at the Information Desk.

One of the easiest ways to find a friend at the reception Wednesday was to look near the refreshment table. Lured by tempting tid-bits, nearly everyone made several trips for shrimp, barbecued meats, and tiny sandwiches.

For IAU participants interested in cooling off a bit, swimming has been arranged at both the Harmon Gymnasium (on Dana Street near Bancroft Way) and at the Strawberry Canyon recreation area (east of the stadium). The Harmon pool is open from noon to $17^h\ 30^m$ daily except Sunday, and admission cards good for the duration of the assembly may be obtained at the IAU Information Desk for $2.00. Bathing suits are provided for men, but women should bring their own. Anyone showing the IAU badge will be admitted to the Strawberry recreation area for one dollar, but must provide his own suit and towel.

Passport and visa problems and questions should be referred to Walter B. Gleason in 810 Cunningham Hall. His telephone number is TH 1-7622, extension 810.

Particle, a quarterly magazine staffed, written, and owned by Berkeley high school and university students, publishes student research articles in mathematics and the physical and biological sciences. Recent titles are "A Small Rocket Telemetry System" and "Determination of the Moon's Distance, Diameter, and Radial

COMMISSION MEETINGS

Friday, 18 August 1961

(Meeting rooms in Dwinelle Hall, unless labeled *W* for Wheeler Hall)

MORNING

Commission		*Time*	*Room*	*Remarks*
9b	Image Qual.			*Meeting canceled.*
12	Solar Rad.	9-12	155	Solar granulation.
16	Planet Phys.	9-11	160	Administrative and scientific.
21	Night Sky	9-11	182	
25	Photometry	9-11	145	
*27	Variables	9-	117	Scientific.
*29	Star Spec.	9-	127	
40	Radio Astron.	9-12	311*W*	Mainly internal organization.
42	Phm. Doubles	9-12	142	Electronic computing. DQ Herculis.
20	Asteroids	11-12	120*W*	Business of international co-operation.
27	Variables	11-12	117	Administrative department report.
29a	Atmospheres	11-12	188	Business.

AFTERNOON

Commission		*Time*	*Room*	*Remarks*
*25	Photometry	16-	111	Combined meeting, Commissions 25
*29	Star Spec.	16-	111	and 29.

*Additional meetings

Saturday, 19 August 1961

MORNING

Commission		*Time*	*Room*	*Remarks*
9a	Image Conv.			*Meeting canceled.*
10	Solar Act.	9-11	155	New research. International co-op.
14	Wave Lengths	9-12	146	Wave-length standards.
19	Var. Lat.	9-11	127	Business. IPMS.
22	Meteors	9-12	142	
26	Doubles	9-11	182	Administrative.
28	Exgal. Neb.	9-12	311*W*	
35	Star Const.	9-11	111	Ages of old stars.
37, 27, 27b		9-10	145	Variables in clusters.
†9b	Image Qual.	11-	160	Report on site testing.
29b	Line Int.	11-12	188	Administrative and scientific.
31	Time	11-12	120*W*	Rotation of the earth.
33c	Sel. Areas	11-12	109	Business on selected areas.

†*Formerly Friday, 9-11.*

A dwarf galaxy of the local group, IC 10, photographed with the 200-inch telescop

IAU NEWS BULLETIN

5 — Monday, August 21, 1961

Berkeley, California

Today's Special Meetings

Joint Discussion No. 3 and a special joint meeting of Commissions 28 and 40 (Extragalactic Nebulae and Radio Astronomy) will be held this afternoon at $14^h\ 00^m$ in Dwinelle Hall, Rooms 145 and 155, respectively. The program for the joint commission meeting, which will concern astronomical problems requiring radio observations of high sensitivity and resolution, was announced on page 5 of *Bulletin* 3.

The Joint Discussion, titled "The Demands Made on Celestial Mechanics in the Computation of Ephemerides," will be conducted by chairman W. Fricke: G. A. Wilkins, computation of the lunar ephemeris; W. J. Eckert and H. F. Smith, Jr., the numerical development of harmonic series for the co-ordinates of the moon; D. Brouwer, the possibility of improving and extending Delaunay's lunar theory by von Zeipel's method; R. L. Duncombe, present and future requirements for planetary ephemerides, G. M. Clemence, theory of motion of Mars and Earth; J. Kovalevsky, need for a new theory of the first four satellites of Jupiter; P. Herget, ephemeris calculations for minor planets; E. Rabe, the further improvement, by conventional and new methods, of the astronomical constants involved in ephemeris computations; W. Markowitz, astronomical and atomic time involved in the observation of artificial satellites.

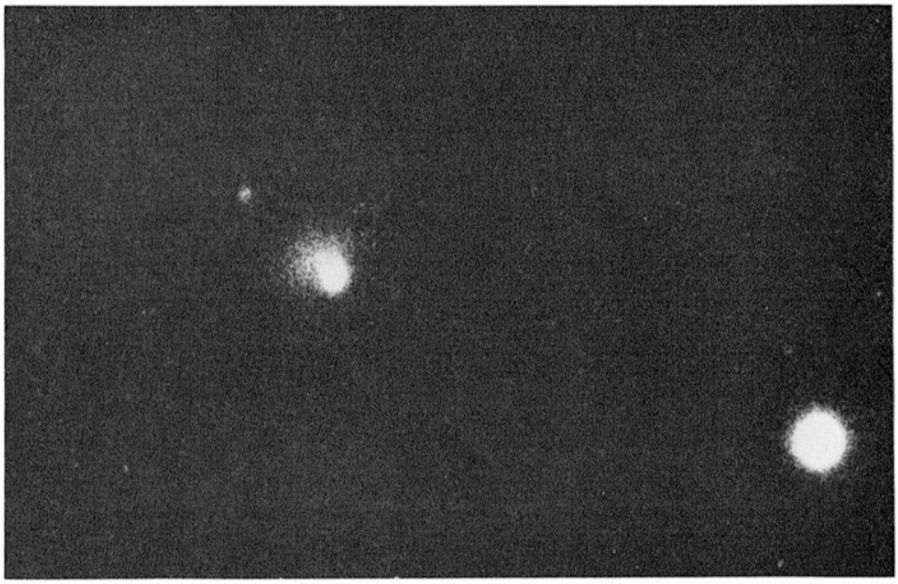
Invited Discourse No. 3

This evening, at $20^h\ 00^m$ in the auditorium of Wheeler Hall, Prof. V. A. Ambartsumian will present the third of the invited discourses—"Problems of Extragalactic Research." He will discuss a number of problems that he feels constitute the most essential points in the further exploration of outer galaxies. The broad divisions of his discourse will be the distribution of matter in extragalactic space, the kinematics and dynamics of systems of galaxies, the nature of galaxies and their clusters, the phenomena of superposition, and instability in galaxies.

Echo Communications Satellite

Passages of the Echo satellite will occur at $20^h\ 47^m$ and $22^h\ 51^m$ tonight. The altitudes of the meridian passages will be 52° and 75°, respectively.

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.



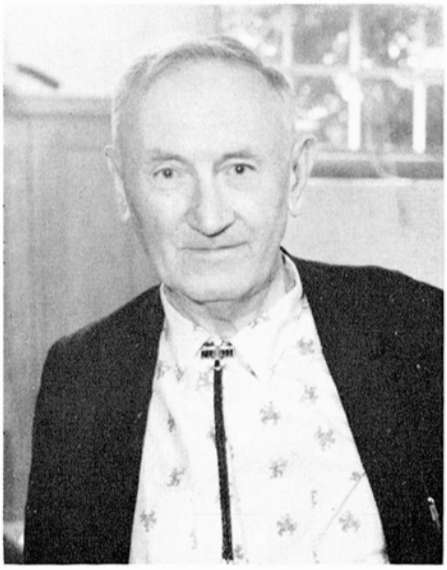
At left of center is a very distant supernova, far outshining its associated faint galaxy. A star in our own galaxy forms the image at the lower right.

Extragalactic Studies

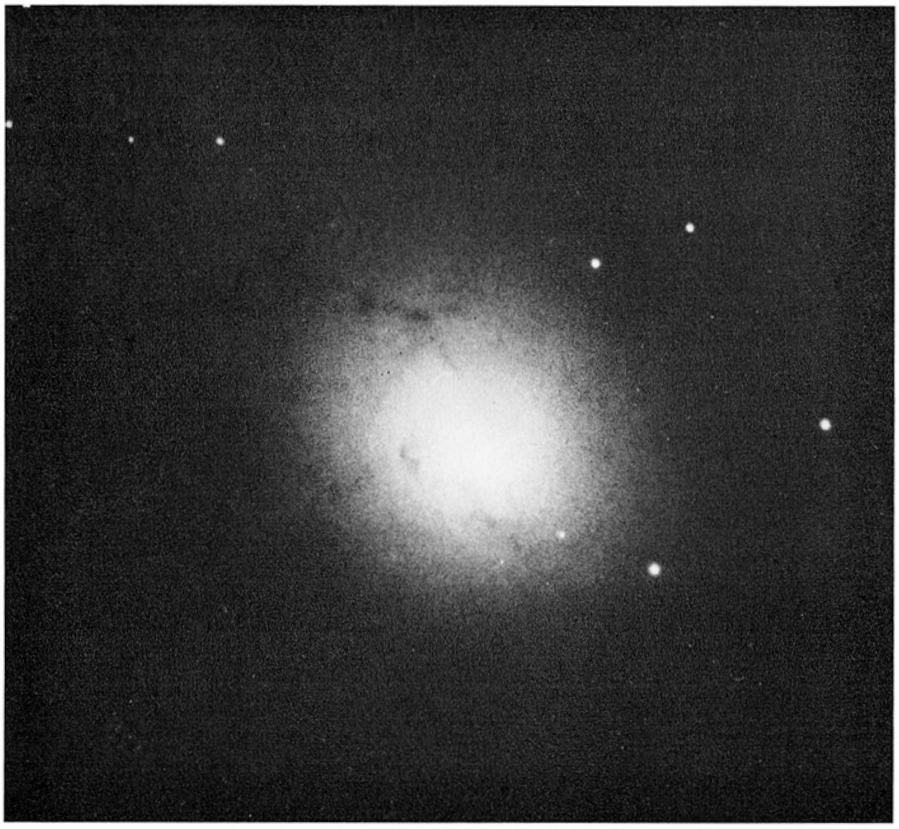
Observations of objects outside our galaxy have long occupied Fritz Zwicky of California Institute of Technology. Reproduced in this *Bulletin* are three of his recent photographs with the 200-inch Hale telescope of Mount Wilson and Palomar Observatories.

On the front cover is a view of IC 10, a dwarf galaxy of the local group visible in Cassiopeia through a rift in the Milky Way. Dr. Zwicky took a 90-minute exposure on an Eastman 103a-E plate to resolve thousands of stars. Many hydrogen emission clouds are visible; some are suspected to be remnants of supernovae which exploded during the past 5,000 years.

The picture above is the most



Dr. Fritz Zwicky.



Dark lanes of obscuring dust are visible against the bright central portion of the Andromeda galaxy. The cover and pictures with this article are from Mount Wilson and Palomar Observatories.

distant supernova ever recorded, at an estimated distance of nearly a billion light-years. The supernova is now about 50 days past maximum. This 30-minute exposure was made about a month ago on a 103a-O plate, the star then being of magnitude 18, about 10 times brighter than the exceedingly faint dwarf galaxy in which it occurred. Its featureless continuous spectrum resembles that of blue stars of spectral class *O*.

The photograph on this page is of the center of M31—the Great Nebula in Andromeda. This galaxy's nucleus is the only one as yet clearly resolved into stars. The original negative of this picture, an 80-second exposure on Eastman IIa-O, records the nucleus as a very bright central patch measuring about 2½ by 1½ seconds of arc. Leading into the nuclear area are dark absorption lanes. The nucleus contains 10^7 stars, and has been found by Lick astronomers, using a Lallemand image converter on the 120-inch reflector, to rotate with a peripheral velocity of 90 kilometers per second.

INVITED DISCOURSE — Stellar Evolution

On Friday evening, Martin Schwarzschild of Princeton University Observatory concisely summarized present knowledge of stellar evolution, in the second of the IAU series of invited discourses. It was realized many years ago that the majority of stars must be evolving, since the radiant luminosity of a star represents an enormous, continuing energy loss. In the last decade or so, the processes governing evolution have begun to be understood. The speaker noted three classes of such processes—nuclear, thermal, and dynamical.

A star's evolution will be very slow when nuclear processes in it are the only cause for change. Thus, a hydrogen-rich star of the mass of the sun could continue to shine for the order of 10^{11} years on nuclear energy. Faster evolution is encountered in a star when it is in dynamical but not in thermal equilibrium. One of solar mass can shine like the sun for about 10^{7} years on the energy gained from gravitational contraction. The third and fastest type of stellar evolution occurs when the star is not even in dynamical equilibrium. Such evolution is catastrophic—its characteristic time scale can be estimated by dividing the star's diameter by the average velocity of sound within it. For the sun, this time is only a few hours!

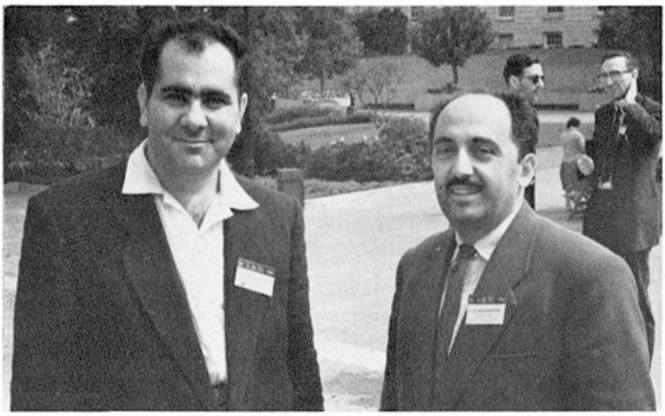
The Princeton astrophysicist next examined these three types of processes in some detail. The very slow evolution at nuclear rates is best illustrated in main-sequence stars. The details of their evolution have been calculated for a variety of stellar masses and initial compositions. But more accurate computations are needed in order to determine reliably the age of a star by comparing its observed place in the Hertzsprung-Russell diagram with a theoretical evolution curve.

Some extremely great stellar ages have been recently derived in this way. For example, the Population I stars in the cluster NGC 188 are about 15 billion years old, according to A. Sandage, and globular-cluster members may be 25 billion. Dr. Schwarzschild emphasized the extreme care needed in studying the time scale of evolution over intervals comparable with the total age of the universe. Can we be quite sure our present physical laws can be extrapolated back that far?

Less is known about the second type of stellar evolution. Magnitude-color arrays determined for the stars in a galactic cluster indicate numerous objects in a contracting stage; they have not reached the main sequence. It is puzzling that such stars should be spread over a much wider area of the Hertzsprung-Russell diagram than theory predicts. One explanation, proposed by L. Spitzer, is that the mass of a contracting star does not remain substantially constant, as had been thought. Instead, it may split, or eject much of its mass.

Another recently discovered thermal evolutionary process is the "helium flash," in which a Population II red giant with a degenerate core produces for a time much more energy than can escape through the outer layers of the star.

(Continued on page 11)



Among our delegates are, left, K. A. Grigorian and E. G. Mirzabekian of
center. French astronomers J. H. Bigay

Convention News and Notes

A sharp earth tremor, enough to vibrate floors and set hanging lamps swinging, occurred last Thursday evening around $18^h\ 30^m$ and fulfilled the hopes of many IAU guests visiting California for the first time to feel a West Coast earthquake. The shock, of magnitude 4 on the Richter scale, had its epicenter in Concord, roughly 20 miles northeast of the university campus. Although the tremor lasted about four minutes in this area, no damage was reported except the cracking of a patio. It followed another shock by about 24 hours.

IAU participants who are planning to attend tomorrow's WESCON meeting on radio astronomy in San Francisco's Cow Palace should register in 100

The Japanese representatives K. Kawabata, K. Takakubo, Y. Hagihara, S.
Larsson-Leander. To the right are L. Rosino, Italy, L. M.

Burakan Observatory. A. Unsöld from Kiel and Michigan's E. Muller are in the
and G. Courtès are at the right.

Wheeler Hall. Busses will leave promptly at $13^h\ 00^m$ Tuesday from in front of the Residence Halls, 2650 Haste Street.

Simone Gossner and M. Minnaert call attention to the university's main library exhibit of rare and historical astronomical works. Entitled "Two Thousand Years of Astronomy," the display includes Christiaan Huygens' *Worlds Discovered* of 1698, in which he declared a plurality of worlds. Papers by Herschel and Halley and the first editions of Newton's *Philosophiae Naturalis Principia Mathematica* (1687) and Einstein's *Zur Elektrodynamik bewegter Körper* (1905) may also be seen in the north lobby of the library, next to Wheeler Hall.

Two concertos by Sir William Herschel were featured in the Thursday eve ning string ensemble program presented under the direction of Sidney Griller "This is a rare opportunity to hear music written by one of your colleagues,'

Obi, and S. Nagasawa are flanked at left by Sweden's B. Lindblad and G.
Volders, the Netherlands, and M. G. Fracastoro of Italy.

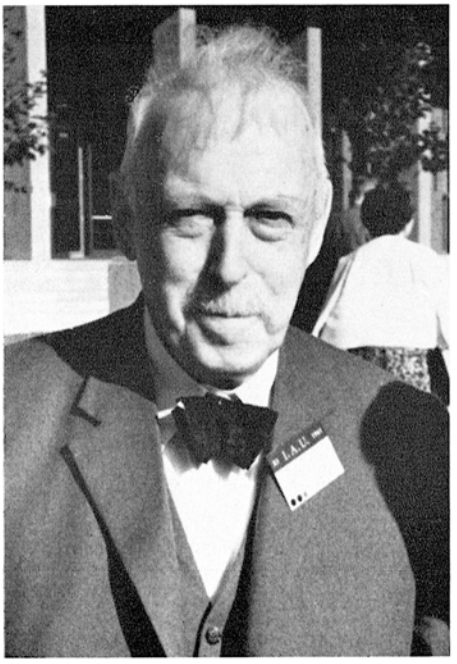
stated Vincent Duckles, head of the University of California Music Library. "Herschel's decision to become an astronomer represented a clear choice between competence and genius." The two pieces are from a group of 10, all in the composer's autograph, in the music library here. The manuscripts are now being displayed on the second floor of the Morrison music building.

Between $18^h\ 00^m$ and $19^h\ 00^m$ Wednesday evening, before the closing banquet of this 11th General Assembly, cocktails may be purchased at a special bar in the Horizon Room of the Claremont Hotel. A bus shuttle service to the hotel from the Residence Halls will start at $17^h\ 45^m$. Persons planning to attend the dinner should purchase their tickets by noon today.

Lost articles may be left and called for at the Registration and Information Desk in the Residence Halls. All IAU participants should check the mail desk in Unit II of the Residence Halls for telegrams and long-distance calls, whether they are staying in the dormitory or not. Many messages have been left there, with no way of conveying them to their proper destinations.

The National Radio Astronomy Observatory at Green Bank, West Virginia, has prepared a set of overlay grids for use with the National Geographic-Palomar Observatory *Sky Survey*. The 15 grids are printed on transparent Mylar plastic and cover each declination zone of the survey. The price will be about $85.00. For further information, contact Mrs. C. R. Lynds at Green Bank.

VENERABLE DANISH ASTRONOMER

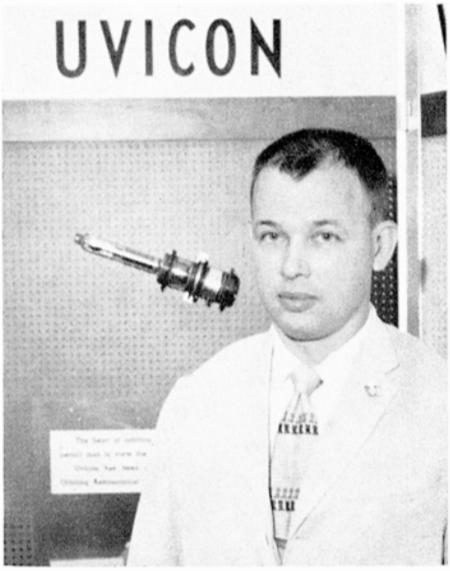


Prof. E. Hertzsprung is making his third visit to California during this IAU assembly. The veteran Danish astronomer came to Mount Wilson in 1912, and worked at Lick Observatory in 1937. His travels have taken him to almost all of the IAU meetings.

An active investigator at 87, Prof. Hertzsprung says he has never retired. He keeps a measuring machine at his home in Töllöse, Denmark, and reports that he "feels obliged to use it." His current work is the measurement of binary stars on plates from Lick and Bosscha observatories. Alpha Centauri is among the more interesting stars he has recently studied. At present the relative motion of the components of the bright binary is very rapid.

With the Exhibits

On display in Room 110, Wheeler Hall, is a Uvicon, a television camera tube to be used in the Smithsonian Astrophysical Observatory's rapidly developing program for obtaining astronomical observations from space—Project Celescope. The Celescope will be a truly celestial instrument, and will consist of four 12-inch-diameter, f/2 television cameras, which will be mounted in one of the S-18 series of satellites of the National Aeronautics and Space Administration. NASA's S-18 program is called OAO, "Orbiting Astronomical Observatories."



Robert A. Davis, Smithsonian Astrophysical Observatory.

Astronomers agree unanimously that of all the reasons for placing telescopes above the earth's atmosphere, studies in the ultraviolet should come first. From the surface of the earth we can obtain no information whatsoever about the far ultraviolet radiations from celestial bodies. Below 2800 angstroms, even the very intense radiation from the sun is unable to penetrate as low as the highest altitudes to which balloons have been sent. Yet it is this region of the spectrum that holds the key to many important aspects of the universe, such as the atmospheres of the hotter stars and the constitution of the interstellar medium.

Because of the great problems involved in creating a telescope capable of doing a good job unattended and unrepaired for its designed one-year lifetime, the Celescope will not be flown until at least 1963. Its optical components require highly specialized grinding techniques, the instruments being of a type never used for ground-based telescopes. The television camera tubes are also of a new type, designed to combine simplicity of operation, very high sensitivity to ultraviolet light, no sensitivity to visible light, ruggedness, and long life. These Uvicon tubes are already available in limited quantities as a result of a Westinghouse research project commenced for the Smithsonian two years ago.

Special television techniques are needed to transmit pictures from the satellite

to the ground. The signal will be processed for sharp "viewing" by an IBM 7090 computer, rather than for monitoring by human eyes. If all goes well, these techniques should furnish four maps (in different ultraviolet colors) of the sky within one year of launch. These maps will contain approximately 100,000 stars, as well as the brighter nebulosities. Automatic computers will furnish, simultaneously, a catalogue of the stars contained in the maps.

The actual building of the Celescope will commence within a few months, while work on the spacecraft to carry it has already begun. In the meantime, a smaller sounding rocket is being planned, for sometime near the end of 1961, to carry a less sensitive telescope above the atmosphere for about five minutes.

SOLAR SYSTEM ASTRONOMER

Planetary physicist V. V. Sharonov, USSR, is a member of Commission 16. He has made an extensive study of terrestrial minerals.

Six successes in six tries—that is the lucky solar eclipse record of Prof. V. V. Sharonov of Leningrad University. He had a clear view of the eclipses of 1936, '41, '45, '52, '54, and '61. At the last eclipse he outwitted the weather by flying in a jet plane at an altitude of 10 kilometers, above a heavy blanket of clouds. His observations indicate that the integrated brightness and color index of the corona remain essentially the same throughout the sunspot cycle.

In his laboratory, Prof. Sharonov has measured the colors and reflecting properties of over 1,000 specimens of rock, dust, and sand, in an attempt to match the known characteristics of lunar surface material. Not a single substance has satisfied the requirements. The Russian astronomer believes that lunar material may be described by the "meteor-slag" hypothesis of N. N. Sytinskaya, which states that a spongelike surface is in a process of continual formation by explosions from meteoritic bombardment. He is convinced that the lunar fragments eventually to be brought back from the moon will consist of such meteoritic slag.

In his studies of Mars, the Leningrad astronomer has concluded, like A. Dollfus, that the color resembles that of powdered limonite.

Commission Announcements

Commission 28: N. U. Mayall, president. Papers: G. Contopoulos, collisions of galaxies; C. Hoffmeister, evidence of an intergalactic absorbing cloud; E. M. and G. Burbidge, rotation and masses of galaxies; F. Zwicky, international co-operative supernova search.

Commission 29a: C. de Jager, president. Discussion of solar problems: A. K. Pierce, the relative value of various photospheric models; J. C. Pecker, new methods for estimating populations of the atomic energy levels.

Tuesday, August 22: Commission 8a will meet with 8 at $11^h\ 00^m$, the subject being reference-star programs. Commissions 27, 29b, and 33 will hold meetings at $14^h\ 00^m$. Subcommission 29a will hold an additional meeting at $14^h\ 00^m$.

Wednesday, August 23: Subcommission 28a will meet from 9^h to 11^h, to discuss a standard co-ordinate system for the Magellanic Clouds; numbering of variables in the Clouds; optical and radio co-operation.

Room assignments for these additional meetings will be announced later.

REVISIONS

In Friday's *Bulletin* 4, page 13, Dr. Alla Massevitch was erroneously listed as the secretary of the Astrosoviet, whereas she is a vice-president. According to E. R. Mustel, 1st vice-president of that council, the current scientific secretary is Nikolay Petrovich Yerpylyev. Prof. Mustel himself has no direct ties with the Sternberg Institute. He said that other Astrosoviet members attending this assembly are A. B. Severny, D. Ya. Martynov, and E. R. Fedorov.

The two institutions principally involved in astronomical translations and publications are State Publishing House of Physical-Mathematical Literature and State Publishing House of Foreign Literature, both in Moscow.

INVITED DISCOURSE *(Continued from page 5)*

The best-known phenomenon identifiable with stellar evolution at a fast dynamical rate is a supernova explosion. Dr. Schwarzschild also called attention to an ordinary nova outburst as a relatively mild but frequently repeated event by which a star could change evolutionarily. Of great interest has been the growing observational evidence, especially from A. Deutsch, that red giant stars are continually ejecting mass in substantial amounts. "Altogether it would seem," said Dr. Schwarzschild, "that for the evolution of the majority of the stars the important dynamical processes are not the cataclysmic ones, but rather the weak persistent ones, such as seem to occur in the initial contraction and in the red giant phases. . . ."

TODAY'S COMMISSION MEETINGS

Monday, 21 August 1961

(Meeting rooms in Dwinelle Hall, unless labeled *W* for Wheeler Hall)

MORNING

Commission		*Time*	*Room*	*Remarks*
* 7	Cel. Mech.	9-	188	
17	Moon			*Joint meeting with Commission 7 canceled.* Subject matter included in Joint Discussion No. 3.
* 9	Instruments	9-	111	Coude spectrographs.
10	Solar Act.	9-11	127	Administrative.
25	Photometry	9-10	145	Combined meeting, Commissions 25
37	Clusters	9-10	145	and 37. Photometric standards.
28	Exgal. Neb.	9-11	155	Optical extragalactic research.
35	Star Const.	9-11	117	Energy source for pulsations.
40	Radio Astron.	9-12	311*W*	Co-operative programs for solar observations. Scientific papers.
*29c	Star Class.	10-	120*W*	Scientific.
20	Asteroids	11-12	142	Business.
22b	Met. Term.			*Meeting canceled.*
27	Variables	11-12	188	Administrative.
29a	Atmospheres	10-	160	Solar photosphere.

AFTERNOON

Commission		*Time*	*Room*	*Remarks*
*12a	Solar Ecl.	14-	117	Continued discussions of communications.
*28	Exgal. Neb.	14-	155	Combined meeting, Commissions 28
*40	Radio Astron.	14-	155	and 40, replaces Joint Discussion No. 4.

** Additional meetings*

Breakdown of bus on Lick Observatory tour blocks road up Mount Hamilton.

IAU NEWS BULLETIN

6 — Tuesday, August 22, 1961

Berkeley, California

JOINT DISCUSSION NO. 3

Yesterday afternoon, IAU delegates gathered to hear nine astronomers tell of the demands made on celestial mechanics in the computation of ephemerides. The session was chaired by W. Fricke.

Computing the lunar ephemeris for 1972-81 at H. M. Nautical Almanac Office was described by G. A. Wilkins. New techniques have been used on a small electronic computer. A progress report to date on the numerical development of harmonic series for co-ordinates of the moon was presented by W. J. Eckert, his co-author being H. P. Smith, Jr. Their method involves successive approximations, and the first of these is now complete. About 3,500 equations in as many unknowns had to be solved. D. Brouwer spoke on the possibility of improving and extending Delaunay's lunar theory by von Zeipel's method.

R. L. Duncombe pointed out the need to introduce refined theories for Venus, Earth, and Mars. The new theory of Mars was the subject of G. M. Clemence, who also reported on the new theory of the earth that is being developed. J. Kovalevsky stated that more must be done on the motions of Jupiter's four bright satellites; numerous observations are needed.

Ephemerides of minor planets occupied P. Herget, who mentioned a plan to compute perturbations by the variation of elements using a set having no reference to the perihelion. This requires a computation of the position of a moving reference point. E. Rabe noted that improved values for many ephemeris constants are now needed, and suggested that "space-age" and radio astronomy methods might provide the data. Finally, W. Markowitz discussed astronomical and atomic-clock time.

Satellite-Ballon Echo

Si le temps le permet, le satellite Echo sera observable aujourd'hui à $22^h\ 13^m$. L'altitude sera de 88°.

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.

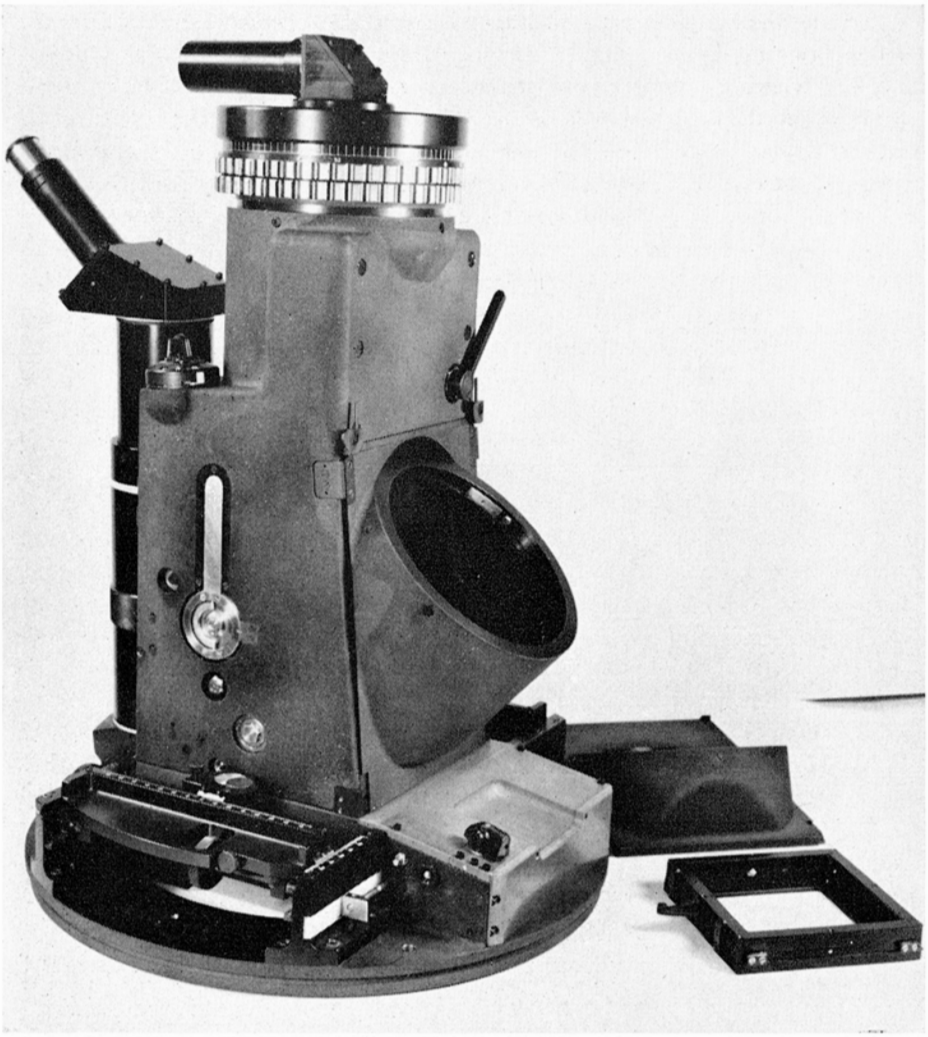
Seen beyond the head table at the Napa Valley barbecue: Host Mondavi at the microphone, Dr. C. D. Shane, and to the right George M. Mardikian, whose Omar Khayyam's Restaurant staff prepared the sumptuous repast.

Notes on Two Field Trips

The excursions and tours planned by the organizing committee, at great expense in both money and human energy, have been heavily subscribed, indicating the enthusiasm and appreciation of the delegates and guests at this 11th General Assembly. Typical of these field trips were those of the past week end, to Lick Observatory on Saturday, and to Napa Valley and the Monterey Peninsula on Sunday.

Delegates attending the large Lick tour (about 240 persons) enjoyed fine weather on Mount Hamilton, with a clear evening for observing the moon, Jupiter, and Saturn, in spite of a most "unusual" rainy morning in Berkeley. However, the Gray Line busses were not exactly suited to the winding road up the mountain and a number of delays occurred at sharp turns where it was necessary to jockey back and forth several times. In one instance, where a corner was cut too close, a rear axle broke and the turn was nearly blocked (see the front cover).

Lick Observatory, in keeping with tradition, is constantly expanding and improving its instrumentation. The delegates visited the coude spectrograph room of the 120-inch reflector. Then, in the main dome, they were given a demonstration



The prime-focus spectograph of the 120-inch reflector of Lick Observatory.

of how the observer enters the prime-focus cage. Incidentally, that cage is being partly rebuilt to give more room for instruments on the side opposite to where the observer sits. Also under construction is the spectrograph pictured above.

This instrument will use several interchangeable reflection gratings, carried in the rectangular container seen at the lower right in the picture. Light from the main mirror will pass to the collimator through a hole in the center of each grating. The collimating mirror is at the top of the housing, where it will be moved for focusing by micrometric controls (large knurled knob). The dark lever on the upper right side of the housing controls the vertical dark slide between the grating and the camera. The grating can be tilted and locked by the polished handle at left front of the housing.

Along the left side of the photograph is the main telescope for viewing the slit and guiding the spectrum. If field stars are to be used for finding or guiding, auxiliary viewing systems can be attached to two-way racks, one of them visible at lower left, the other invisible on the far side of the housing. Between them on the right side is a container for comparison spectrum sources of several kinds. The first camera, to be attached over the large circular opening, will be a solid f/0.5 Schmidt, while an air-spaced Schmidt system is also being designed.

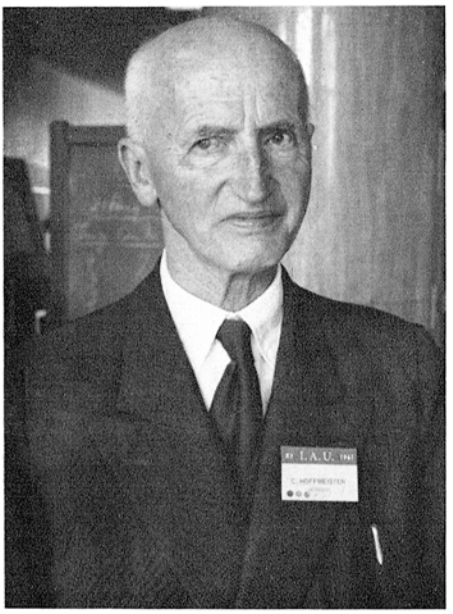
Those who brought coats or jackets on the tour to the Napa Valley wineries soon discarded them, because the temperature in the valleys north of the Bay region rises into the 80's and 90's these August days. Vast prune orchards and vineyards decorate a region already made beautiful by rolling golden hills and dark green and brown mountains. All 800 visitors were glad, however, for the opportunity to cool off in the winery storage tunnels and to sample the vintages.

Wine making began in California 150 years ago, and today's vines are all of the better Mediterranean varieties. Six wineries played host to the astronomers, and then everyone gathered on the spacious lawns of the Charles Krug Winery for an exciting dinner prepared by George Mardikian and the staff from his Omar Khayyam's Restaurant. It was so warm, however, that the guests of honor forsook the beautiful head table in the sun (see page 3) and ate rose petal preserves, stuffed grape leaves, shish kebabs, and paklava in the shade of near-by trees. The festive occasion will long be remembered by those present.

A smaller trip, to the Monterey Peninsula and Carmel, was equally successful, although the weather was cool and foggy.

In spite of the hot August sun, Henry Albers of Vassar Observatory samples a few grapes in one of the vineyards at the Charles Krug winery.

Evidence for Intergalactic Absorption



Dr. C. Hoffmeister is director of Sonneberg Observatory.

At Commission 28 yesterday, evidence of an obscuring cloud beyond the limits of our galaxy was presented by Cuno Hoffmeister. If this cloud is within the local group of galaxies, its dimensions are possibly comparable to those of the Magellanic Clouds.

For six months in 1959, Dr. Hoffmeister used the 10-inch Metcalf telescope of Boyden Observatory in South Africa to search for RR Lyrae variables at high galactic latitudes. Many such stars were affected by interstellar absorption, and to check its nature he studied the distribution of exterior galaxies on his plates. About two months ago, while working some two degrees north of Iota Microscopii, he detected an irregular area of about 20 square degrees where only five galaxies appear instead of an expected 20 or 30. However, the RR Lyrae variables are in normal abundance there, being distributed quite at random.

If intergalactic obscuration is the cause of this anomaly in galaxy counts, Dr. Hoffmeister believes it should have less dense, diffuse outer parts, with the central galaxies in the area appearing fainter than those farther out. He counted galaxies in each of five zones, from the center to the surrounding field, obtaining these mean magnitudes and numbers: 15.75, 5; 14.97, 36; 14.85, 36; 14.69, 34; and 14.58, 106. Individual galaxies would have their extended or elongated parts dimmed out first, the bright centers shining through, but somewhat dimmed. Using only 15th-magnitude objects, he counted the percentage of elongated objects, the numbers and percentages being: 5, 0%; 25, 24%; 19, 31.6%; 22, 36.4%; and 46, 47.8%. This evidence seems strong enough to suppose that an intergalactic cloud does exist beyond the halo of the Milky Way galaxy.

In the discussion of this paper, Dr. Fritz Zwicky wondered why he had been looking for intergalactic material in objects millions of parsecs away when it could be found right in the local group! Dr. Hoffmeister is continuing his studies, particularly to determine the possible reddening of galaxies in the region covered by the dust. Apparently there is no evidence of associated gas, which might be detected by radio techniques.

SYMPOSIUM on Galaxies

O. Heckmann, director of Hamburg Observatory.

The IAU's 15th symposium, devoted to problems of extragalactic research, was held August 10-12 on the beautifully located campus of the University of California at Santa Barbara. Some 130 astronomers from 15 nations were present by invitation of the chairman, O. Heckmann of Hamburg Observatory. As might be expected from the many contributions by the giant California reflectors to the field, more than one fourth of the participants were from this state. The symposium was preceded on August 8-9 by a conference on the instability of systems of galaxies, jointly sponsored by the Berkeley Statistical Laboratory of the University of California and by Van Vleck Observatory.

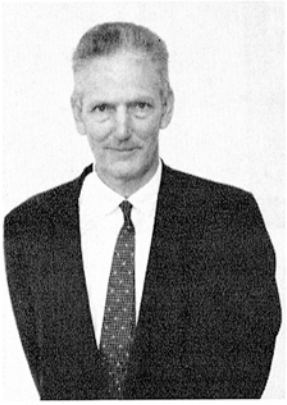
Both conference and symposium programs consisted of formal invited papers, carefully chosen to cover all fields of interest, followed by full discussions. Summaries of the meetings have been prepared by Drs. Heckmann, T. L. Page, J. H. Oort, G. R. Burbidge, and G. C. McVittie, and will be available.

The large discrepancy between masses of galaxies as determined from internal rotations and from application of the virial theorem to velocity dispersions in clusters of galaxies has cast doubt on cluster stability. V. A. Ambartsumian, to explain this, postulates that clusters have positive total energy. This would imply both that spiral and elliptical galaxies have short evolutionary lives, 10^8 to 10^9 years, and also that there exists some mechanism for energy release at an enormous rate. The Soviet astronomer tentatively relates this to the strong extragalactic radio sources.

An alternative assumption regarding the clusters is that 99 per cent of the matter in the universe is in the form of invisible intergalactic medium. Radio sources can then be explained as galaxies in collision, and spiral arms by magnetic fields in interstellar plasmas.

Discussing observational evidence for the two theories, E. M. and G. R.

Burbidge reported new data on four compact and two loose groups of galaxies, showing them to be unstable unless excessive mass-luminosity ratios are assumed. Dr. Ambartsumian presented the preponderance of trapezium-type configurations among multiple galaxies. B. E. Markarian reported on a physical chain of eight bright systems in the Virgo cluster which, if stable, implies one of them (NGC 4406) has a mass of 4×10^{13} suns, and a mass-luminosity ratio of 1,000, both numbers much too large to be acceptable. G. B. van Albada described numerical integrations showing that a cluster of galaxies, under gravitational forces, develops a rather dense and homogeneous nucleus surrounded by an extended corona. H. Spinrad noted the strong correlation between the intrinsic luminosity of a galaxy and the strength of the sodium D line, and Dr. Page presented evidence that pairs of galaxies are formed by a capture process. E. Holmberg explained the high velocity dispersion of the Virgo cluster as due to systematic errors in the red shift measurements, orbital velocities within subgroups, and the inclusion of optical non-members.



Dr. John B. Irwin, of Indiana University, author of this report.

Important observational advances noted during the symposium were W. W. Morgan's new data on classification of galaxies, B. A. Vorontsov-Velyaminov's atlas of interacting galaxies, and the new *Hubble Atlas* edited by A. R. Sandage. G. Münch reported that luminous knots in the disk of NGC 4594 showed no emission lines. A movie based on electronic calculations by B. Lindblad dramatically showed how spiral arms might form in a galaxy by a perturbation of its gravitational field. One second of film time corresponded to eight millions years, and in 10^9 years the spiral arms were seen to form, first leading and then trailing.

A new Hubble constant of 98 ± 15 kilometers per second per megaparsec has been derived by Dr. Sandage, while F. Zwicky announced the discovery of three new supernovae with light curves entirely different from either type I or II. A preponderance of the brighter radio sources are double, reported A. Moffet and P. Maltby. H. P. Palmer presented the angular diameters of 246 bright radio sources as determined at Jodrell Bank using a transit interferometer with aerial separations of up to 62,000 wave lengths. Only seven of these sources were unresolved at any base line, and one of these (3C48) has been provisionally identified with a remarkable optical star which has faint traces of nebulosity. M. Ryle referred to new Cambridge radio observations with large resolving power and sensitivity and showed that less than one per cent of sources in high galactic latitudes are in our galaxy. The limit of the present survey is somewhat greater than 10^9 parsecs, with most sources presumably unobservable by present optical techniques. The slope of the number-flux density plot was -1.80, in sharp disagreement with Sydney results.

Astronomy in Greece will receive considerable impetus from this new observatory.

Convention News and Notes

The observatory of the University of Thessaloniki, Greece, has just been completed, reports G. Contopoulos. Its main instrument, a 20-cm. refractor of three meters focal length, will be used in photoelectric photometry, and an H-alpha filter will permit solar investigations. Theoretical work at the observatory is to be concerned mainly with stellar dynamics.

A shopping tour for ladies from abroad has been arranged for Wednesday, and will depart at $9^h\ 30^m$. If interested, please leave your name at the Information Desk before $17^h\ 00^m$ Tuesday. Also at $9^h\ 30^m$ Wednesday, in the living room of Cunningham Hall, the ladies are invited to discuss informally their activities in education, the community, and international affairs.

An interesting model home that is used by students as a laboratory in household management is located on the roof of the home economics building. Groups may visit it by appointment, and tours have been arranged for $10^h\ 00^m$ and $14^h\ 00^m$ Wednesday. Persons interested should register with the Information Desk.

The closing dinner of the Assembly takes place at $19^h\ 00^m$ at the Claremont Hotel, Wednesday evening. From $18^h\ 00^m$ to $19^h\ 00^m$, cocktails may be purchased at a special bar for IAU members and guests in the Horizon Room. Busses will begin to shuttle from the Residence Halls to the hotel at $17^h\ 45^m$. After dinner, an orchestra will play for those who wish to dance. The adjoining room will be open as well, with tables and a bar.

On exhibit Saturday in Dwinelle Plaza was a plush 1912 electric auto, powered by a number of solar cells. Brought from the WESCON meeting in San Francisco by International Rectifier Corp., the car will run four to five hours on one charge, which however, the solar cells take many hours to generate.

The final concert for IAU participants takes place this evening in Hertz

Auditorium at $20^h\,30^m$. Courtesy of the University of California, the Griller Quartet will present a program of classical selections including works by Haydn, Mozart, and Ravel.

During the past few years, the editors of the *Bulletin* of the Astronomical Institutes of the Netherlands *(BAN)* have had to turn down many requests for the issues concerning the spiral structure of the galaxy as determined from 21-cm. radiation observations. These issues have now been reprinted in one 165-page volume consisting of *BAN* 452, 458, and 475, with articles by van de Hulst, Oort, Muller, Kwee, Westerhout, Ollongren, Schmidt, and Raimond. A limited number of copies have been brought to Berkeley and may be purchased at the mail desk at 2650 Haste Street for $3.00 per copy.

INVITED DISCOURSE

Problems of Extragalactic Research

A broad, searching view of the problems of extragalactic research was presented by V. A. Ambartsumian in last night's invited discourse, third of these addresses sponsored by the IAU here.

A true picture of external stellar systems was first gained only about 40 years ago, and therefore most of the basic problems of galaxies are still unsolved. For this reason, the Armenian astrophysicist discussed primarily the exploration of these systems, rather than cosmological theories.

Most of the matter observed in space is in the form of stars, and the overwhelming majority of them are members of galaxies. Dr. Ambartsumian emphasized the extraordinary range in the properties of these systems. At one extreme are supergiant galaxies like the brightest two in the center of the Coma cluster, with photographic absolute magnitudes about –22; they contain hundreds of thousands of millions of stars. On the other hand, F. Zwicky has discovered a galaxy in Capricornus, of absolute magnitude –6.5, which seems to contain only a few tens of thousands of stars.

It is nowadays realized that most—if not all—galaxies belong to clusters, groups, or multiple systems. These clusters, Dr. Ambartsumian pointed out, are of two types: spherical, regular clusters whose brightest members are chiefly elliptical galaxies, and irregular, loose aggregations that contain many spirals.

Although as a rule galaxies are individual entities, there are many observed cases of interacting systems. In this connection, Dr. Ambartsumian expressed the view that radio galaxies are no longer to be interpreted as colliding galaxies; instead, strong radio emission marks some stage, possibly of short duration, in the internal evolution of high-luminosity objects.

In discussing the distribution of systems, he listed a number of subjects requiring study, including the nature of superclusters and the properties of intergalactic matter.

Turning next to the kinematics of the realm of galaxies, the speaker stated

that the value of Hubble's constant is very likely within the limits 60 and 140 kilometers per second per megaparsec, or, with some risk, it may be taken between 70 and 100. He pointed out that in some groups of galaxies, such as the one in Sculptor studied by G. de Vaucouleurs, kinetic exceeds potential energy, and hence such systems must be losing members, or perhaps totally disintegrating. This frequent tendency toward instability may be somehow related to the general expansion of the metagalaxy.

An important desideratum for fuller insight into the nature of the galaxies is a complete but simple system for classifying them. The speaker pointed out the value of W. W. Morgan's classification, but said it does not define the luminosity of a galaxy. He urged the desirability of regarding a galaxy as the superposition of two or more subsystems containing various types of stellar populations. In any one galaxy, the subsystems are relatively independent, each pursuing its own evolutionary development. NGC 5128 (Centaurus A) and the Large Magellanic Cloud were discussed from this viewpoint.

Much importance can be attached to the observational evidence for instability in individual galaxies. Instances of this include the Milky Way, with neutral hydrogen flowing outward from its central parts, and certain other systems whose nuclei exhibit the spectral line 3727 as a greatly widened emission feature. Well known, too, are giant galaxies with nuclear jets. Dr. Ambartsumian remarked, "We can assuredly speak of the *cosmogonic activity of the nuclei.*" He recommends an intensive, multisided observational attack on the properties of galactic nuclei.

Commission Announcements

Commissions 8 and 8a: F. P. Scott and D. Brouwer, presidents. Agenda: reference star programs—the AGK3R and the Southern Reference Star Program.

Commission 15: K. Wurm, president. Program: structure of the gas tails of comets: K. Wurm, introduction; V. B. Vorontsov-Velyaminov and W. Liller, dimensions and intensity gradients of cometary heads; V. Vanysek, types of tails and observed repulsive forces; K. Wurm, structure and development of the gas tails; L. Biermann, theory of cometary tails.

Commissions 27 and 42: P. T. Oosterhoff and D. J. K. O'Connell, presidents. U Geminorum stars as binaries, R. P. Kraft; automatic reduction of photoelectric observations, H. C. Arp, G. O. Abell, R. H. Hardie, D. L. Crawford, H. L. Johnson, W. Blitzstein, and F. C. B. Bertiau.

Commission 29a: C. de Jager, president. Discussion of stellar problems: methods of analysis of stellar atmospheres, A. B. Underhill; theoretical methods suitable for analyzing extended stellar atmospheres, L. H. Aller.

Commission 33: A. Blaauw, president. Papers: stellar orbit computation, Contopoulos and Miss Torgard; a theory of the tilt of the H I layer, Elwert; the dynamics of spiral galaxies, Greyber; H I spiral structure and the 15-meter survey, Kerr; and a theory of spiral structure, Mrs. Pishmish.

TODAY'S COMMISSION MEETINGS

Tuesday, 22 August 1961

(Meeting rooms in Dwinelle Hall, unless labeled *W* for Wheeler Hall)

MORNING

Commission		*Time*	*Room*	*Remarks*
8	Positions	† 9-11	188	Combined meeting, Commissions 8 and
8a	Phg. Catalogues	† 9-11	188	8a. Organizational and scientific.
15	Comet Phys.	9-12	145	Scientific. Formation of comet tails.
27	Variables	9-11	111	Combined meeting, Commissions 27
42	Phm. Doubles	9-11	111	and 42. Automatic reduction of photoelectric observations.
*34	Interstellar	9-	312*W*	Extinction and polarization by interstellar grains.
37	Clusters	9-11	155	Miscellaneous scientific topics.
*40	Radio Astron.	9-10	311*W*	Continuation of earlier meetings.
43	Mag.-Hydro.			*Meeting canceled.*
29a	Atmospheres	†10-12	120*W*	Stellar atmospheres.
27b	Var. in Clus.	11-12	142	Report. Scientific discussion.
31	Time	11-12	127	Business. Recommendations.

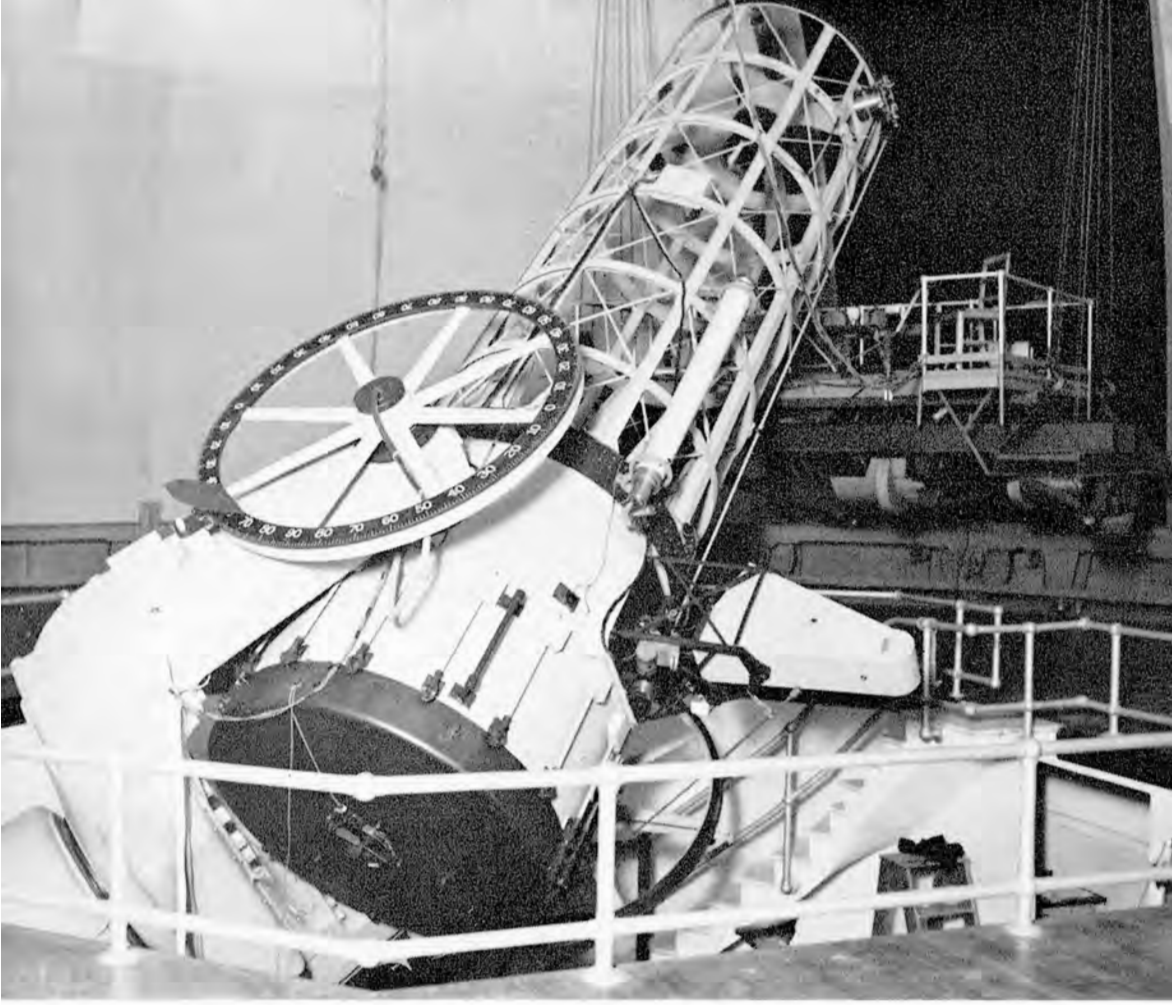
AFTERNOON

Commission		*Time*	*Room*	*Remarks*
*27	Variables	14-	155	Atmospheres of RR Lyrae variables.
*29a	Atmospheres	14-	182	Exchange of computer programs.
*29b	Line Int.			*Meeting canceled.*
*33	Gal. Struc.	14-	145	
*28	Exgal. Neb.	15-17	311*W*	Reports of scientific research.
*35	Star Const.	15-	111	Mathematical methods.

†*Formerly 11-12*

**Additional meetings*

The Finance Committee will meet at $14^h\ 00^m$ in Room 146.



The 60-inch reflector of Cordoba Observatory in Argentina.

IAU NEWS BULLETIN

7 — Wednesday, August 23, 1961

Berkeley, California

CORDOBA OBSERVATORY IN ARGENTINA

High in the Cordoba hills, about two hours drive from that city, is an observatory of the Argentine National University. Its principal instrument is the telescope shown on the front cover. Since 1942 this reflector has been used for direct photography and for spectroscopic investigations.

The aluminized mirror, 60 inches in diameter, is plate glass poured at St. Gobain, France. It was figured by J. W. Fecker and is carried on a mounting built by Warner and Swasey. The short focal ratio (f/5) makes it well suited to photography of nebulous objects, as illustrated by the picture of the region of Eta Carina reproduced on the facing page. This 50-minute exposure shows the feature called the Keyhole nebula, and the associated stars and nebulosities in this densely populated region of the Milky Way.

According to J. L. Sersic, the observatory shops in Cordoba have recently completed a grating spectrograph utilizing only reflecting optics.

Group Photograph on Thursday

The official IAU photograph will be taken on Dwinelle Plaza at approximately noontime on Thursday, August 24th, immediately following the General Assembly. All participants are urged to leave Wheeler Hall promptly at the adjournment of the morning session to go *directly* to the plaza.

In order to give persons eating at the Residence Halls time to be included in the group photograph, the hours for lunch on Thursday will be *$12^h\ 30^m$ to $13^h\ 30^m$*, instead of the usual $12^h\ 00^m$ to $12^h\ 45^m$.

Echo Communications Satellite

Passages of the Echo balloon satellite will occur at $21^h\ 33^m$ and $23^h\ 37^m$. These predictions are based on an extrapolation of those previously given by the Smithsonian Astrophysical Observatory.

This *News Bulletin* has been prepared by the editorial staff of *Sky and Telescope*.

The region of Eta Carinae, photographed with the Cordoba 60-inch reflector. Eta itself is located two inches from the left and 3½ inches from the bottom.

With the Exhibits

Astronomical literature, instruments, and personalities from the 6th to the 20th centuries are the subjects of the historical exhibits in Rooms 101 and 102, Wheeler Hall. Ranging from a page of a 10th-century Armenian manuscript of the solar and lunar tables of Anastase Tarmetsi (about A.D. 584) to photographs and a map of the moon's far side, the Soviet exhibits highlight that country's astronomical progress.

The *Meigetsuki* or diary of a Japanese nobleman from 1180 to 1236 contains the entry, "In the year 1054, between May and June, a new star appeared in the constellation Tenkan [a part of Taurus]. The star was as bright as Jupiter," an important clue to the recognition of the Crab nebula as the remnant of a supernova. A 1699 scroll contains a star atlas; on exhibit also is a picture calendar which enabled the illiterate to determine times of equinoxes and solstices.

A dramatic picture of Copernicus, and facsimiles of an autograph diagram and notes on the heliocentric system are featured in the Polish exhibit, while Belgium displays a reproduction of the first map of the moon, drawn by Michel Van Langren of Antwerp in 1644.

Historical documents, personalities, and observatories are illustrated in the displays of Swiss, German, and Dutch astronomy. Five engraved portrait prints of Sir Isaac Newton, from ages 27 to 83, and an impressive array of his works emphasize his monumental contributions to physics and astronomy. There is also a scale model, on loan from the Royal Greenwich Observatory, of Sir William Herschel's 40-foot-long reflector, with which he discovered the sixth and seventh satellites of Saturn.

Asaph Hall's observing notebook is opened to the page for 11 August 1877, where is noted, "A faint star near Mars," which a few days later proved to be Mars' first satellite. There are early photographs of American observatories—Maria Mitchell, Lick, Yerkes, and Harvard. Several historic Harvard plates on display include objective-prism photographs used by Annie J. Cannon in compiling the Henry Draper catalogue; the spectrograms of Beta Aurigae by which it was discovered to be a spectroscopic binary, the first known; two of the earliest double star photographs, of Mizar with the 15-inch refractor on wet plates, May 8 and June 15, 1857; and a stereoscopic view of the moon by J. A. Whipple in 1860.

In 1890 Thomas A. Edison planned pioneer experiments to detect radio emission from the sun and to correlate it with optically observed solar activity. Modern progress in radio astronomy instrumentation is graphically presented by the Australian exhibition. It pictures many types of equipment, from the sea interferometer of 1946 used to locate active areas on the sun, to the 210-foot paraboloid about to begin 21-cm. work.

Convention News and Notes

The entrance to Muir Woods National Monument.

A flaming bus was pursued by a local motorist two blocks through downtown Berkeley on Monday before being halted, according to Peter Millman, a member of the all-day tour to the Muir Woods. When the bus finally stopped and its driver began looking for aid, the fire chief happened to drive by; he radioed the nearest station, and soon two hoses were in operation. The IAU passengers were invited to wait in a near-by house until the smoke had cleared. During the Sausalito stop, each passenger was presented with a souvenir fire bell by C. H. Smiley.

A new radio telescope, one of the largest of its kind, is being planned by a Benelux group working under the direction of W. N. Christiansen at Leiden Observatory. This five-kilometer cross antenna will be constructed near the Belgian-Dutch border in the next five years, at a site still to be chosen, according to Mlle. L. M. Volders.

David Cudaback, who is available at the Information and Registration Desk after any meal, says that the best way for visitors to Yosemite National Park to appreciate the scenery there is to take walks, either for a few hundred yards or several miles. He will be happy to help devise tours through the park or answer any questions about its facilities.

Copies of the U.S. statement on Project West Ford, by the Space Science Board, are available at the mail desk in the Residence Halls.

Extra bus tours of San Francisco on Wednesday morning and afternoon will leave promptly at $9^h\ 00^m$ and $13^h\ 00^m$.

Many IAU participants from abroad have inquired about the necessity of obtaining sailing permits to indicate that they have complied with United States income tax laws. The Internal Revenue Service states that persons with American visas stamped B-1 or B-2 on their passports are *not* required to obtain sailing permits, if at the time of their departure they have been in the United States less than 90 days and have received no taxable income. Travel grants are not considered taxable income.

Persons who are not included in this category or who have questions about

their status should consult the U.S. Internal Revenue Service at their ports of departure. In San Francisco, the Departing Aliens Section of the tax office is at 100 McAllister Street, telephone UNderhill 3-4900, extension 6730. In Los Angeles, contact the Revenue Service, Post Office and Courthouse, Los Angeles 12, Calif.

Dr. Nathan Robinson.

ISRAELI SOLAR EXPERT

Pictured at the left is Nathan Robinson, head of the solar physics laboratory at the Israel Institute of Technology in Haifa. He is a member of Commissions 10 (Solar Activity) and 12 (Solar Radiation). In the spring of next year, Elsevier Publishing Co. will issue a book he is editing and for which he has written much material—*Solar Radiation*. The work will be the first book exclusively on this topic to appear in English.

Dr. Robinson has been with the University of California, Los Angeles, since March, and will remain there until the end of October. In addition to English, French, German, and Russian, he speaks Czech, Hebrew, and Lithuanian.

U Geminorum Variable Stars

A striking hypothesis as to the origin of the U Geminorum variable stars was advanced at the Tuesday morning session of Commission 27 by Robert P. Kraft. The Palomar astronomer first summarized his extensive observations with the 200-inch reflector, using a prime-focus spectograph of 130 angstroms-per-millimeter dispersion.

Dr. Kraft reported that at least four stars of this type were short-period spectroscopic binaries, in addition to SS Cygni, which was already known to be one. Thus the hypothesis that all U Geminorum variables are binaries is strengthened.

From their motions, Dr. Kraft deduces a preliminary value for the visual absolute magnitude of U Geminorum stars at minimum light as +9.5. Since the individual components of the binaries seem to have masses close to the sun's, it follows that these stars are markedly underluminous for their masses—by four or five magnitudes.

He further pointed out many similarities of these binaries with the familiar W Ursae Majoris systems. In both cases, the primaries fill the inner lobes of their Lagrangian surfaces, and are subluminous. The motions of both classes of variables indicate that they are low-velocity stars, belonging to the disk population of the galaxy. From these and other points of resemblance, Dr. Kraft suggests that the two kinds of binaries are related, and that the U Geminorum systems may in fact be descendants of W Ursae Majoris stars.

SOVIET ASTRONOMER

D. Y. Martynov presiding over a meeting of Commission 5. A. Dermul, the secretary, is at the left.

Dmitri Martynov, director of Moscow's Sternberg Institute, heads one of the largest astronomical training centers in the world. Over 100 university students, as well as a group working towards a doctorate, study at his institution. Two substations, one in the Crimea and a high-altitude solar station near Alma Alta, provide favorable conditions for observing, although several instruments are located at the institute itself. Theoretical work on radio astronomy carried out at Sternberg is backed up with observations made at various Soviet radio observatories.

In addition to the bibliography of spectral binaries mentioned in *Bulletin* 4, Prof. Martynov has recently analyzed the observations of the occultation of Regulus by Venus. His results for the apparent radius of Venus are similar to those found by G. de Vaucouleurs, although these independent reductions have been carried out in an entirely different manner. He has recently written *Kurs prakticheskoy astrofiziki (A Course in Practical Astrophysics)*.

SYMPOSIUM ON RADIO STARS

At the joint session of Commissions 28 and 40 on Monday afternoon, there were discussions of problems in radio astronomy that require high observing resolution for their solution. Ways and means of achieving such resolution will be featured at the Philco symposium on radio astronomy at $14^h\ 00^m$ on Thursday afternoon in Room 155, Dwinelle Hall. The meeting is open to all participants in the General Assembly.

The symposium has the title "Future Trends in Radio Telescopes of Very High Resolution," and will be chaired by J. L. Pawsey of Australia. Speakers and their topics are: M. Ryle, the synthesis of large radio telescopes; J. P. Wild, circular aerial arrays and the possibility of image formation; W. N. Christiansen, the Mills cross and its modifications; F. D. Drake, comments on the construction of high-performance radio telescopes; and R. N. Bracewell, guiding principles for the design of future large radio telescopes.

TODAY'S COMMISSION MEETINGS

Wednesday, 23 August 1961

(Meeting rooms in Dwinelle Hall, unless labeled *W* for Wheeler Hall)

MORNING

Commission		*Time*	*Room*	*Remarks*
*28a	Mag. Clouds	9-11	111	Specific problems.
42	Phm. Doubles	9-12	117	Co-ordinated programs.
44	Ex.-Ter. Obs.	9-12	155	Scientific.
*37	Clusters	11-12	127	Distribution of stars in clusters (I. R. King).

AFTERNOON

Commission		*Time*	*Room*	*Remarks*
*12	Solar Rad.	14-	111	Co-operative programs for observing chromospheric granulation.
*16	Planet Phys.	14-	117	The atmosphere of Venus.

**Additional meetings*

An ad hoc group under the chairmanship of Dr. G. de Vaucouleurs will meet to discuss the photometry of galaxies from 11-12 in Room 106.

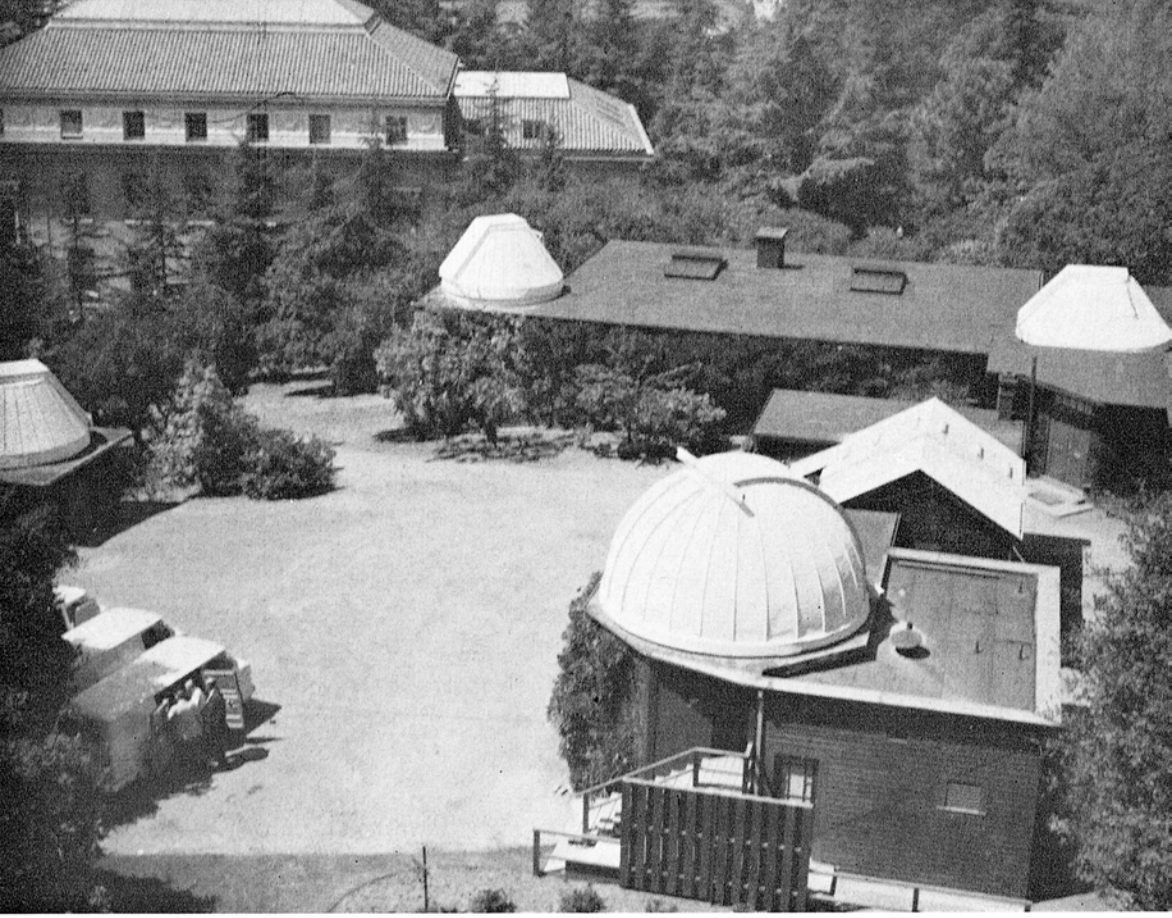
The closing dinner will be at the Claremont Hotel this evening at 19h 00m.

Commission Announcements

Commission 12: L. Goldberg, president. Co-operative programs for observing chromospheric granulation, and other scientific matters.

Commission 28a: S. C. B. Gascoigne, president. Standard co-ordinate system for the Magellanic Clouds; numbering of variables in the Clouds; optical and radio co-operation.

Commission 42: D. J. K. O'Connell, president. Internal organization; bibliography; co-ordinated observing programs; Engelhardt Catalog.



Here on the campus is Leuschner Observatory, in a view taken yesterday from the Earth Sciences building. The 20-inch reflector is in the largest dome.

IAU NEWS BULLETIN

8 — Thursday, August 24, 1961

Berkeley, California

Leuschner Observatory of the University of California

Yesterday afternoon, delegates to this 11th General Assembly had the pleasure of visiting Leuschner Observatory, shown in the front-cover photograph. Formerly called the Student's Observatory, it is the Berkeley observing station of the University of California's department of astronomy. Armin O. Leuschner, for whom the observatory is now named, made notable contributions to the field of celestial mechanics and especially orbit computation; he was a famous teacher whose students include many of today's leading American astronomers.

The principal instrument here is a 20-inch Cassegrainian reflector, made by Tinsley Laboratories of Berkeley, California. Housed in the largest dome in the picture, this telescope is primarily for student use. The astronomical department itself is located on the top floor of Campbell Hall, named for the famous Lick astronomer W. W. Campbell.

Group Photograph Today

The official IAU photograph will be taken on Dwinelle Plaza at approximately noontime, immediately following the General Assembly. All participants are urged to leave Wheeler Hall promptly at the adjournment of the session to go *directly* to the plaza.

In order to give persons eating at the Residence Halls time to be included in the group photograph, the hours for lunch will be $12^h\ 30^m$ *to* $13^h\ 30^m$, instead of the usual $12^h\ 00^m$ to $12^h\ 45^m$.

Prints of the photograph will be 11 by 14 inches in size, and may be ordered at the Information Desk, 2650 Haste Street, at a cost of $2.00 each, including mailing charges to anywhere in the world.

Satellite-Ballon Echo

Des passages du satellite-ballon Echo auront lieu à $20^h\ 54^m$ et $22^h\ 58^m$. Ces prédictions reposent sur l'extrapolation de celles qui ont été fournies auparavant par le Smithsonian Astrophysical Observatory.

This series of eight IAU *News Bulletins* has been prepared by the following members of the staff of *Sky and Telescope:* Joseph Ashbrook, Nancy R. Bolton, Gail B. Carney, Charles A. Federer, Jr., William E. Shawcross, and Raymond N. Watts, with the kind collaboration of Owen Gingerich, Stuart J. Inglis, and George S. Mumford, III.

We wish to thank our printer, Lederer, Street & Zeus Co.; our engraver, California Art & Engraving Co.; and our photographic processer, Berkeley Commercial Photo Co., for their co-operation.

Dr. D. H. Sadler, IAU general secretary, of Royal Greenwich Observatory.

Convention News and Notes

The mail window of Residence Halls Unit II will remain open until 22^h on Saturday night. Mail not called for by that time will be given to the organizing committee for forwarding. Please leave your forwarding address at the IAU desk.

Those who are going on the Hat Creek and Yosemite trips may leave their extra baggage at the Residence Halls and call for it when their busses return Saturday night. Each piece must be clearly marked and tagged. Baggage tags for this purpose are available at the Information Desk.

Candlelight and fresh California flowers decorated the Garden Room of the Claremont Hotel for the closing banquet of the 11th General Assembly, as about 700 IAU participants enjoyed strawberries in orange cream sauce, roast beef, and orange parfait. The centrally located wine fountain, its contents donated by 10 California wineries, attracted much attention. D. H. Sadler, general secretary of the IAU, acted as toastmaster, calling first upon P. Swings of Belgium, who proposed a toast to the IAU and to international co-operation in astronomy. Seconding this toast were A. R. Hogg, Australia; M. Miyadi, Japan; S. Plakidis, Greece; and J. Sahade, Argentina. President Oort answered the toast. A special rising vote of enthusiastic appreciation was given to Mrs. Mary Shane, whose untiring attention to all the details of registration and ladies' activities made the

assembly so successful. Following the dinner, there was dancing in the Horizon Room overlooking San Francisco Bay.

According to the official tally now completed by the Registration Desk, 947 members and guests of the IAU have taken part in this convention. Thirty-six countries are represented. Almost half (425) of the participants are from the United States, while British, French, German, and Soviet delegations have 87, 56, 55, and 45 members, respectively.

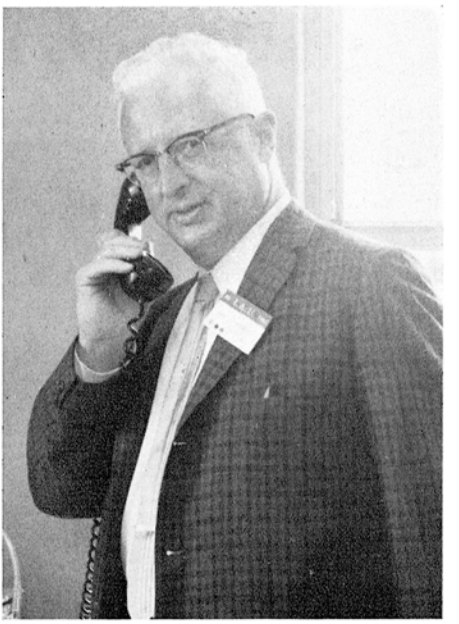
Group photograph reminder: The official IAU photograph will be taken today around noontime on Dwinelle Plaza. Please go there immediately after the close of the General Assembly session.

The final concert presented for IAU members and guests by the University of California was a recital of three string quartets by the Griller Quartet. Most famous was the work of Maurice Ravel, a well-performed impressionistic piece.

Special thanks go to Berkeley astronomers John G. Phillips, who so ably handled the exhibits, and Richard Michie, who arranged for the meeting and transportation of guests to the campus from San Francisco airport.

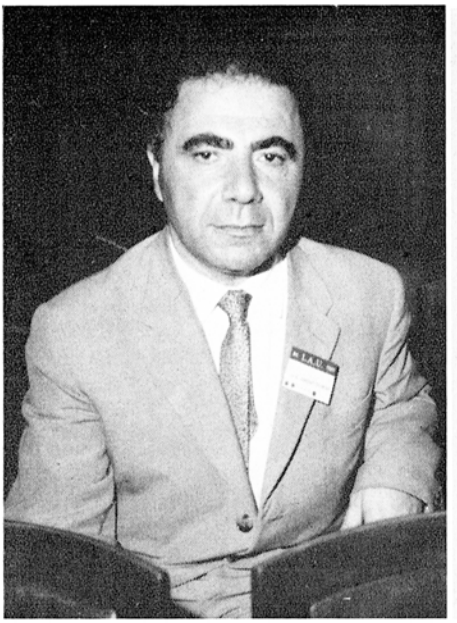
At the reception of the French consulate Tuesday, Dr. A. Danjon acted for A. Lallemand, president of the Société Astronomique de France, in presenting to Dr. A. E. Whitford, of Lick Observatory, the Jansen medal in recognition of his pioneering work in photoelectric photometry.

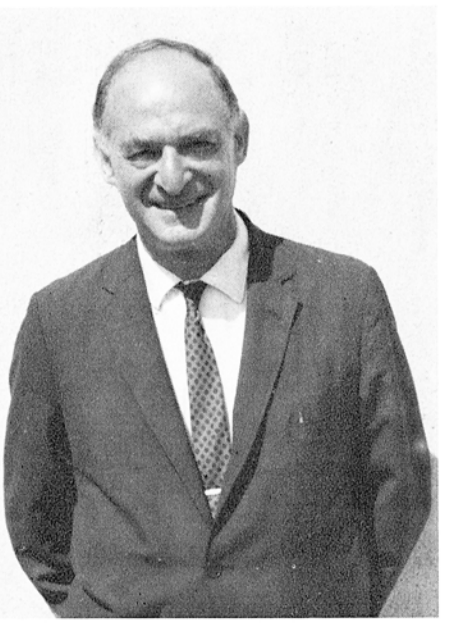
Dr. C. D. Shane, chairman of the Organizing Committee, and Mrs. Shane, who together carried out the local planning for the assembly.



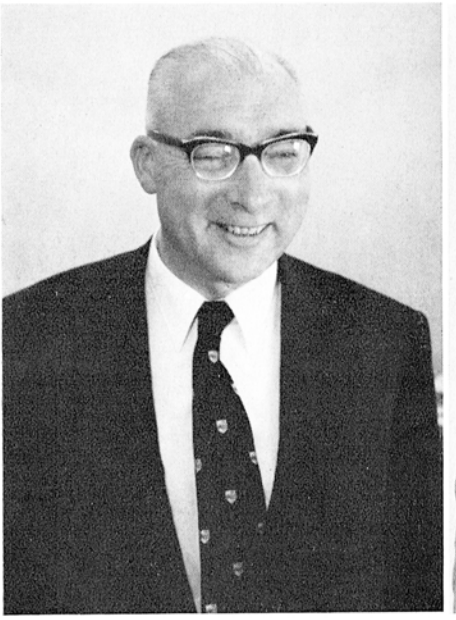
Left: L. G. Henyey, chairman of the Berkeley Astronomical Department.
Right: D. H. Menzel, chairman, 11th General Assembly Finance Committee.

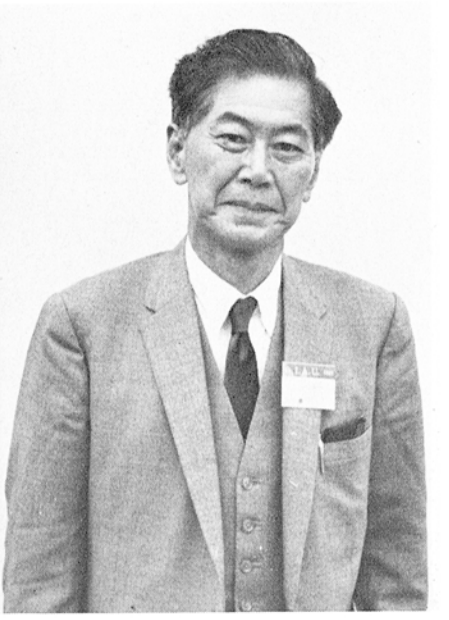
Dr. and Mrs. Harold F. Weaver of Berkeley. Mrs. Weaver was co-planner of the program for the ladies, and her husband, director of the Radio Astronomy Laboratory, was very active in making local arrangements.





Left: V. A. Ambartsumian, Burakan Observatory, the IAU's president-to-be.
Right: Harvard Observatory's Leo Goldberg is a vice-president of the Union.





R. H. Stoy (left), Cape Observatory, is an IAU vice-president, and Y. Hagihara, Tokyo University, has been nominated to serve as vice-president. G. Haro, of Mexico, not attending this meeting, is the other nominee.

Agenda for General Assembly

The second session of the General Assembly will be held at 9^h 15^m today in Wheeler Hall. The numbers on the agenda are those printed in the *Agenda and Draft Reports.*

3b Report of decisions taken by the Executive Committee.

10b Resolution withdrawn.

10c The Executive Committee submits the following two resolutions:
Resolution No. 1 (see page 12) Resolution No. 2 (see pages 13-14)

11a, b Resolutions withdrawn.

12 The Executive Committee proposes that the General Assembly adopt the Resolution referred to it by the International Union of Geodesy and Geophysics, and that it recommend that Japan be invited to set up the Central Bureau of the International Polar Motion Service.

13, 14 Report of the Finance Committee, and unit of subscription (see page 10).

15 Advisory Finance Committee.

16 Special Nominating Committee: The following alternative committees are proposed by the Nominating Committee—

	Together with
1. L. Goldberg; W. H. McCrea	V. A. Ambartsumian
2. R. M. Petrie; A. E. Whitford	J. H. Oort
3. D. H. Sadler; A. E. Whitford	Ch. Fehrenbach
4. B. Sternberk; W. H. McCrea	M. Miyadi
5. R. H. Stoy; A. E. Whitford	J. Sahade

17 New members of the Union.

18a The Executive Committee proposes that:

(i) Commission 3 be dissolved
(ii) Subcommission 29a become Commission 36
(iii) Commission 14 be renamed "Commission on Fundamental Spectroscopic Data"
(iv) Commission 28 be renamed "Commission on Galaxies"

18b, c The Executive Committee submits (b) a list of Presidents and Vice-Presidents for election by the General Assembly, subject to their willingness to serve, and (c) a list of Organizing Committees for general approval.

19 Of the 23 resolutions submitted by Commissions before the agreed time and considered by the Resolutions Committee, 10 have been considered by the Finance Committee and incorporated in its report, five have been referred to the Executive Committee, and only one has been regarded as suitable for consideration by the General Assembly.

The 11th General Assembly of the IAU,

considering that the angstrom is equal to 10^{-10} meter with an accuracy as great as that with which it has been realized in terms of the

(Continued on next page)

red line of cadmium and that, on the other hand, the meter now is defined with a greater accuracy in terms of the $2p_{10}$-$5d_5$ radiation of krypton 86

decides, subject to agreement by the other Unions represented in the Triple Commissions for Spectroscopy, that

(1) The angstrom is defined as being equal to 10^{-10} meter,

(2) the definition of the angstrom in force since 1907 based on the red line of cadmium is revoked.

La 11e Conférence de l'UAI,

considérant que l'angstrom est égal à 10^{-10} mètre avec une précision aussi grande que celle avec laquelle il a été réalisé par la raie rouge du cadmium, que, d'autre part, le mètre est maintenant défini avec une plus grande précision par la radiation $2p_{10}$-$5d_5$ du krypton 86

décide, pour autant que les autres unions représentées dans la Commission Triple de Spectroscopie soient d'accord

(1) l'angstrom est défini comme étant égal à 10^{-10} mètre,

(2) la définition de l'angstrom en vigueur depuis 1907, fondée sur la raie rouge du cadmium, est abrogée.

In order to give greater authority to those resolutions adopted by Commissions but not submitted to the General Assembly, the Executive Committee proposes the following resolution:

Considering the impracticability of giving individual attention to every resolution adopted by each of its 58 Commissions and Sub-Commissions and having full confidence in its Commissions, this General Assembly approves resolutions adopted by its individual Commissions, and *recommends* that astronomers give effect to these resolutions in so far as they are able.

Considérant qu'il est impraticable d'accorder un examen particulier à chaque résolution adoptée par chacune des 58 Commissions et Sous-Commissions, et ayant pleine confiance dans ses Commissions, cette Assemblée Générale desire agréer les résolutions adoptées par ses Commissions individuelles, et *recommande* que les astronomes les rendent effectives dans tout la mesure de leur possibilités.

20 The place and date of the 12th General Assembly.

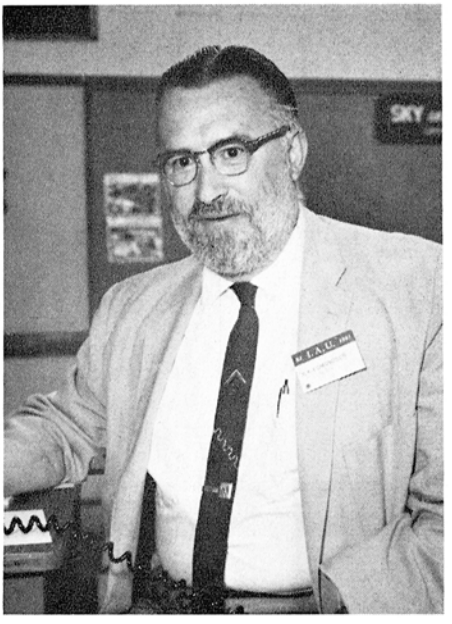
21 The election of a President, six Vice-Presidents, and a General Secretary.

22 The appointment of representatives to the International Council of Scientific Unions.

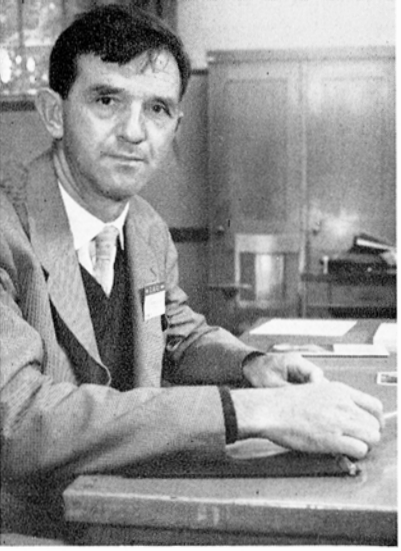
23 Addresses by the retiring and the newly elected Presidents.

24 Closing ceremonies.

Two IAU vice-presidents are R. M. Petrie (left), Dominion Astrophysical Observatory, and B. Sternberk of Czechoslovakia.



Left: Miss Nel Splinter, assistant secretary of the International Astronomical Union. Right: F. K. Edmondson of Indiana University, vice-chairman of the U. S. national committee.



Ch. Fehrenbach, director of Marseilles Observatory.

Comite des Finances

Le Comité des Finances a élu un sous comité composé par M. M. Buchar, Bok, Fehrenbach, Kharadze, et Mayall.

1. Ce sous comité a examiné les comptes de l'UAI pour la période allant du 1er novembre 1957 au 31 décembre 1960. Les comptes correspondant à des avoirs en Dollars U.S., Livres Sterling, Florins néerlandais, et Francs français ont été tous vérifiés par des experts comptables agréés et certifiés exacts. Le sous comité a examiné ces documents et a demandé au comité de les approuver. Le comité les a approuvé à l'unanimité.

2. Pour rendre ces comptes, très complexes, facilement compréhensibles le Secrétaire Général a fait préparer les comptes sommaires figurant aux pages xxvi et xxvii du *Agenda and Draft Reports*. Le sous comité a constaté que ce document reproduit bien les dépenses qui figurent dans les comptes vérifiés par les experts comptables. Il a exprimé le désir de voir figurer aussi dans ces comptes les sommes allouées pour des buts spéciaux et seulement administrés par l'UAI. Le comité a accepté ce point de vue et le Sécrétaire Général a fait modifier en conséquence les pages xxvi et xxvii. Les sommes figurant à la fois en recettes et en dépenses sélèvent ainsi à 228.022 $U.S.

3. Le comité a constaté à cette occasion l'importance du travail de comptabilité de l'Union, il a été heureux de constater avec quel soin ce travail a été fait par Mlle Splinter sous la direction du Sécrétaire Général. Le Comité des Finances leur exprime sa vive reconnaissance. Le Comité des Finances signale au Comité Exécutif la grande aide que représenterait pour le Sécrétariat Général l'engagement d'un comptable.

4. Le comité a examiné la demande du Comité Exécutif d'augumenter la contribution unitaire de 500 à 600 Francs Or. Le Comité a examiné avec attention cette demande, elle lui a paru très justifiée par

1. l'augmentation de coût de la vie,
2. l'augmentation du nombre de membres de l'Union,
3. l'augmentation considérable de son activité par la réunion de nombreux symposiums, et de la publication de leurs procès verbaux,
4. l'augmentation considérable des échanges d'astronomes entre les divers pays adhérents.

Le comité a voté cette augmentation par 25 voix pour et une voix contre.

Le budget pour la période des trois années a ensuite été examiné. Après discussion ce budget est proposé en équilibre à 132.000 $U.S.

Le comité propose de réduire toutes les dépenses au minimum indispensable de façon à garder disponible les sommes les plus élevées pour l'échange des astronomes, les réunions de symposiums, et la publication de leurs travaux.

Le président du Comité des Finances,

CH. FEHRENBACH

Budget of Expenditure, 1 January 1962—31 December 1964

This budget is based on an estimated total income of the equivalent of 132.000 U.S. dollars. Part of this income cannot be reliably estimated in advance, but certain headings of expenditure, notably 5, 7, 8, 9, and 12, are within the control and discretion of the Executive Committee.

Accordingly, the General Assembly, in approving this budget, specifically authorizes the Executive Committee to vary the expenditure under headings 5, 7, 8, 9, and 12, indicated by an asterisk(*). This variation may be achieved by increasing or decreasing the activities, or in other ways, to accord with any variations in the estimated income of the Union.

The General Assembly is conscious that it will have the opportunity, if it should prove necessary, of approving a supplementary budget for the period 1 January 1964 to 31 December 1964, at the General Assembly in 1964.

Heading	*Purpose and notes*			*U.S. dollars*
1	Administrative Office: 1962: 5,000; 1963: 5,000; 1964: 6,000			16,000
2	Subscription to the ICSU			1,200
3	Expenses of Commissions			2,000
4	Specific projects			44,676
	Comm. No.	*Project*	*Sum*	
	5	Bibliography of Astronomy 1881-1898	5,000	
	6	IAU Telegram Bureau (666.66 annually)	2,000	
	10	Cartes Synoptiques (882 annually)	2,646	
	10	Cartes Héliographiques (326.66 annually)	980	
	20	Cincinnati Minor Planet Center (750 annually)	2,250	
	23	Carte du Ciel	8,900	
	27	English version of remarks to the supplement of GCVS	400	
	38	Exchange of astronomers (7,500 annually)	22,500	
*5	General Assembly, 1964			15,000
6	Transactions, Vol. XI and Draft Reports 1964			12,000
*7	Meetings of the Executive Committee			5,000
*8	Expenses of Symposia			18,000
*9	Proceedings of the Symposia			8,000
10	Inter-Union Committees			5,000
11	Representation			1,000
*12	Projects authorized by the Executive Committee			4,000
				131,876

IAU CONTRIBUTORS (continued)

Boeing Aircraft Scientific Research Laboratories

Boller & Chivens, Inc.

Bolt, Beranek and Newman, Inc.

Broadview Research Corporation

The Cincinnati Milling Machine Company
Mr. Frederick V. Geier

Corning Glass Works Foundation

Cutler-Hammer, Inc.
Airborne Instrument Laboratory

The Detroit Edison Company

Douglas Aircraft Company, Inc.

Eastman Kodak Company
Research Laboratories

Electro-Optical Systems, Inc.

Esso Research and Engineering Company

Ford Motor Company Fund

General Dynamics Corporation
General Atomic Division

General Motors Corporation

General Radio Company

The Gillette Company

Grand Central Rocket Company

Grumman Aircraft Engineering Corporation

Hewlett-Packard Company

Hughes Aircraft Company

Hycon Manufacturing Company

IBM
International Business Machines Corporation
World Trade Corporation

International Telephone and Telegraph Corporation

ITEK

The Kaman Aircraft Corporation

E. Leitz, Inc.

Foundation of the Litton Industries

Lockheed Aircraft Corporation

McDonnell Aircraft Corporation

The Martin Company
RIAS

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The Perkin-Elmer Corporation

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The Rockefeller Foundation

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Alfred P. Sloan Foundation

Space Technology Laboratories, Inc.

Standard Oil Company of California
California Research Corporation

United Aircraft Corporation

United States Steel Foundation, Inc.

Varo Manufacturing Company, Inc.

WESCON

Western-Knapp Engineering Company

Westinghouse Electric Corporation

Yarnall-Waring Company

Zenith Radio Corporation

United States Scientific Institutions

Harvard College Observatory

High Altitude Observatory

Leuschner Observatory

Lick Observatory

Lowell Observatory

Mt. Wilson and Palomar Observatories

National Bureau of Standards

National Radio Astronomy Observatory

Smithsonian Astrophysical Observatory

Stanford Radio Propagation Laboratory

Steward Observatory

University of Colorado

University of Illinois Observatory

University of Texas

Van Vleck Observatory

Yale University Observatory

Yerkes Observatory