

XVIIIth GENERAL ASSEMBLY



ASTROKOSMOS



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Number 1



Patras: Greece 1982

Le 17 Août
Numéro 1

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Editor: ARCHIE E. ROY

Telephone: 991 465

The University of Patras Welcomes You

Article by the Rector Prof. George Maniatis

The University of Patras was established in November 1964 as a self-governing institution under the supervision of the Ministry of Education. The planning for the establishment of the University goes back to 1962 with a study assessing the possibility of creating a new University in the western part of Greece. Subsequently, in August 1964, an international conference was convened under the auspices of the Ministry of Coordination to discuss issues of developing such a new institution. The conference was attended by government representatives, rectors and professors from Europe and the United States and representatives of several international organizations. In August 1965, a second, week-long conference was held (this time under the auspices of OECD) on the same subject in which both Greek and foreign experts took part. As a result, specific studies were formulated regarding the formation and development of individual schools and services of the University. In conformity with them and with the approved schedule of a comprehensive development, the School of Science and the School of Engineering were first established. To these two schools, the school of Medicine was added in 1977. Thus today the University of Patras has three faculties as follows:

- A. Faculty of Science with 6 divisions (Mathematics, Physics, Chemistry, Biology, Geology and Pharmacy).
- B. Faculty of Engineering with five divisions (Electrical, Mechanical, Civil, Chemical and Computer Engineering) and
- C. Faculty of Medicine.

The University has today a teaching staff of 300 and over 6000 students of which 3800 are in the School of Science, 1800 in the School of Engineering and 500 in the School of Medicine.

The University campus, overlooking the Corinthian Gulf, occupies an area of over 500 acres and is located on the foothills of Panachaicon Mountain at Rion, 6 Km from the city of Patras.

In 1973 the architectural firm of Doxiades Associates prepared the Master Plan for the University of Patras. Subsequently, the same firm was commissioned to design the buildings for the three existing Schools. Many of these buildings are under construction now.

Despite its short life the University of Patras has been the center of several innovations in the greek university system and its faculty is well represented in the international scientific literature.

Now, the University is host to the participants of the XVIIIth General Assembly of the International Astronomical Union. Its one wish is that its guests enjoy their stay here and take away pleasant memories of Patras University, of Patras and of Greece

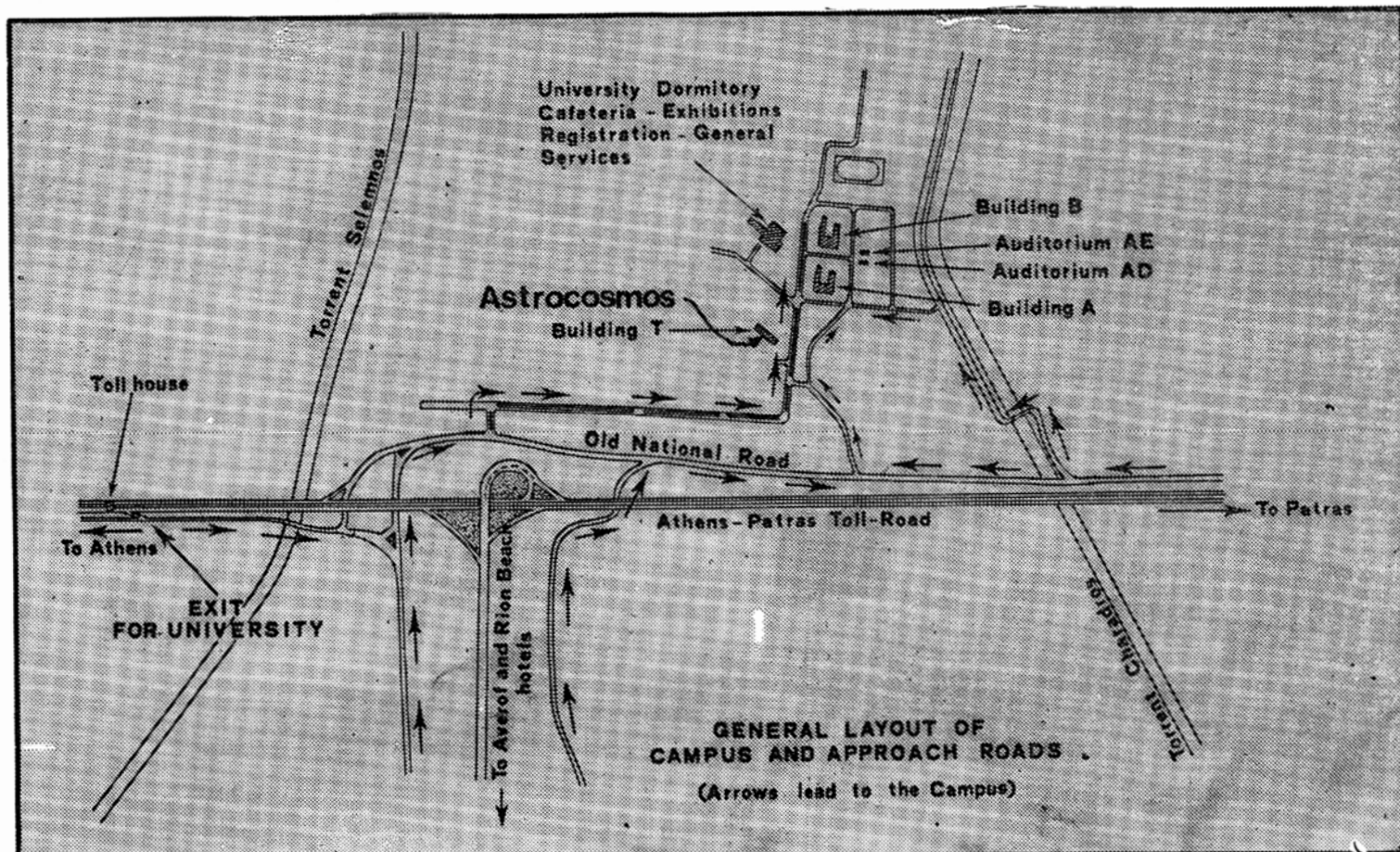
Welcome to you all!



The Rector



First customers arrive!



Informal gathering, page 4

Editorial

Kalimera! Good morning and welcome to Greece, to Patras, to the International Astronomical Union and to your newspaper ASTROCOSMOS.

Why the name ASTROCOSMOS? For two reasons: one is that astronomers are concerned with the universe or cosmos and the other is that a meeting of the IAU is a cosmos in itself, the cosmos of astronomers. And that of course is why the symbol of the intertwined letters of the IAU - UAI appears with the name of the newspaper.

Why the symbol of St Andrew and his cross? Because it is the symbol of the University of Patras, host of the IAU. And perhaps a little bit because your editor is Scots and St Andrew is the patron saint of Scotland and St Andrew's cross appears on the national flag of Scotland.

Why the owl? Ah, that's because we are in Greece where one of the most famous goddesses is Pallas Athena, goddess of knowledge and whose symbol is an owl. And of course because astronomers are night birds.

Now, what will you find in your newspaper, which will be published every day you are here? Something of interest for everyone, we hope. There will be programmes of forthcoming events, reports and accounts of mee-

Publisher: For the Local Organizing Committee, V.V. Markellos
Editor: A.E. Roy

Both at the University of Patras

Typesetting and Printing: P. Constanti-nopoulos, 115 Maizonos Str. - Patras

tings and excursions, articles not only on astronomical topics but also about your host country and her customs, her food, her wines and so on. There will be of course, advertisements. What newspaper could do without them, a necessity that has given rise to the definition of a journalist - a person who writes on the back of advertisements. There will also be puzzles and cartoons, prepared at enormous expense to test your skill, helpful articles such as How To Earn An International Reputation, Useful Scientific Phrases, etc. In the next issue of ASTROCOSMOS you will find a feature about your newspaper's staff. We assure you that they are all friendly people and eager to get to know you. If you have things to tell us, matters of general interest or simply feel the urge to write a letter then please do so. Better still, come and see us.

This is your editor's seventh visit to Greece. I can from experience assure those who have never been to Greece before that they are in for a truly memorable sojourn; those who have been before already know that. As members of the IAU we have come from all over the globe to this ancient land that has given so much to astronomy, mathematics, art and all those other creations of mind and spirit, and continues to do so. And so under a Greek sun by day and at night under the same constellations known to Hesiod and Homer, to Aristarchos of Samos and Hipparchus of Rhodes, we will work and play and get to know one another better.

And perhaps in some small way bring forward the day when, as Schiller put it, *Alle Menschen werden Brüder*.

Kalimera! Bonjour et bienvenue en Grèce, à Patras, à UAI et à votre journal ASTROCOSMOS

Pourquoi le nom d'ASTROCOSMOS? Pour deux raisons: d'abord parce que les astronomes s'occupent de l'univers ou cosmos et ensuite parce qu'un congrès de l'UAi est en lui-même un cosmos, le cosmos des astronomes. Et c'est naturellement pour cela que figure en tête du journal le double sigle entrelacé UAI - IAU.

Pourquoi le symbole de saint André et sa croix? Parce que c'est celui de l'Université de Patras, hôte de l'UAi. Peut-être aussi un peu parce que votre rédacteur-en-chef est Ecossais, que saint André est le patron de son drapeau écossais.

Pourquoi la chouette? C'est, bien entendu, parce que nous sommes en Grèce et que l'une de ses plus célèbres déesses, celle du savoir, est Pallas Athena dont l'emblème est la chouette. Et puis, bien sûr, parce que les astronomes sont des oiseaux de nuit. Qu'allez vous trouver dans notre journal qui sera publié tous les jours de ce congrès? De quoi intéresser chacun d'entre vous, espérons-le, avec le programme des diverses activités prévues, le compte rendu des réunions, le récit des excursions, des articles non seulement sur les sujets astronomiques mais aussi sur le pays qui nous accueille, sur ses coutumes, sa nourriture, ses vins, etc. Il y aura naturellement des annonces publicitaires. Quel journal pourrait s'en passer? Cette nécessité a même engendré la définition du journaliste: quelqu'un qui écrit sur le dos de la publicité. Il y aura également des devinettes et

des bandes dessinées, préparées avec grand soin pour tester votre subtilité, des articles pratiques tels que «comment gagner une renommée internationale», «expressions et phrases astronomiques courantes et leur signification», etc.

Le prochain numéro d'ASTROCOSMOS vous renseignera sur le personnel de votre journal. Soyez sûrs que ce sont tous des gens charmants qui ne demandent qu'à faire votre connaissance.

Si vous avez des choses à nous dire, que ce soit d'intérêt général ou tout simplement parce que vous éprouver le besoin de nous exprimer une opinion plus personnelle, n'hésitez pas à le faire. Mieux encore, venez nous voir!

Votre rédacteur-en-chef en est à sa septième visite de la Grèce. A tous ceux qui foulent pour la première fois le sol de ce pays, je puis assurer que leur séjour sera mémorable. Les autres le savent déjà. En tant que membres de l'UAi, nous sommes venus des quatre coins du monde dans ce pays, berceau d'une civilisation antique qui a tant apporté, et continue de le faire, à l'astronomie, aux mathématiques, aux arts et à toutes les autres créations de l'esprit. Sous le soleil grec et sous les constellations que connurent Hésiode et Homère, Aristarque de Samos et Hipparque de Rhodes, nous allons donc travailler et nous détendre et apprendre à nous mieux connaître. Et, qui sait, peut-être modestement contribuer à l'avènement du jour, où, comme l'a dit Schiller, *Alle Menschen werden Brüder* (Tous les hommes seront frères).

THE INTERNATIONAL ASTRONOMICAL UNION

by Patrick A. Wayman

The International Astronomical Union has a subscribing membership of fifty Adhering Organisations, each accepted as representative of astronomers on a national basis. In 1981, there were some 4500 individual IAU members. It is expected that this category of membership will increase to over 5000 after the Patras General Assembly, by the proposals of the adhering bodies.

The scientific and documentary work of the IAU is principally the concern of its forty commissions, new Commissions being formed from time to time and others being dissolved. Presidents of IAU Commissions are appointed at each General Assembly. Each Commission deals with details of its subject that require international agreement; scientific meetings on particular topics are held, either at General Assemblies or during the intermediate years; Commissions are also concerned with questions such as documentation and the maintenance of agreed international standards.

Cooperative programmes of observation and of recording astronomical phenomena have an international history covering more than a century. Seldom do IAU Commissions actually guide the procedures adopted in cooperative programmes, but a forum exists where the problems and desiderata can be discussed and the results presented, a wide range of interested persons being able to take part.

The IAU has always paid attention to the participation of young astronomers. Part of its income is regularly devoted to assisting young astronomers. Funds are awarded to the IAU-Unesco Schools for Young Astronomers and to individuals enabling them to work in other countries or to attend General Assemblies and IAU Symposia, Colloquia and Regional Astronomy meetings. These meetings are the principal scientific activity of the Union and result in the publication of several volumes per year, the «IAU Symposia» series and other publications. Produced with the cooperation of a publisher, they mark the progress of astronomical science and are also from an international standpoint.

Each scientific meeting is held only after

readable compilations of recent research proposals have been approved by an IAU Commission President and scrutinized by the Executive Committee of the IAU. The IAU makes modest contributions to the costs of each meeting, quite small as compared with the total costs, but organizers agree readily to suggestions by the Executive Committee, ensuring that international balance is thereby properly served.

It is a customary for commissions of the Union to be regarded as autonomous and the role of the Executive Committee and the Secretariat is to coordinate the functions of the Commissions and to point the way towards achieving new goals. Astronomy, which was formerly regarded as a somewhat esoteric activity of a small coterie of scientists has come to be of wide popular interest and to be a background subject for many sciences. With proliferation of electronic, atomic and optical techniques, astronomy has developed in an extraordinary way in the past thirty years; the launching of space vehicles has resulted in astronomical research being carried out by a much wider circle of scientists. In the IAU, all Commissions find their basic flow of information transformed by modern techniques and, where other bodies exist with overlapping interests, a policy of cooperation by co-sponsorship of scientific meetings is actively pursued.

For the future countries where astronomical research is only starting will increasingly find that participation in IAU activities brings benefits. The network of personal acquaintance that exists within the IAU Commissions will enable knowledge of astronomical work and participation in generously provided facilities (optical observatories in remote sites, data-acquisition from satellites, computing networks, etc) to be spread where it did not previously exist. This work is encouraged in the belief that scientists can contribute markedly not only to a wider knowledge of human achievement but also to better international understanding. Increasingly, the IAU endeavours to strengthen its educational activities (Commission 46) and its out-ward-

looking functions; but it must maintain strong international scientific activity within its Commissions, such as scientific meetings of a high standard, consistent with adequate international participation, that represent the summits of current achievement.

Traditionally, much work of the IAU was concerned with international agreement on how the standard ephemerides were to be produced, and how standards of time and earth-rotation were to be achieved internationally from astronomical data. These traditional activities continue to develop and they retain their importance, but it is noteworthy that the use of earth satellites and long baseline radio methods are now transforming the basic data.

The Union has, as its highest authority, its triennial General Assemblies, the first having

been held in Rome in 1922 and the seventeenth in Montreal in 1979. The eighteenth General Assembly is being held in Patras. The representatives of the adhering bodies have voting power at General Assemblies, receiving reports and resolutions from committees and working groups. In this way, the work and the policy of the Union are recorded in a series of volumes, the Transactions of the International Astronomical Union, one volume being published after each General Assembly.

Founded in 1919, the IAU in 1982 finds increasing work for it to do in encouraging cooperation between astronomers of different countries and of different specialties. The Patras General Assembly gives an opportunity for fresh impetus and new ideas in furthering these aims.

About Patrick A. Wayman



Patrick A. Wayman, General Secretary of IAU, 1979-1982, is Director of the Dunsink Observatory, Dublin Institute for Advanced Studies, Castletknock, Co. Dublin.

He was born in Bromley, UK, in 1927. His qualifications include a Cambridge University BA (1948), an MA (1952) and the PhD (1952). Subsequently, he has been fellow of the Royal Astronomical Society since 1949, Visiting Astronomer at the Case Institute (1950) and the Yerkes Observatory, University of Chicago (1951), astronomer at the Royal Greenwich Observatory, UK (1951-1964), member of the IAU since 1952, and Senior Professor in the Astronomy Section, DIAS, Dublin (1964-date). He is a Member of the Royal Irish Academy (1966; Vice-President 1978-1979), an Associate of the Royal Irish Astronomical Society (1982), and was Assistant General Secretary of IAU from 1976 to 1979.

After serving on secondment in South

Africa to the Royal Observatory, Cape Town (now the South African Astronomical Observatory) from 1957 to 1960, Patrick Wayman was appointed officer in charge of the Meridian Department of the Royal Greenwich Observatory in 1962. In 1964, he became Director of the Dunsink Observatory in the Republic of Ireland with responsibility for developing interests in a range of astronomical activities. He has worked on cepheid variable stars in the Magellanic Clouds and on problems related to the Hyades distance modulus determinations. He is currently interested in the establishment of Irish participation in the Spanish International Astrophysical Observatory in the Canary Islands through the UK Science and Engineering Research Council. He is Chairman of the Editorial Board of the Irish Astronomical Journal and was principal founder of the Astronomical Science Group of Ireland which is part of the Irish Astronomical Society and he was the first Chairman of the Irish National Committee for Astronomy as a representative of the Royal Irish Academy, the IAU adhering body for Ireland.

As General Secretary of the International Astronomical Union, he was responsible for the initial work of the Paris IAU Secretariat in 1979 and has prepared the work of the XVIIIth General Assembly held in Patras.

GASTRONOMY CORNER



A visit to any country cannot be a success without sampling the food and beverages characteristic of that land. But even if we do so, and enjoy what is offered, all too often memory fails when we return home. We forget the details, the names, the ways in which the food and drinks are prepared.

And so we have prepared for you some typical recipes, adding where we thought it appropriate to do so, short accounts of the background. In the days that follow we will therefore put before you, as the Greeks so love to do in reality, dish after dish accompanied by justly famous Greek wines. Look upon them as a meal prepared with customary Greek care for our international guests.

SOUVLAKI

One kilo of meat (lamb, veal or pork) preferably from the leg.

Bone the meat, cut it into small pieces, thread them on wooden or reed skewers (seven pieces in each, the one in the middle being fat). Cook under a moderately hot grill, turning them frequently so that they cook evenly. Sprinkle slightly with salt and pepper.

In order to give the meat a particular taste, press the juice of 2 or 3 lemons into a dinner plate, add a little salt and oregano and beat well with a fork for two minutes.

As soon as the meat is well cooked and juicy but not to the point of being dry, moisten the skewers with the lemon mixture, turning them on every side, and put them again under the grill for a further minute or two.

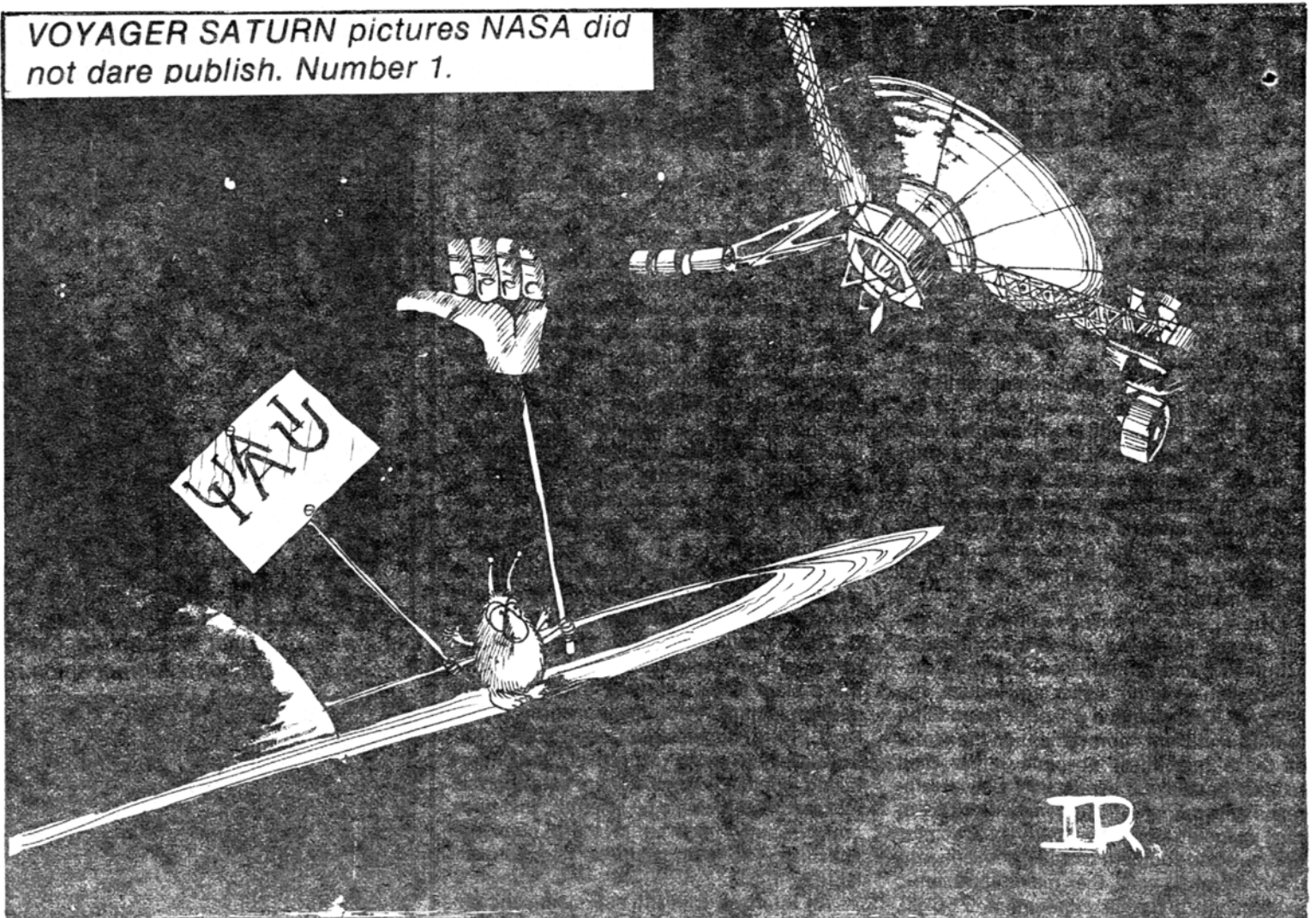
You will thus have a delicious appetizer

WANDA GOUDAS

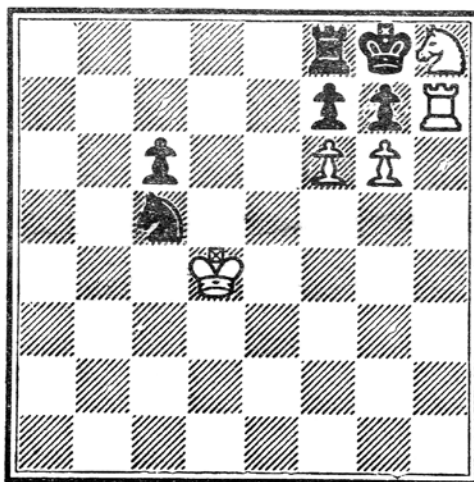
ANNOUNCEMENT

A local Greek family Dr and Mrs Calliolias and their children, offer hospitality to the son (aged 9-13 years) of an English-speaking family attending the General Assembly. They offer to collect the boy each morning and return him to his parents each evening or he may, if he wishes, stay the night. Anyone interested should phone 991-889. (The family have the LOC's recommendation).

VOYAGER SATURN pictures NASA did not dare publish. Number 1.



Chess Position 1



White to play and win

V V M.

Lynnos

Hand made items of popular art. Silver - copper - bronze - woodcraft items, woven goods. Chandeliers and table lamps - clay, pottery, brick items.

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HEALTH - INSURANCE - SECURITY

(Tel: 992.342)

Participants and guests, or other persons on their behalf, seeking medical assistance urgently should call day or night the following telephone numbers

Telephone	Name	Specialization	Language
276 400	Dr S Stavropoulos	Cardiologist-Pathologist	English
278 957	Dr C Christopoulos	Cardiologist-Pathologist	French
222 744	Dr C Klounikas	Cardiologist-Pathologist	French
277 833	Red Cross		English-French
992 342	Mrs Helen Ghekas		English-French German

Mrs Ghekas, member of the Secretariat, will assist participants to find the appropriate health service in case of extreme urgency

During the scientific sessions there will be outside the University Dormitory Concourse a Red Cross ambulance that will provide First Aid service on the spot or take patients, in case of need to the University Hospital which is located about 10 km from the University

Participants who requested or will buy upon registration insurance coverage, under the terms specified in the Preliminary Programme, should contact, in case of need, Dr Paul Hatjiconstantinou (tel 991 920, building A, first floor, Office of LOC) To Dr Hatjiconstantinou participants should also address their questions concerning security

Bali Hairdressing Salon

«La coupe bali», haute coiffure.

200, Corinthou str. (1st floor).

ASTROCROSSWORD

In the unlikely event that you find a spare moment amid all the IAU activities, why not pit your wits against

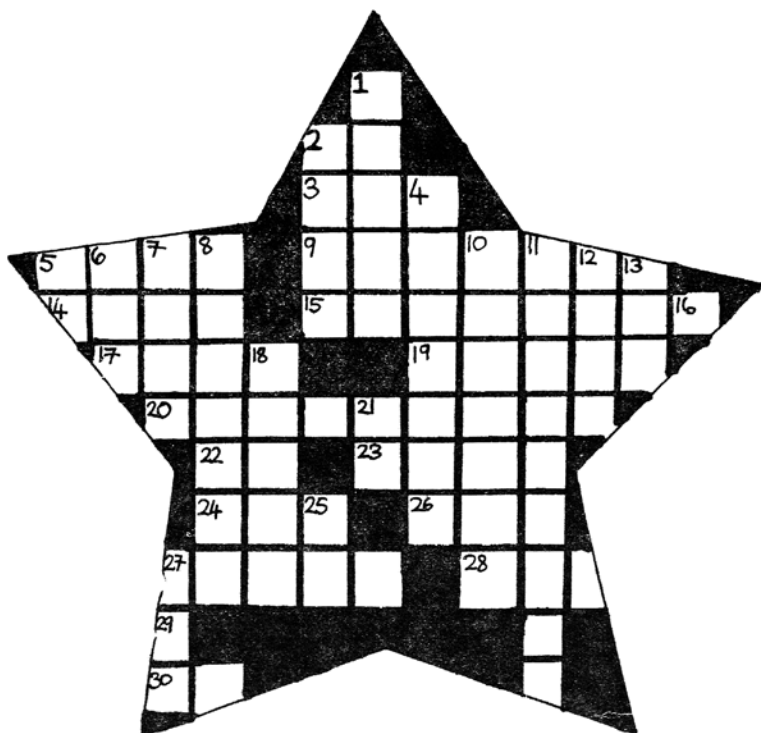
the author of the ASTROCOSMOS crossword, specially designed for participants.

ACROSS

- Third in the spectral classification
- Much more common than the alternative
- Reverse instructions
- Gastronomers and astronomers delight in it
- J S Bath excelled in it
- Mexican wolf
- It began it all
- Wind instrument
- Positive pole
- The reason for it all
- Addition of an E definitely finished the article
- Belonging to a celestial wolf
- Trading partners
- Add 'K' to give a baby a good start
- We all make them
- When tired, do it
- See 1A
- With reference to

DOWN

- Thespian
- Sounds like the initials of a brand-new system for transporting people
- Half of the lunar stormy one.
- One more than 149
- Add 1000 to provide accommodation
- Internationally acclaimed group of stars.
- Without it Shuttle wouldn't make it.
- It just fails to beat Sirius
- Number of atoms in the molecule.
- Admirable habit not many have
- An 'N' and a 'D' will transform it to 19A.
- 'Now' reminds us of it in the mnemonic (see 1A)
- An anaesthetic or a discarded concept
- If I enter it, it becomes valuable
- Commanding officer
- The organ of hearing



The HIPPARCOS Space Astrometry Mission

M A C Perryman Astronomy Division, ESTEC, Noordwijk, 2200 AG The Netherlands

HIPPARCOS is a space mission currently under development by the European Space Agency and due for launch in 1986, dedicated to the accurate determination of astrometric data for a large number of celestial bodies.

The scientific goals of the mission are the accurate measurements of the positions, proper motions and trigonometric parallaxes of about 100 000 pre-selected stars, mostly brighter than magnitude $B = 10$ mag and with a limiting magnitude of about $B = 13$ mag. After the nominal satellite life-time of 2.5 years, the accuracy expected for stars brighter than magnitude $B = 9$ mag is 0.002 arcsec in the parallaxes and 0.002 arcsec in each component of the positions and annual proper motions.

The mission will provide a uniform whole-sky stellar catalogue suitable for detailed astrometric and astrophysical studies. Compared with existing stellar catalogues, the HIPPARCOS catalogue will offer (in addition to the significant improvement on the errors of these quantities) absolute rather than relative parallaxes, a relatively dense reference network, and homogeneous sky coverage including a firm connection between the northern and southern celestial hemispheres.

In parallel with the main astrometric experiment, a further experiment, TYCHO will result in an astrometric and photometric survey of all stars down to a limiting magnitude of $B = 10-11$ mag (some 400 000 or more stars). Positions for these stars will be derived with an accuracy of some 0.05 arcsec and these will be tied directly into the HIPPARCOS reference grid providing a dense stellar network of some 10 or more stars per square degree. Two-colour photometry will be performed for each star at some 50 epochs throughout the 2.5 year mission lifetime.

Detailed discussions of the scientific objectives and of the experimental design have been presented in the Proceedings of the Colloquium on the Scientific Aspects of the HIPPARCOS Space Astrometry Mission (ESA SP-177, 1982). The essential principles of the present experimental design were originally

put forward by Professor P. Lacroûte in a proposal to CNES in 1967; the angles between stars widely separated on the sky are measured by means of a telescope in which two fields of view are superimposed by a complex mirror. The stellar images are modulated by a grid at the focal surface, and angles are determined from the relative phases of the resulting modulated signals. Angular measurements are made at many different orientations and epochs as a result of the continuous scanning of the celestial sphere. On ground data-processing leads eventually to the determination of the astrometric parameters of the programme stars.

The scientific tasks associated with the mission are being undertaken by three consortia of scientific institutes. One, led by Dr. C. Turon (Meudon) is involved in the preparation of the «Input Catalogue» containing those stars to be observed throughout the mission lifetime. Two other consortia, led by Dr. E. Høg (Copenhagen) and Professor J. Kovalevsky (Grasse) respectively, are undertaking independently the entire data analysis tasks. A total of some 50 scientific institutes are presently involved in these consortia activities. The final catalogue may be available by 1991.

An interface with the astronomical community is provided by the «Invitation for Proposals Contributing to the Observing List». This document presents the necessary information for those individuals who wish to submit objects for inclusion in the observing programme, and has a closing date of 1 October 1982. Copies of the Invitation for Proposals are available from the author at the following address: Dr. M.A.C. Perryman, Astronomy Division, ESTEC, Noordwijk, 2200 AG The Netherlands.

FIRST SESSION OF 1982 GENERAL ASSEMBLY ON TEACHING OF ASTRONOMY

A session of IAU Commission 46 on Teaching of Astronomy was held Monday morning under the Chairmanship of Prof. G. Antonakopoulos of the University of Patras. It was the first official meeting of the General Assembly and was dedicated to the teaching of Astronomy at the highschool level. It was attended by representatives from USA, India, Portugal, Taiwan, Greece and several other countries.

SCANDIA RESTAURANT

Agiou Andreou 6.

In our menu you will find the succulent specialties of the Greek cuisine. The original moussaka and the ever popular Greek souvlaki served with rice. Both are gourmet's delight. Your choice of wide variety of our tasty pizzas and sea food is also available. Open to serve you from 17.00 to 02.00.

Our catering service is also operating the Wine Festival of the International Astronomical Union.

Greek traditions greet the IAU



Chairman of Local Organizing Committee Constantine Goudas and Victor Szebehely (right) with Astrocosmos reporters.



General Secretary Patrick Wayman (right) greets Vice-President Robert Wilson.

Dionysus rules! The IAU's opening informal session combined the delights of a Greek Wine Festival with a riot of local colour, music and dancing, as participants were regaled at the EOT Swimming Resort on Monday night.

The god Dionysus brought the art — and science? — of winemaking to Greece tens of centuries ago, and the delegates enjoyed the results straight from the taps of the great wooden barrels under open tents by the shores of the Gulf of Corinth. And IAU members and guests will be able to take memories of the warm, dusky evening home with them, in the form of specially produced IAU glasses and carafes. Other souvenirs for sale appeared in the stalls of local craftspeople: ceramic ware, intricate woodcarvings and tapestry mats and bags in bright colours.

The evening's entertainment reached its climax as the dancers of the Lyceum Club of Greek Women appeared on an open space fringed by hibiscus trees. In the Patras dress — a local variant of traditional Greek costume — they solemnly, then more wildly, swayed to the uninhibited sounds of the local musicians. The girls in headscarves of black, red and green — with aprons of contrasting colours over their white skirts and jewelled bodices flashing under the lights — danced by themselves, or with male dancers in black waistcoats and knee-britches which contrasted starkly with their white shirts and leggings.

In the heady, colourful atmosphere, old friends met and embraced, while «names» only known on papers made contact with international counterparts they scarcely knew — but should grow to know well, by the time the General Assembly is over!

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ELLINOS STRATIOTOU 25 - OPEN: 8.00-15.30
KANARI STR. 66-70 - OPEN: 8.00-15.30
EVERY DAY EXCEPT SUNDAY

TODAY'S EVENTS:

LES EVENEMENTS DU JOUR:

In Building B, Drafting Room:

09 30-10 30 Meeting of Presidents of Commissions

11 30-12 30 Meeting of Official Representatives

14 30-15 30 Meeting of Nominating Committee

16 30-17 30 Meeting of Finance Committee

In the Ancient Odeon of Patras at 20.00:

Official opening of the General Assembly Inaugural Ceremony and First Session of the General Assembly

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL 20 00-24 00

Karamouzis Ant. (optician)

Prescription glasses, sun glasses, contact lenses.

112, Maizonos str. Patras.

Tel.: 274.728, 221.989.

Wine Festival

The Local Organising Committee of the 18th General Assembly of the University of Patras has organised a wine festival to entertain our honoured guests.

It will be open every evening from the 10th until the 26th of August 1982 between 20 00 and 24 00.

The entrance charge for registered participants is \$2 and for the non-registered \$4. Special wine glasses and wine carafes will be on sale inside the festival area.

Greek specialties (souvlaki) and soft drinks will also be available at a cantina at reasonable prices. Participants will also be able free of charge to drink wine from different parts of Greece.

An Orchestra «The Planets» will provide music for the occasion. There will also be contributions from local choirs.

Buses and coaches will be available to take participants from their hotels to the Wine Festival and back to their hotels. The last bus will leave the Festival at 00 10.

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August 18
Number 2



Patras: Greece 1982

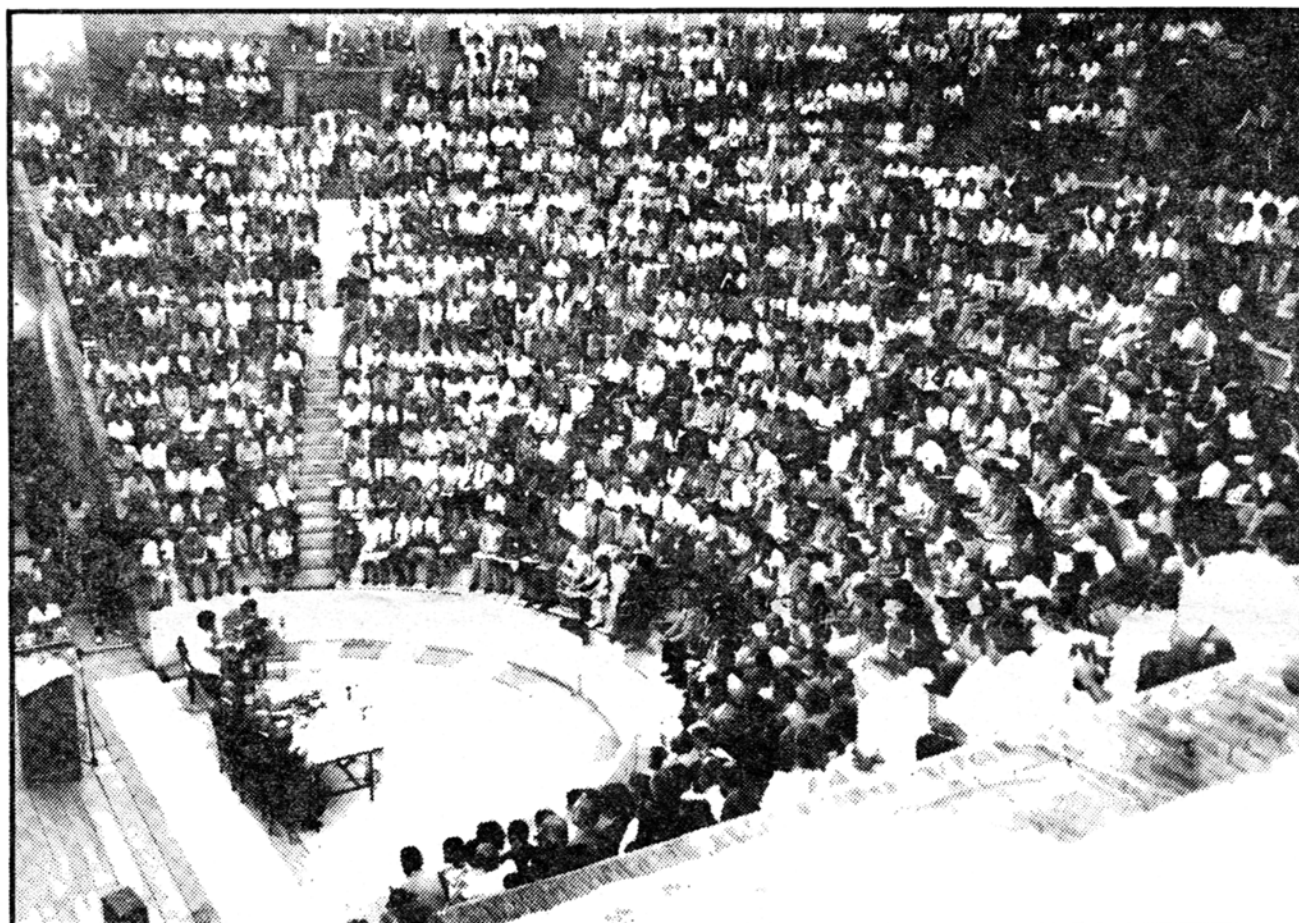
Le 18 Août
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Editorial Office: T-block

Editor: ARCHIE E. ROY

Telephone: 991 465

Inaugural Ceremony and First General Assembly



Seated under deepening twilight skies in the warm-hued ancient Odeon of Patras, 2,500 astronomers and guests last night attended the Inaugural Ceremony of the IAU. But the mood of happiness and relaxed optimism was marred by the news that Professor M.K.V. Bappu, the President of the IAU, is seriously ill in hospital following openheart surgery earlier in the month.

The evening, however, was as perfect an introduction to the «cradle of astronomy» as anyone could wish. Delegates were first entertained by musical prelude from the mixed choirs of OTE and Patras. As swifts and swallows swooped overhead, strains of traditional Greek folk tunes echoed off the ancient walls of the Odeon. The women's costumes were exquisite: wine and mulberry Byzantine-style dresses worn by the OTE choir, and flowing white traditional gowns, clasped by belts of gold leaves, by the women of Patras.

Following the singing, Professor C.L. Goudas, Chairman of the Local Organizing Committee, introduced the Chairman of the National Organizing Committee, Academician J. Xanthakis. In his welcome to the IAU, Professor Xanthakis spoke of astronomy's roots in ancient Greece, and how appropriate it is, 25 centuries later, that the descendants of the ancient astronomers should return to the land where their science first began.

(His full speech appears on page 2)

Professor Goudas followed to deliver a message from the President of the Hellenic Democracy, Mr Constantine Karamanlis. Due to unforeseen duties, the President explained in his message, he himself could not inaugurate the Assembly, but he wanted to convey his appreciation of the peaceful, international co-operation which is its cornerstone. «This unity amongst students of space constitutes a model of peaceful co-operation and an example which would be most desirable if the troubled world of our times could follow... for the sake of all peoples of the Earth.» (The full text appears on page 2).

The Rector of the University of Patras, Professor George Maniatis, welcomed the delegates on behalf of the University. «It is an honour for such a young university», he said, «and it is the biggest international gathering we have had on our campus». Professor Maniatis explained that the meeting was particularly important for the University, as it would provide a stimulus for the active community of astronomers who are already working there. And he went on to express the kinship that he, as biologist, felt with astronomers: both disciplines were ultimately concerned with the Universe and Man's place in it. He looked forward to the day-to-day business of the Assembly, for he knew that the exchanges and personal contacts made at such international meetings could not be achieved by the normal channels of scientific communication.

Continued on page 6



Top left: delegates await the start of the Inaugural Assembly in the ancient Odeon, Patras.

Bottom left: the OTE choir entertains the delegates with a Greek folk song.

Bottom right: Professor C.L. Goudas delivers the address of the President of the Hellenic Republic.



MESSAGE TO THE ASSEMBLY

sent by the President of the Hellenic Democracy

Mr. CONSTANTINE KARAMANLIS

It is a great pleasure for me to salute the convocation of the 18th General Assembly of the International Astronomical Union in Greece, and to welcome its members to this country, which is one of the ancient cradles of Astronomy. I am very sorry, indeed, that due to unforeseen duties, it has become impossible for me to inaugurate personally the works of your Assembly.

I deeply appreciate the fact that in your Assembly, scientists participate from all over the world. This unity among students of space constitutes a model of peaceful cooperation

and an example, which would be most desirable if the troubled world of our times could follow, in order to find new ways towards progress, for the sake of all peoples of the Earth.

The program of this Convention manifests the wish of the participants to make this meeting a landmark in the field of exchanging information among students of space.

I wish your efforts to be successful, not only for the benefit of science, but also for the good of humanity in general.

MESSAGE A L'ASSEMBLEE

envoyé par le Président de la Démocratie Grecque

Monsieur CONSTANTIN KARAMANLIS

C'est une grande joie pour moi de m'adresser à la 18ème Assemblée Générale de l'Union Internationale Astronomique en Grèce et de souhaiter la bienvenue à ses membres dans ce pays, qui est un des anciens berceaux de l'Astronomie. En effet, je regrette vivement de ne pas pouvoir inaugurer la Convention à cause d'un engagement inattendu.

Le fait que les scientifiques, qui participent à cette convention, viennent de tous les pays du monde, est d'une importance capitale pour nous. L'unité qui existe parmi les étudiants de l'espace constitue un modèle de coopération

pacifique et un bon exemple, tellement souhaitable pour notre monde en confusion, afin de trouver de nouvelles voies menant au progrès pour le bien de tous les peuples de la Terre.

Le programme de cette Convention reflète le souhait des participants de faire de cette rencontre un événement spécial pour échanger des idées parmi les étudiants de l'espace.

Je désire réellement que votre effort sera un succès, non seulement pour le bénéfice de la science mais aussi pour le bien de l'humanité.

ADDRESS BY THE CHAIRMAN OF THE NATIONAL ORGANIZING COMMITTEE, ACADEMICIAN J. XANTHAKIS

It is a great event for Greece and a great honour for the University of Patras to welcome the 18th General Assembly of the IAU. Astronomers young and old from all over the world have come here to present the results of their recent researches, covering the various fields of astronomy and astrophysics. They will also present new ideas and opinions concerning their working programme for the future.

Dear colleagues, we have gathered here on the land that gave birth to a new child, the Science of the Skies, the land where ancient people from the Near and Far East made their first observations of stars and planets. This new child grew up in the Land of Ancient Greece, with the support of geniuses like Thales of Miletos, Pythagoras, Philolaos, Heraclitus and Aristarchos of Samos.

This young Science eventually emigrated to the Western world to receive his later education from Copernicus, Galileo, Newton and other great scientists of the Renaissance and more recent times.

Thus, it is natural that twenty-five centuries later, the descendants of Ancient astronomers would wish to visit this country where the science of astronomy saw for the first time the light and made its first steps.

We heartily welcome you in this small

ALLOCUTION DU PRÉSIDENT DU COMITÉ NATIONAL D'ORGANISATION, L'ACADÉMICIEN J. XANTHAKIS

C'est un grand événement pour la Grèce et un grand honneur pour l'Université de Patras d'accueillir le 18ème Congrès International d'Astronomie. Des savants et des jeunes astronomes venus des différents pays du monde sont ici réunis, pour présenter les résultats de leurs recherches récentes dans les différentes disciplines d'astronomie et d'astrophysique. Ils vont aussi discuter et exposer leurs idées nouvelles et leurs opinions pour les recherches de l'avenir.

Chers collègues, nous sommes ici, dans la région où a vu pour la première fois la lumière du jour, ce nouveau né, qui était la Science du Ciel, avec les observations des peuples anciens du Proche et d'Extrême Orient. Ce nouveau né, dans ce pays des Grecs anciens, avec le génie de Thales de Milet, de Pytha-



Professor John Xanthakis

corner of Europe with its old history and civilization. We do however regret that our financial means do not allow us to meet the standards of hospitality set by «*Ἐννοχ Δίας*» i.e. Jupiter, the father of the Gods of our ancestors.

The National and Local Organizing Committee have done their best however to facilitate your work here and make your stay in this picturesque coast of Peloponnesus as pleasant as possible.

gore, de Philolaos, d'Héraclite et d'Aristarque de Samos est devenu un adulte.

C'est dans l'âge de la puberté que ce jeune homme a émigré quelques siècles après dans l'Occident pour se former en un jeune savant, sous l'impulsion des découvertes de Copernic, de Galilée, de Newton et d'autres grands savants de la Renaissance et des années récentes.

C'était donc une nécessité que les successeurs des astronomes des peuples anciens, de vouloir visiter, après 25 siècles, le lieu où a vu la lumière et a fait ses premiers pas solides, la science du ciel. Nous vous accueillons ici cordialement, dans ce petit coin de l'Europe avec sa longue histoire et sa civilisation ancienne. Mais nous regrettons que nos moyens financiers ne nous permettent pas d'être à la hauteur de notre tradition hospitalière, de «*Ἐννοχ Δίας*», de dieu Jupiter de nos ancêtres. Les Comités d'Organisation Nationale et Locale ont essayé de faire tout ce qu'ils pouvaient pour faciliter aussi que possible votre travail ici, et de rendre votre séjour à cette côte pittoresque du Péloponnèse agréable autant que possible.

Editorial

NOT THE LAST OF THE WINE...

For many of us it is as if we never parted three years ago in Montreal. Old friendships have been renewed, old discussions and arguments resumed. We are already in the interlacing orbits of meetings after the Informal Gathering of Monday and the Inaugural Ceremony and First General Assembly of Tuesday.

In the area of the Wine Festival members and guests had their first reunion in Greek manner: after all, the original symposium was a drinking party which included music and dancing and good conversation though by all accounts it often ended in an orgy of wine drinking. Hippocrates prescribed wine for indigestion while Socrates is said to have been able to imbibe huge quantities of it with no ill

effects. Certainly no-one was heard to complain of indigestion after the Informal Gathering and equally certainly some of the learned participants had at least one thing in common with the great philosopher.

But the wine that uplifted our spirits was the wine of friendship, that gives joy in seeing the faces of our friends once more. Some of us recalled with affection old friends who alas will be seen no more at General Assemblies of the IAU but who live on in our memories. We watched new friendships being formed among the younger members and guests and realised again that as far as the wine of friendship and continuity and enthusiasm is concerned, there happily will be no end to that glorious vintage.

New Commission to search for Extraterrestrial Life

The Executive Committee of the IAU has approved the establishment of a new IAU Commission, No 51, with the title «Search for Extraterrestrial Life», which will be proposed next week, to the General Assembly for final approval.

The goals of the new commission will include: Search for planets accompanying other stars; habitability and evolution of planets; Search for radiotransmissions of extraterrestrial origin; Studies of biologically relevant interstellar molecules; Possible spectroscopic evidence of biological activity; Coordination of international efforts and collaboration with other international unions.

The Organizing Committee of the proposed new commission consists of the following: R. Brown (Australia), P. Connes (France), F. Drake (USA), G. Gatewood (USA), L. Goldberg (USA), J. Jugaku (Japan), N. Kardashev (USSR), G. Marx (Hungary), F. Pacini (Italy), M. Papagiannis (USA-Greece), M. Rees (UK), V. Troitsky (USSR).

The Executive Committee will be proposing Prof. Michael Papagiannis, Chairman of the Astronomy Department of Boston University, USA and corresponding member of the Academy of Athens, Greece, as the first President of the new commission.

IAU members who would like to become members of the new commission are asked to leave a note in the mail box of Prof. Papagiannis (No 1585 in the boxes of Greece) indicating their name, address and institute of affiliation.

IAU Commission 9

Working Group on Photographic Problems

There will be a Working Group meeting on WEDNESDAY AUGUST 18 in Room T 15 from 15.00 to 18.00 h. This meeting is open to anyone interested in astronomical photography and its applications.

ANGLO-AUSTRALIAN TELESCOPE

There will be a meeting to discuss instrumentation and future plans for the AAT on Wed 18 Aug. The meeting will be held from 17.00 to 19.00 hours in Room T 12.

All AAT users and others interested in the Telescope are welcome to attend

Commission No 49 is concerned with the physics of the heliosphere, its boundary and interface to the interstellar medium. At this 18th General Assembly of the IAU the Commission will have the following specific topics that are presented in form of invited reviews as short contributions. Special emphasis will be given to the problems of the three-dimensional structure of the heliosphere and its boundary configuration.

Program for sessions of Comm. No 49 scheduled for the General Assembly-IAU at Patras, Greece:

Date: Thursday, 19th August, Room AE

49/1 Scientific session. Inner heliosphere 9.00 to 10.30 h.

1) «Acceleration mechanisms of the solar wind» (invited review) by Dr. A. Barnes.

2) «Heavy ion dynamics in the solar wind» (invited review) by D. H. Rosenbauer

49/2 Scientific session. Outer heliosphere 11.00 to 13.00 h.

3) «Solar wind interaction with interplanetary obstacles» (invited review) by Dr. C. Goertz.

4) «Solar wind modulation of cosmic rays» (invited review) by Dr. Martin Lee.

5) «Role of cosmic rays in decelerating the solar wind» (contr. paper) by Dr. M.K. Wallis.

49/3 Scientific session: Heliospheric interface 14.00 to 16.00 h.

6) «The outskirts of the solar system» (invited review) by Dr. S. Grzedzielski.

7) «Modification of the interstellar gas parameters in the heliospheric interface» (contr. paper) by Dr. A. Himmes.

8) «Comment on heliospheric boundary structure effects» Dr. H.W. Ripken.

(The program is open for further contributions and remarks).

Hans J. Fahr
(President)

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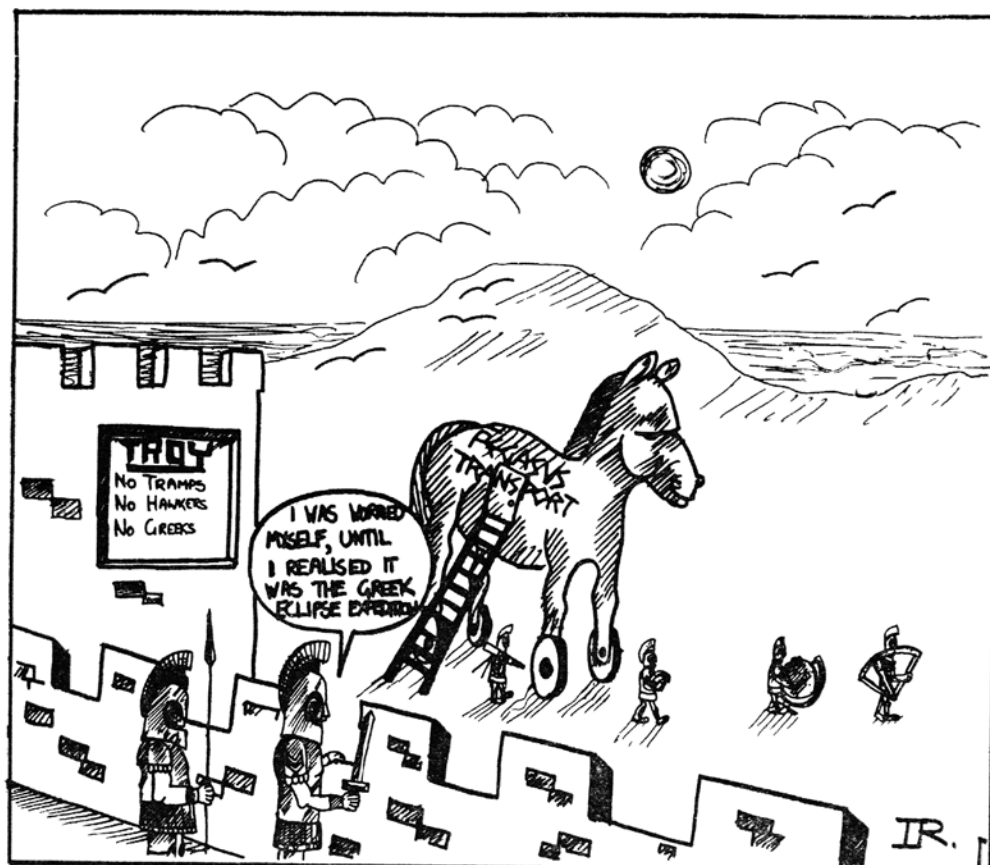
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Editor: A.E. Roy
Both at the University of Patras

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The French have a pickled olive the call picholine. Picholines are grown specially for the table. The best of all olives, it is said, come

Helen Markellos

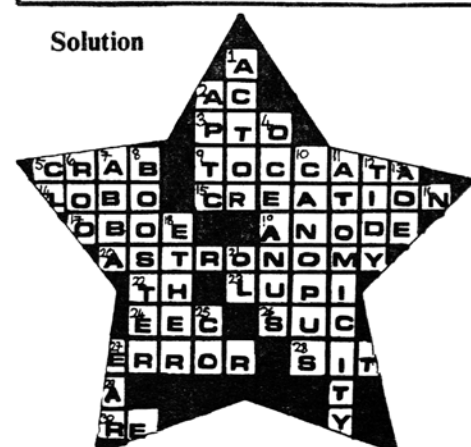
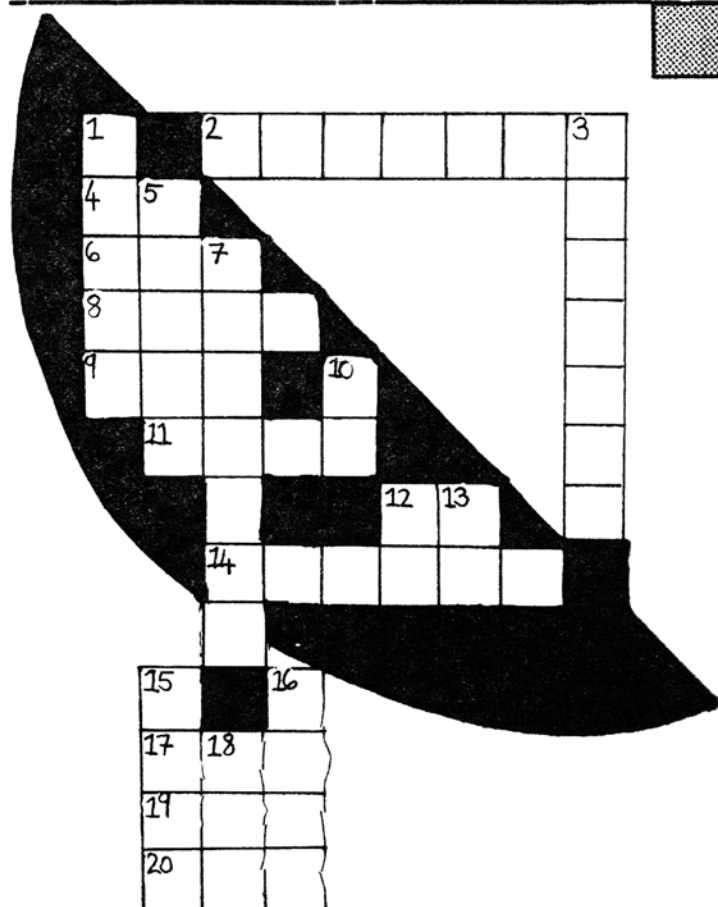


TAURUS (Apr. 21 - May 21). Mars is in the ascendent, Jupiter is in opposition to the Moon which is in the first quarter; Venus and Saturn are in the sixth house of the

Have a good day!

1. R X P ch, K X Kt 2. R-R7ch K-Kt1 3. R-R8ch, K X R 4. P-Kt7ch, K-Kt1 5. R X R = Qch, K X Q 6. K X Kt White has a won ending.

1. It conducts electrifying chase of a smaller body.
3. One keeps hopping on their quick change behaviour.
5. Nose-cone.
7. Appropriate instrument for the music of the spheres?
10. Not them.
12. Neither male nor female.
13. A refusal.
15. (American) astronomers do it at.
16. The sound of one clapping gives 18D?



INAUGURAL CEREMONY ADDRESS

read by Prof. E.K. Kharadze
of Professor M.K.V. Bappu

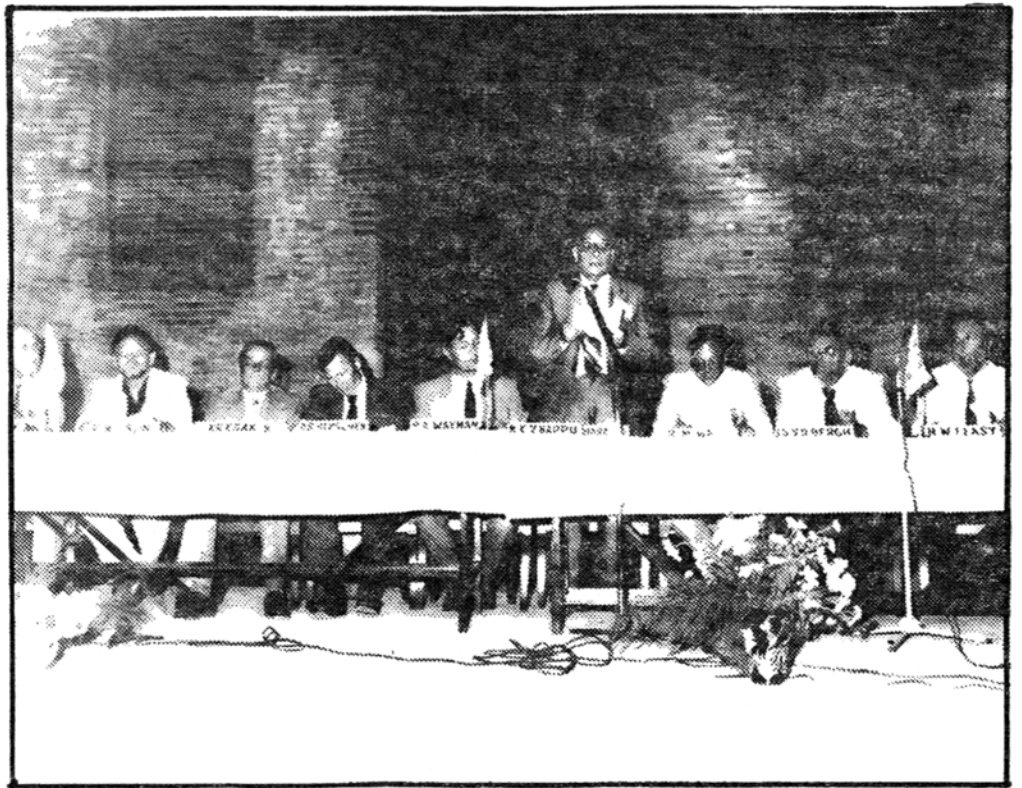
Your Excellency, Minister of Education, Professor Xanthakis, Mayor of Patras, Mr. Vice Chancellor, Ladies and Gentlemen:

It is with great pleasure that I wish to convey to you, the sincere gratitude of the International Astronomical Union, for your very kind invitation to hold our General Assembly in Greece, and for the very warm welcome you have extended to us. This delightful seaside venue with its ancient castle, the several attractions for the visitor, and its place of learning, provides a setting for our deliberations of the forthcoming week, that is both popular and practical. Sitting here today, in this ancient Odeon of Patras, whose walls have held the rapturous silence of deep concentration or the thunderous ovation of approval of many a Greek classic, here beneath a glowing canopy of stars, a present generation of astronomers seeks to keep a tryst as it were, with their predecessors of an ancient past. The Greek philosophers of antiquity have provided us with much of the basis of our present concept of man, state and society. From the point of view of those gathered here, the Greek mind has demonstrated the power of abstract thought and mathematical ingenuity. Its picture of the

world was intertwined with reasoning and apparent harmony.

It is therefore, very gratifying to find that Astronomy in the Greece of today has not just rested on these very creditable laurels that assure it a place in the history of Mankind. There are several flourishing schools at many centres of learning whose contributions in such fields as mechanics, galactic dynamics and solar physics, to mention just a few, have been highly rated by the astronomical fraternity. This awareness of its role in human history and willingness to participate in international cooperation is seen in the fact that Greece has been a member country of our Union since its inception. Its individual members have contributed very effectively to the progress of our science. We can offer no better testimony of your interest in the affairs of the Union, than the fact that our General Secretary of a few years ago has been a distinguished colleague from this country.

We are happy to be here today. There is an air of excitement akin to homecoming. For, it is a privilege to be invited as astronomers to this cradle of human endeavour from where Man first speculated on the nature of the Universe and his environment.



In the absence of Professor Bappu, Professor Kharadze opens the First General Assembly.

FIRST SESSION GENERAL ASSEMBLY PRESIDENTIAL ADDRESS

read by Dr. M.W. Feast

of Professor M.K.V. Bappu

Members of the Union,
Ladies and Gentlemen:

Circumstances, totally unexpected, and to some extent beyond my control prevent me from being with you during this General Assembly. Like many amongst you, I had looked forward to a feast of scientific fare with a gourmet's anticipation and especially the opportunity to meet both a young generation of IAU members, as well as those already

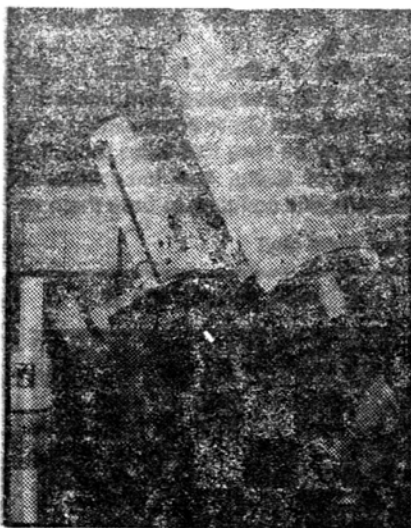
established in the profession, when I was a newly initiated member. Wherein lies the strength of our Union and at the same time its principal charm that keeps us all together. Besides the aspects of international cooperation, the Union has a prime responsibility of promoting the study and development of Astronomy in all its branches. It does so by fostering an awareness of accomplishment, and providing some of the sources of stimuli

that can result in creative intellectual productivity. On this occasion, the joint-discussions, the invited discourses, the joint commission meetings, to mention a few, cover a wide variety of astronomical enterprise; the cream of much effort and its implications, discussed and absorbed, before we return homewards for a fresh look at the problems that interest each of us.

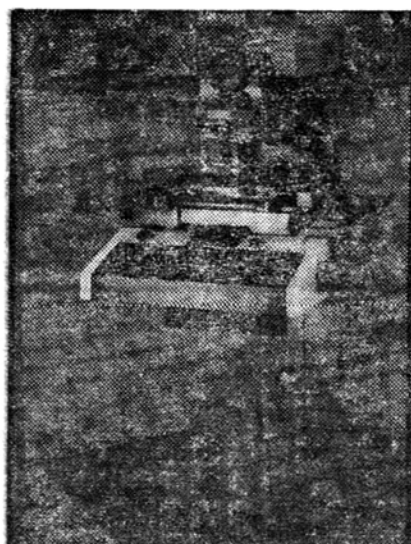
The years ahead hold forth the promise of striking developments on a magnitude never witnessed before. We are on the threshold of an era when we shall have the opportunities of using telescopes from space that will have apertures, considered large even from ground-based standards. With the veil of limitations imposed by the earth's atmosphere

behind us, and with the variety of new technological triumphs at our disposal, we approach in our quest, the ultimate in resolution and limiting brightness. This has always been the astronomer's fondest dream. And the nature of physical discovery that we have witnessed over the ages gives us the feeling of assurance that a major technological leap of this kind will in its wake stabilize some of our conjectures, bring out the totally unforeseen characteristics in some of the objects we study, will revolutionize our thinking, and in general produce a multitude of data that needs to be sifted through with care and judgement. This avalanche of information will

Continued on page 6



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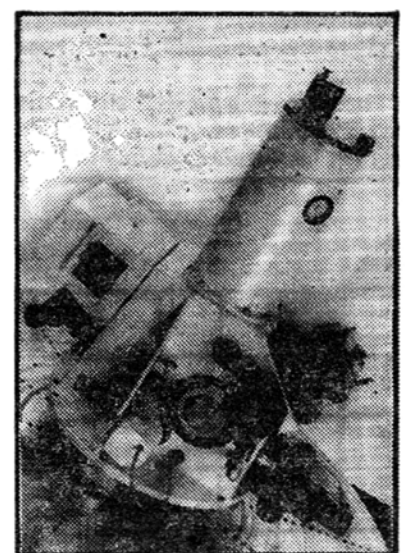
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The IAU - the First 60 years

Reminiscences and Reflections

by Zdeněk Kopal

The 18th General Assembly of the International Astronomical Union meeting in Patras this month coincides with an important anniversary in the history of our organization: for it is 60 years almost to a month since the first IAU General Assembly met in Rome, Italy, in 1922. Many events have occurred since that time which changed the face of the world almost beyond recognition; and it is only natural that these events should be reflected also in the life and activities of our Union. The aim of the present notes, written by an old-timer, should be to give a brief account of them, and attempt to trace their causes.

First, some vital statistics: when the I.A.U. was formed in the aftermath of World War I, it had only a little more than 200 members — in a world of some 1500 million inhabitants. Its membership grew up at first only at a moderate speed — by the time of the 9th General Assembly held in Dublin in 1955 it was still possible to take a group photograph of the entire assembly on one plate. However, with the advent of the space-age in 1957 the I.A.U. membership began to grow by leaps and bounds. Ten years later — by the time the 13th General Assembly met in Prague, the I.A.U. membership already exceeded 3000 in a world whose population had risen to 4500 millions: therefore, while the world population trebled, the number of astronomers organized in the I.A.U. increased 15 times. This fact, in turn, was bound to bring about also secular changes in the role of astronomers (and their organizations) in the world, which may be of interest to recall.

The first 5 General Assemblies of the I.A.U. were held in Western Europe (one on the East Coast of the United States) — never too far from the shores of the Atlantic; and since in the days of predominantly surface travel one did not have to worry about baggage allowances, the tenor of most meetings was more formal: white tie and decorations were de rigueur for more than one occasion; and when the Union met in a national capital, its membership used to be received in person by the head of state. Who would ever forget the 5th I.A.U. General Assembly held in July 1935 in Paris, when all astronomers of the Union were received by the President and Mme Lebrun in the gardens of the Elysée palace; or the closing banquet at the Eiffel Tower which lasted till dawn? The 6th General Assembly in Stockholm was held in August 1938 already in the deepening shadow of another storm of global dimensions, which broke out a year later with unparalleled fury to shake the world to its foundations. And when the main storm blew over, the world never returned to what it used to be — an observation fully applicable to the IAU as well.

On the external side, the heads of state ceased to receive the Union (at least in person), possibly to economize on the costs

of large receptions! Moreover, the locations where general assemblies are being held have been (quite rightly) de-centralized from small areas of high-density population to a theatre of global proportions, but this fact is bound of necessity to increase the travel costs for the participants from distant parts of the world. In the «roaring sixties» it was still possible to have these travel costs underwritten from public funds of national origin even for young participants who may not stand yet too high on the official ladder of their organizations. However, in the more recent past, the costs of travel (mainly by air) have kept escalating — and the sources of national support drying up — to such an extent as to make a participation of especially the young generation of astronomers in the I.A.U. meetings in the future increasingly difficult — a problem of concern not to them alone; for without a steady influx of young blood the Union could wither rapidly into insignificance.

And there are other costs for the participants in the Union activities besides travel. In the days which its older members still well remember, participants travelling from a distance could usually rely on a considerable amount of local hospitality. Due to the economic facts of life such hospitality has now all but disappeared. On the contrary, few organizations can afford now to invite the Union to meet on their ground without charging «registration fees» to all participants — fees which (like everything else) are escalating with inflation. Older participants can still remember the days when there were no such charges. At Montreal in 1979 they amounted, however, already to \$50 per person; at Patras they have now escalated to \$100; and whether future escalation will be in arithmetic or geometric progression is anyone's guess.

Political Perturbations

The principal reason for this distressing situation is, of course, the rampant inflation of our age — coupled with the fact that the I.A.U. is not (and never has been) a wealthy organization; nor has it ever been politically independent of its sponsors. It was, in fact, founded by the Allies of 1918 as an annex to the Treaty of Versailles (with English and French still remaining its «official languages»), and created as a union of National Committees of adhering countries, whose financial contributions (bartered in the style of Common Market) are essentially responsible for its maintenance. Alternative, or supplementary, sources of income for the Union have not been seriously sought by its leadership, because the present system continues to offer certain advantages to its sponsors.

It may be of interest to recall, for instance, that the German astronomers were not

admitted to the membership of I.A.U. during the days of the Weimar republic — that privilege was extended to our German colleagues only after the advent of Hitler (whom the former Allies were obviously more intent to please); and the Union has really never been free of political interference from many directions ever since. Perhaps the most conspicuous example of such an interference in recent years was the technical expulsion of the Republic of China, which was eased out of our midst in 1955 by the United States (during the enlightened era of John Foster Dulles), in collaboration with certain astronomers from Western Europe. Only God knows what good should have come to the science of astronomy and to the International Astronomical Union from severing (albeit temporarily) its official ties with the most populous nation of the Earth; but such acts did happen, and will continue to happen as long as the present structure of the I.A.U. remains unchanged — i.e., as long as it remains in effect only a Union of National Committees; with little strength at grass-roots. For this has been its principal weakness built in at the time of its foundation; and the principal obstacle why the Union has not addressed itself to problems facing it — and astronomy — now with greater effectiveness.

Some of these (concerned with escalating costs of meeting attendances) we have mentioned already. Let us now mention another — and equally important — task which should exercise the Union and its members seriously and in the near future: namely, the need for all results of current astronomical research to be made freely available to others. An exchange of publications to this effect — initially the task of learned societies or national academies — assumed since the commencement of the 19th century a more organized form through astronomical publications and journals (some of which — like the *Astronomische Nachrichten* or the *Monthly Notices of the Royal Astronomical Society* — are still with us today). The same cannot, unfortunately, be said of publications once issued by individual observatories — once printed at their own expense and distributed freely to all interested parties.

The formative years of the I.A.U. coincided with the time of «Indian summer» of that heroic epoch in the history of our science; and the first half of the 20th century saw its general decline. Disappearing series of once-proud serials of observatory publications or annals made way, to be sure, to new serials of observatory reprints of individual papers printed in different journals — a way which has dominated exchange of astronomical publications in the second half of this century — but anyone can read the writing on the wall that this mode of information exchange is likewise apt soon to become extinct.

Why? the reason usually given to justify this trend — namely, the escalating costs of printing — may at best constitute a part of the answer, but certainly not the whole. For it leaves out of consideration the fact that all costs of contemporary scientific life — buildings, instruments, salaries, etc. not only printing — have been escalating in a similar way; and yet money seems available to meet them. No; a general decline in the exchange of astronomical publications is being caused by our greed — a growing tendency to spend available funds «in-house», and to de-emphasize «hand-outs». This, if it continues unchecked, will be bound to increase the gap between «have» and «have-not» nations in astronomy (as it is doing in so many aspects of human life on this planet) — and which organization other than the I.A.U. could be called upon with greater justification to anticipate the needs of the future, and do something about them while there is still time?

Page Charges

In the meantime, astronomical journals continue to appear (and some even flourish); but another devil has of late raised its ugly head to impede dissemination of astronomical information: namely, the bogey of «page-charges» levied against the authors (or their institutions) for the privilege of having their work appear in print. Arguments usually advanced to rationalize such an economic policy are specious and unconvincing. But whatever the case may be, many will find it repugnant in principle that it is the author — the man who did the work — who should, in addition, pay for the privilege of offering freely the results of his work to others. If anyone, it is the user who should pay (through subscription, or other ways) for free access to them.

For authors (or their institutions) to subsidize publication of their work is, moreover, demoralizing and, as such, of legitimate concern to the I.A.U. on at least two counts: it favours individuals (or institutions) who can afford to buy themselves access to the channels of publications; and it discriminates against contributions from countries with «soft» currencies, not readily convertible (at least, not without a lot of red tape) into those in which page-charges are to be paid. Neither of these points has anything to do with the quality of the work in question, but with circumstances largely beyond the control of any individual astronomer. Should, moreover, this situation worsen in the course of time, would it not only be legitimate, but necessary, for the Union to provide assistance to professional colleagues in the developing countries to ensure that the flow of astronomical information continues to function unimpeded.

Most astronomers would probably agree that this is a worth-while challenge; but to accept it would again cost money which the Union at present does not possess; and the question is: how to raise it? By augmenting the regular income of I.A.U. by dues (statutory, or voluntary) paid by the members themselves? By enlisting interest and support of philanthropic organizations (national, or international) which could assist in our needs? Or by developing a closer cooperation between I.A.U. and amateur astronomers — who outnumber the professionals organized in the I.A.U. at least ten-to-one; and some of whom are well organized in large associations of considerable wealth? After all, there is much more money in circulation in the world now than has ever been in the past; the question is only how to channel it to useful ends.

None of these questions admit of easy answers but all (and many others) may have to be asked and answered — before we shall have done what is expected of our generation.

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Participants and guests, or other persons on their behalf, seeking medical assistance urgently should call day or night the following telephone numbers

Telephone	Name	Specialization	Language
276.400	Dr. S. Stavropoulos	Cardiologist-Pathologist	English
278.957	Dr. C. Christopoulos	Cardiologist-Pathologist	French
222.744	Dr. C. Klounikas	Cardiologist-Pathologist	French
277.833	Red Cross		English-French
992.342	Mrs. Helen Ghekas		English-French German

Mrs. Ghekas, member of the Secretariat, will assist participants to find the appropriate health service in case of extreme urgency

During the scientific sessions there will be outside the University Dormitory Concourse a Red Cross ambulance that will provide First Aid service on the spot or take patients, in case of need, to the University Hospital which is located about 10 km from the University

Participants who requested or will buy upon registration insurance coverage, under the terms specified in the Preliminary Programme, should contact, in case of need, Dr. Paul Hatjiconstantinou (tel 991 920, building A, first floor, Office of LOC) To Dr Hatjiconstantinou participants should also address their questions concerning security

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FIRST SESSION GENERAL ASSEMBLY PRESIDENTIAL ADDRESS

read by Dr. M.W. Feast

of Professor M.K.V. Bappu

Continued from page 4

undoubtedly need the coordinated effort in analysis of so many dedicated to astronomy, that it will need to be global in nature. As a Union of such likeminded individuals, we see ourselves in an important role of the task of assimilation of these new results; it would be a perfect setting for international cooperation where the entire fraternity is engrossed in the adventure of exploring the vistas of the unknown. Should we not explore this important angle in great detail before we are engulfed in the actuality of subsequent events?

At this time and stage of development of our science I cannot rule out the feeling that our approach to the unknown and the unexplored has been overcautious and without the touch of daring, bordering on rashness that has characterized the bold explorer of the past. Are we enmeshed in the fetters of inhibition originating from a conservatism of outlook? Could we have had discoveries ahead of the times they were actually made, if only a freshness of approach was not lacking? I am of the opinion that it has been so.

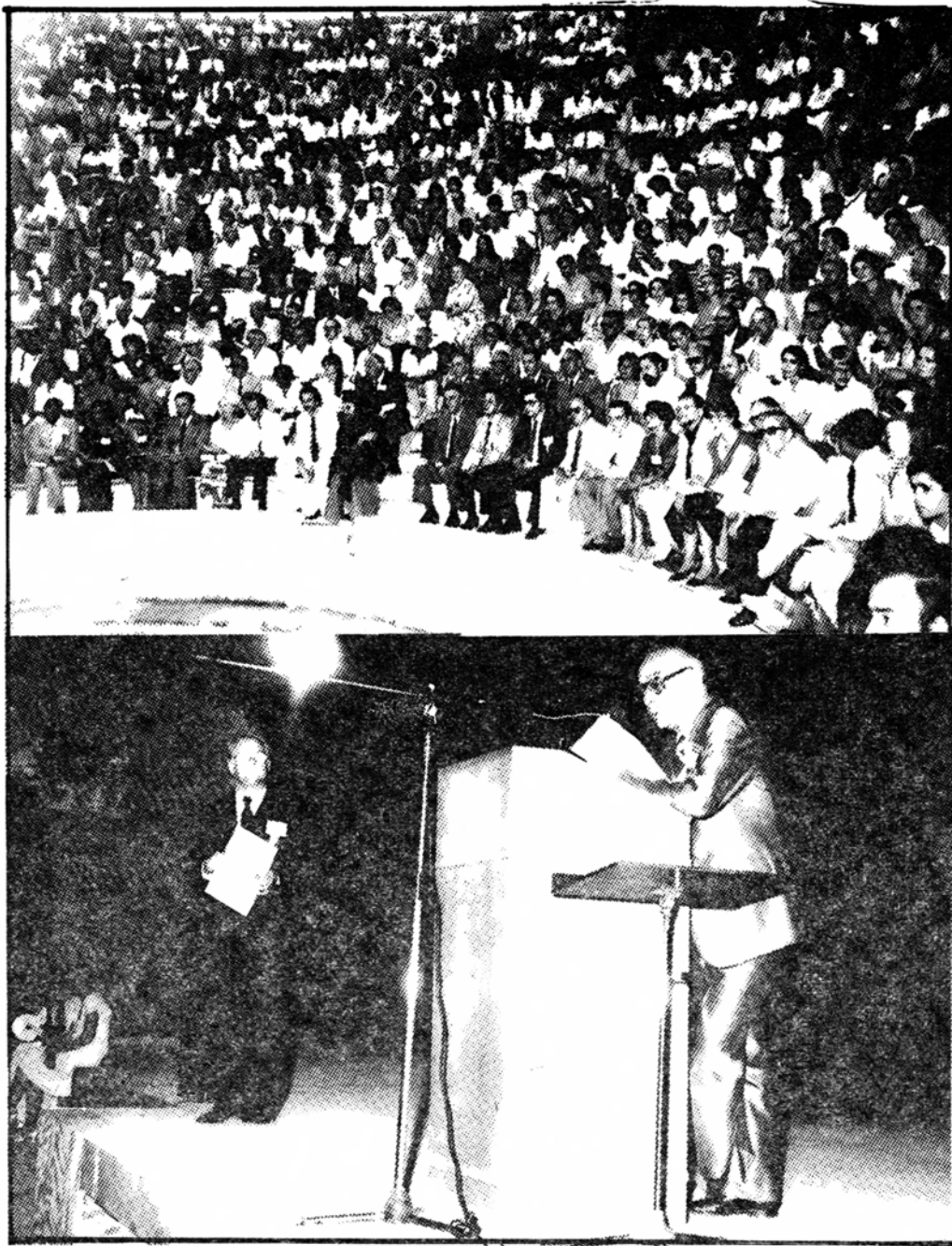
Assuming that my surmise is likely to be valid, I fear that we have been slow to respond to the lessons of experience of the recent past. In our search for objects that display peculiarities of a kind beyond our normal familiarity, we could with advantage follow the pattern adapted by that illustrious pioneer, Kapteyn, of sampling received from objects in a restricted area of sky. With the era of the large space telescopes round the corner, perhaps this philosophy of approach would be a dire necessity.

While innovation in technique is a factor of much significance in the discoveries that will yet be made, it is certain that an even greater role will undoubtedly be of a human intellect. Time and again we have seen how an individual has appeared on the scene and transformed a picture of gathering confusion into one of logical rigour and aesthetic simplicity. In the final reckoning, it is this aspect of Man that is a responsibility shared by each one of us in our individual roles, be it of teacher or senior colleague, as well as of the astronomical community and the Union as a

whole, to nurture such possibility. The history of the human race provides the evidence that the spark of enthusiasm which fires the genius in Man has no regional preferences for its origin. To fan this streak into the flame of intellectual achievement is at once an obligation and an assurance of a dynamic future. In its longterm view of contributing to the development of Astronomy, the Union must necessarily give considerable attention to the very important role of the individual in Astronomy.

I shall dwell very briefly on one further aspect to which the Union must find the resources necessary for effective implementation. Since the dawn of human civilization, we have seen how emulation has spread the zone of achievement. The facility of travel has been the prime means of doing so. The examples witnessed and experienced first hand, the contacts made, the discussions, the arguments and the listening which update one's awareness of the problem, all apply to any form of enterprise, astronomical or otherwise. In research and in the propagation of learning, it is well-known that a brief period of contact with the great masters, whichever part of the globe they be in, has always provided the stimulus for achievement; the confidence of one's capability coupled with a spark of ambition inevitably brings on a measure of success. Our efforts within the Union, to promote such possibilities, have been of modest dimensions, for the resources we usually provide Commission 38 are meagre. This is an important area which deserves considerable attention. In the years ahead, it might indeed be an important lifeline of existence.

I send each of you my greetings and good wishes. I hope you will all have a very useful and enjoyable stay at Patras.



Participants at the Ancient Odeon; Professor Kharadze delivers the President's address;

Inaugural Ceremony and First General Assembly

Continued from page 1

Following the Rector, IAU Vice President Professor E.K. Kharadze read out an address prepared by the President Professor M. K.V. Bappu. In his speech, Professor Bappu conveyed the IAU's thanks for the invitation to hold the Assembly in Patras, in the country where many of our present ideas on man, state and society were born. (A full report of Professor Bappu's speech appears on page 4).

After these speeches of welcome and thanks, the President of the National Academy

of Athens rose to open the XVIII General Assembly. Professor Pericles Theocharis expressed his honour and pleasure at welcoming the IAU to Patras, city of his origin. Then to applause from the encircling rows of delegates, Professor Theocharis declared the General Assembly open.

Professor Theocharis described the IAU's Assembly in Greece as a pilgrimage of astronomy to the place of its birth. The Greek contribution to astronomy was most marked in three spheres. Greek astronomers have, first, improved the standards of measurement in astronomy; secondly, they have developed geometrical models of motions in the sky; and thirdly, the Greeks have specialized in the calculation of cosmic dimensions. In the first, they have followed on from the Egyptians and Babylonians, but in the other two fields the Greek astronomers have opened new chapters resulting in new advances.

Why this precision in astronomy while there was a paucity of measurements in other physical sciences? Professor Theocharis ascribed this partly to the obvious practical uses in navigation — as mentioned in the most ancient poetry — and in agriculture. But more important were irrational factors, stretching back to earlier times of astrology. The cyclical character of changes in the sky awoke the consciousness of ancient man to the certainty of the heavens as opposed to the uncertainty of our life on Earth. This religious fascination led to simple star worship, which was then rationalized into an urge to achieve great precision in studying the sky.

Through the great years of Greek philosophy and the birth of science in Greece, this concept was a disputed one: Plato spoke of the immortality of the soul as contrasted to the divinity of the stars, while the Pythagoreans refuted the concept of separating the sky and Earth. Once Aristotle accepted this unity, it became fundamental to the development of Greek science which has led eventually to our modern world of science and technology.

The colourful choirs then returned for another recital of songs, both national and international — ranging from a folk song on the sailing of sponge-fishing boats to the negro spiritual Kybaya and a Greek song mimicking a kitten chasing a mouse. The audience warmly applauded the marvellous musical performance that the choirs had given.

These songs concluded the Inaugural Ceremony, and after the official visitors had left, the meeting proceeded to the First General Assembly. Vice-President Kharadze opened the Assembly with the sad news concerning the President. Professor Bappu had undergone a major open-heart operation in Munich on 9 August. But although the operation was successful, serious complications have now occurred, and his condition now gives «cause for serious anxiety». He called on the Assembly to join in his earnest desire for Professor Bappu's full recovery. Dr. M.W. Feast then read the President's prepared address to the Assembly (in full on page 4). The Assembly continued to its programme.

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AN ASTRONOMY VIDEO DISC PROJECT

By Claire J. Carr and Everett Q. Carr
Herkimer BOCES Planetarium
Herkimer, NY 13350

In July 1980 we began work with a Pioneer VP-1000 Laser Disc and a PET computer to construct an intelligent interactive video disc learning system. The first programs were written for the MCA-Discovision disc, «What Makes It Rain». An adaptor consisting of a few IC chips and a pair of transistors made it possible for a computer program to control the VP-1000. All the functions of the remote control could be duplicated under program command. For example the program could search the disc for a specific frame; run the disc forward or backward for a specific time, halt for a specific time, return to the original or specified frame and repeat the process as often as required. The pedagogical design allowed reinforcement of correct answers in several ways. The words could appear in print on the computer display. The visual and audio of the disc could be repeated simultaneously. As one of our third graders who participated

in the test exclaimed, «Gee that's neat!»! We tested 137 third graders with our program. Their test results were compared with 105 students subjected to a chalkboard lecture on the same material. The test results were considered identical

The Intelligent disc

We teach astronomy with a planetarium and computers. They are tools. The «intelligent» video disc is another tool, one equally at home in a class as at our planetarium. The Intelligent disc is however uniquely suited to an ideal of an educator, individualized instruction — taking a student from where they are to where they want to be in their studies. In a proper program the student is fully engaged, a necessary condition for learning. The LaserDisc, the computer and the adaptor can be assembled in a quantity of

one unit for just under \$1300 at this writing. A VIC would be used with a 13 inch monitor. Our working premise in considering a laserdisc is that the same disc can be used at several levels of instruction just by altering the program. We also hope to explore the idea that an average interested teacher could learn a simple programming scheme and make their own programs. Failing that, the teachers could be induced to allow the system in the class room or in a center so that students could use the equipment and prepared computer programs. There are other hopeful ideas to be explored. For instance, the 750,000 NASA pictures of the planets could actually be reproduced on 7 laserdiscs. In fact JPL has already made such a disc. The results were excellent considering the bandwidth limitations of the standard TV receiver here in the US. I must guess, but if the high definition TV system comes into use the laserdisc can probably handle the bandwidth. It is possible even now however to place these seven discs in US high schools and colleges for less than \$160 a set. Students then can have access to the source material planetary scientists will use for the next 20 years. It is possible for a skillful high school student to draw wind vectors on Mars dune pictures and uncover secrets of Martian weather, its soil and ice transport mechanisms.

Our work with commercial discs showed it was possible to construct useful learning modules with the disc made from a film. These discs were far from ideal however. It was difficult to branch for fast and slow students. There were no provisions for a scientific approach of observation, hypothesis and experimentation. Nor were there provisions for simulation under computer control. And there were no opportunities to use the computer as a measuring device, timer or calculator. It would be neat, as our student said to measure the major and minor diameters of an IO volcano and determine its true diameter, the altitude of an elevation from the sun angle, do a crater count in the quadrants for comparison or measure the altitude of the eruption on the moon's limb. In fact there seemed countless opportunities for pertinent, engaging and useful studies. In

fact, its boggling

A bold proposal

All this prompted a bold proposal to the assembled membership of the Mid Atlantic Planetarium Society, in April 1980. We asked for \$1500, almost all the treasury contained, to undertake the work of producing a video disc. An interesting but not lengthy discussion took place during which it was determined that no other member of the society had video disc player and fewer than one in four thought that they would acquire one in the next two years. The affirmative vote to proceed was therefore a surprise. The officers were to determine how much would be spent however and that others should share the opportunity. The proposal was therefore presented to the International Planetarium Society in Mexico City, July 26th. Approval was given there for the production provided that at least 50 copies would be ordered of the disc at \$50 per copy. At this writing we have orders for 23 copies resulting from a sample mailing about the project. It seems appropriate to open up the opportunity to the international community since the disc will be a collector's item at the very least. Moreover it will be a bargain since we estimate it will contain the equivalent of \$300 to \$500 worth of equivalent slides and films. The MAPS/IPS laserdisc will contain as much planet flyby material as possible. This will include the first Moon shots thru the Voyager II mission out to Saturn. There will be a computer generated image of the Venus surface, in rotation showing both hemispheres. We will attempt some Martian 3D and a simulation of the flight down Valle Marinaris. The project is however a modest one since the only costs covered so are the direct disc production of 50 copies. The authors will supply an index and demonstration programs for the PET and VIC computers. Discs are designed for the Pioneer VP-1000 but are believed to be usable on the Magnavox, SONY MCA Discovision Associates machine and the Philips machines if they have produced any.

Discs may be ordered from the International Planetarium Society. Checks should be payable to the Society. The authors will be happy to pass the orders on to the Treasurer. Perhaps others will care to join in the endeavor.

NASA STUDIES CONCEPTS FOR ORBITING HIGH-ACCURACY ASTROMETRIC TELESCOPE

David C. Black, research scientist, Theoretical and Planetary Studies Branch,
Ames Research Center, NASA

An important and long-standing problem in astronomy is the origin of the solar system. Is the solar system but one example of a process that occurs frequently in nature, as would be indicated by currently accepted theories of star formation, or is it representative of a relatively rare process? A necessary step in answering this question, as well as in providing details of the process by which planetary systems and stars are formed, is provided by a comprehensive search for and characterization of other planetary systems. At the present time there is no unequivocal observational evidence for the existence of any planetary system other than our own.

A wide variety of techniques could be used to search for evidence of other planetary systems (see *Space Sci. Rev.* 25, 35 (1980) for a review of these techniques). Perhaps the most promising search technique, and the oldest, is that of astrometric observation. Until relatively recently the accuracy with which measurements of the relative positions of stars could be made was several milli-seconds of arc per yearly normal point (displacement of the sun due to Jupiter as viewed from a distance of 10 pc is 5×10^{-4} seconds of arc). However, it is now possible using photoelectric detectors to obtain the accuracy in a single night of observing that required a year using photographic detectors. Ultimately turbulence in the earth's atmosphere will limit the accuracy attainable for wide-field, single-aperture astrometric observations at a level of $\sim 1-3 \times 10^{-4}$ seconds of arc. While this level of performance would be a significant improvement over that currently attained, and would allow detection of Jovian-mass companions to many nearby stars, it is not adequate for a comprehensive search effort. In order to conduct such a search, it is necessary that observations be accurate to 10^{-5} seconds of arc or better and that in turn requires a space-based astrometric system.

There are currently plans for two space-based telescopes which can be used for astrometric observations. The space telescope (ST) can be used in at least two modes to conduct relative stellar positional measurements, but the estimated accuracy of ST for such measurements is only 10^{-3} seconds of arc, inadequate for a comprehensive search. The European space agency's Hipparcos Satellite, unlike the ST is specifically designed to conduct astrometric observations with emphasis on parallax measurements. However, the expected accuracy of Hipparcos for relative stellar positional measurements is also only $\geq 10^{-3}$ seconds of arc. Recognizing both the fundamental scientific importance of results from a comprehensive search effort and the inadequacy of existing or planned astrometric instruments to conduct such a search, NASA and the California

Space Institute recently sponsored a joint study on the feasibility of developing a space-based astrometric system capable of measuring relative stellar positions with an accuracy of 10^{-6} seconds of arc (the angular subtense of the bohr radius of hydrogen viewed from a distance for ten meters!) the study was conducted by the Lockheed Electro-optics Group in Palo Alto, California

The study considered two types of astrometric telescope, a classical imaging system and a white-light interferometric system. The physical characteristics of the initial concepts were 1-meter aperture 16.5-meter long imaging system, and 1-meter aperture(s) 15-meter baseline interferometric system. The latter was a pupil-plane system that would simultaneously measure the positions of four reference stars and a target star. The former was a simple parabolic reflector with measurement done at the prime focus using a CCD array behind a moving Ronchi ruling, and could simultaneously measure the positions of hundreds of stars. The ruling modulates the incoming starlight thereby encoding the information concerning relative positions of stars into phase information in the output response of a discrete region of the CCD Array. A major consideration of the study was to define a system which would cost (including spacecraft) less than \$150 million.

After several months of study it was concluded that although the interferometric system would be more sensitive than the imaging system, it was not clear that it was technically feasible and the cost estimates were well above the goal of $\$1.5 \times 10^8$. The imaging system appeared technically feasible, but was also too expensive as originally conceived. Lockheed then considered a scaled-down version of the imaging system (an F/8 rather than a F/16). The reduced system was nearly as accurate as the larger system, but was considerably less expensive. A major gain in cost savings derived from the fact that an existing spacecraft (the multimission modular spacecraft) could be used, and the reduced size permitted use of a less-expensive thermally-compensating truss structure for the telescope. The cost for the scaled-down system, including space-craft, is estimated to be $< \$150M$. The theoretical accuracy of the system for measurements of relative stellar positions is estimated to be 10^{-6} seconds of arc in 10 hours of integration.

NASA is continuing to study this promising instrument, not only because of its potential for shedding light on the issue of the origin of the solar system, but also because of the wide range of other valuable observations which could be conducted with such an accurate system. Individuals interested in more detailed information can contact Dr. David C. Black at NASA's Ames Research Center, Moffett Field, CA 94035

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NOTE FROM YOUR «PUBLISHER»

Your publisher is the Local Organizing Committee. It is our great pleasure to welcome you all to Patras and wish you a pleasant and fruitful XVIIIth General Assembly. You are the people we have been planning, predicting, thinking about for the last two years. We hope you will find the results of our efforts satisfactory, that not many omissions have been made. If, however, you meet with some shortcomings you will perhaps find them acceptable considering our limited finances and personnel. Despite such shortcomings and apart from the Assembly's strictly scientific content, we hope that this meeting of astronomers from so many countries will help to promote international understanding and collaboration, for Astronomy, the study of the Universe, is perhaps the human endeavour most likely to bring together the peoples of this Planet Earth in peace and friendship.

ABOUT ASTROCOSMOS AND ITS EDITOR:

YOUR ASTROCOSMOS AND PRESS OFFICE STAFF

In spite of the above the Editor still had some doubts that he was fitted for the post. So we craftily gathered round him a talented staff of young people to do all the work so brilliantly that afterwards he can take much of the credit for their success.

Our reporters Heather Couper and Nigel Henbest form the well-known writing team known to their friends as Hencoup Enterprises. Nigel is a successful author, having written a number of books on astronomical topics. He is also astronomy feature writer for the British science publication *NEW SCIENTIST* and a consultant for the Royal Greenwich Observatory. Heather is a lecturer at the Greenwich Planetarium, National Maritime Museum, London, U.K. She has also published a number of books, lectures extensively in astronomy and is particularly interested in astronomical education, being currently on the Education Committee of the Royal Astronomical Society, U.K. Among the many talents of Hencoup Enterprises is the ability to make palatable wine out of the most unlikely ingredients. Heaven alone knows what alcoholic inspiration they will find on this visit to Greece where every village seems to have its own local vintage. The idea of Retsina Chateau Hencoup is almost too much to contemplate.

Peter Thomas Pappas, born in Milwaukee, Wisconsin, spent most of his professional life in the experimental flight centre of Boeing Airplane Industry in Seattle Washington, U.S.A. After returning to Greece he has written for a number of years a column of interpretative journalism for a Greek daily newspaper on world affairs. As the only person on ASTROCOSMOS staff with direct newspaper experience we can blame him if he allows us to create a journalistic disaster.

Tonia Margaret Pappas is currently attending business administration classes in the American College in Athens. She finds her participation in ASTROCOSMOS and the Press Office of the IAU General Assembly «a most memorable experience». We find her knowledge of English, Greek, French and Spanish decidedly useful.

Aspasia Koutsouveli is the young lady who manages to transform quickly and efficiently the editor's highly individualistic handwriting (unkind people have been known to call it illegible) into neat typescript for the printer as well as providing coffee to stimulate our talents.

Kosta Papadakis' main concern during the

TOR: Considering ASTROCOSMOS as the most important of our publications we invited Archie to be its Editor. Archie E. Roy is Professor of Astronomy at the University of Glasgow, Scotland. His teaching and research has been in Celestial Mechanics and Mathematical Biophysics. He has written astronomical textbooks and has annoyed many of his scientific colleagues by taking parapsychology seriously (I have been one of the annoyed colleagues myself since I spent eight years in Glasgow without being visited by a single ghost). But what fitted Archie best for the job of Editor of ASTROCOSMOS was, we thought, his being an author of fiction too (six of his novels will be in paperback soon). Also, his connections with Greece and knowledge of the place (he has visited the Country seven times and has made many Greek friends both here and in Glasgow) were the best guarantees for that «Greek flavour» we wanted ASTROCOSMOS to have. When he

accepted the job we knew we only had to secure the necessary facilities and leave the rest to him. This was done to the best of the L.O.C.'s means and by last week all was set and ready for action; office, personnel (reporters, translators, typist, couriers), telephones, typewriters, etc. We hope you will like ASTROCOSMOS. If you do it will be due to Archie.

Most of the standard material to appear in this newspaper (general articles, cartoons, etc.) was in press before the Assembly began. The unfailing patience and in our opinion superb technical competence of our printers Mr and Mrs Constantinopoulos have already been in evidence and we thank them gratefully. They also helped in producing our other publications — final programme, list of participants, etc. — which we hope you will find up to standard.

Vassilis Markellos
L.O.C.



Left to right: Olga, Heather, Nigel, Aspasia, Vassili, Archie, Peter, Tonia, Karen (liaison to the IAU Secretariat), Kosta.

Assembly will be to safeguard the non-Greeks in our staff from... losing themselves in the town of Patras or between the ancient odeon, the wine festival and the printer's office. Also, to help our publisher Vassili Markellos provide all the facilities to them. For example, he is the one who brought in that huge coffee-maker Aspasia uses about six times a day for the benefit of our Editor and staff. Normally Kosta is a research student at the University of Patras working on the three-body problem.

Ian D.B. Roy is the young man, son number two of the Editor, who has provided all the cartoons you will find in ASTROCOSMOS as well as the layouts for the astronomical crosswords. Sixteen years of age, he hopes to make a career in commercial art. A large fee for his services to ASTROCOSMOS was negotiated on his behalf by his young

brother David, aged 14, who as agent hopes to take the customary ten percent (Note by the publisher: the fee in question will be paid BY THE EDITOR when he returns to SCOTLAND!).

Olga Filippa works mainly in the Press Office. She is an undergraduate student of Engineering at the University of Patras but thinks that «astronomy is probably more exciting».

Last but not least, Vassili Goudas is our part-time courier, part-time photographer and general troubleshooter. He plans to be an undergraduate student at the University of Patras next autumn when he hopes to meet «more students and fewer Professors» than in the IAU General Assembly (just out of high school, he is not convinced yet that Professors are eternal students!).

TODAY'S EVENTS: LES EVENEMENTS DU JOUR:

JOINT DISCUSSION I:

«Solar Luminosity Variations»
(IAU Commissions 10, 12, 27, 35)

09.30-11.00, 11.30-13.00, 15.30-18.00, Room AB, 18th August

SOC	Commission
* J.A. Eddy (USA), Chairman	10
P.V. Foukal (USA)	35
D.O. Gough (UK)	10
G.A. Newkirk (USA)	27
G.W. Lockwood (USA)	
* Editor	

Programme

H.S. Hudson: «Observations of Short-Term Solar Irradiance Variations from Spacecraft».
P.V. Foukal: «Interpretation of Short-Term Solar Irradiance Variations».
J.A. Eddy: «Historical Reconstruction of Solar Constant Variations».
G. Frohlich: «Radiometry of Solar Irradiance Variations over Long Time Scales».
J. Christensen-Dalsgaard: Theory of Evolutionary Changes in Solar Luminosity».
W.C. Livingston: «Indirect Diagnostics of Solar Irradiance Changes».
G.W. Livingston: «Indirect Diagnostics of Solar Irradiance Changes».
G.W. Lockwood: «Luminosity Variations in Late-Type Stars».

JOINT DISCUSSION VI:

«Active Galactic Nuclei»
(IAU Commissions 28, 40, 48)

09.00-10.30, 11.00-12.30, 15.15-17.45, Room AA, 18th August

SOC	Commission(s)
* F. Pacini (Italy), Chairman	48
M.J. Rees (UK)	48
M. Kafatos (USA)	28
K.I. Kellermann (USA)	28, 40
E.Y. Khachikian (USSR)	28
* Editor	

Programme (Provisional):

Topics: The Evolutionary Stage of Galaxies with Active Nuclei. Physical Conditions inferred from observations in the inner regions of active galactic nuclei.

INVITED DISCOURSE

In the Ancient Odeon of Patras: at 20.30 h.

«Astronomy in Ancient Greece», by M.A. Hoskin.

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL: 20.00-24.00

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hardcover 0-85274-465-X £20.00
flexicover 0-85274-466-8 £9.95

A E Roy and D Clarke These two textbooks, now in updated editions, continue to meet the need for a comprehensive and systematic treatment of astronomy, including the physical and mathematical groundwork so often omitted from other textbooks. Reviews of the first editions. The two volumes are very successful in giving a clear exposition and in driving points home. *Nature* A well-written pair of attractively illustrated books, and with their practical approach they should be welcomed both by teachers of first-year university or polytechnic classes and by serious amateurs. *The Observatory*

OPTICS:

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XVIIIth GENERAL ASSEMBLY



ASTROKOSMOS



August 19
Number 3



Patras: Greece 1982

Le 19 Août
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INVITED DISCOURSE AT THE ANCIENT ODEON OF PATRAS

«Astronomy In Ancient Greece»

In his discourse the speaker drew attention to the mistake of certain classical scholars who thought that Greek culture ended with the deaths of Alexander and Aristotle. This was not so. Long after their deaths the great Greek thinkers such as Ptolemy, Hipparchus, Apollonius and Aristarchus were active. He pointed out that it was a mistake also to try to interpret their thoughts according to today's views and he drew attention to the fact that almost no original material has come down to us. A good synthesis tends to destroy previous material and so what we have is for the most part derived material and not original documents.

The speaker remarked how recently our western scientific methods have been created. Prior to Galileo and Kepler we have nothing of the body of scientific societies that existed in the seventeenth century nor do we have any wide acceptance of what a scientist is or how he works.

In discussing Copernicus's work *De Revolutionibus*... the speaker pointed out how essentially Greek it was in plan and content, being obviously modelled on Ptolemy's *Almagest*. He described in detail how brilliant the Ancient Greeks were at designing models of the cosmos, based for the most part on the acceptance of a spherical Earth at the centre. This series of models culminated in the tour de force of Eudoxus where he constructed an essentially geometric model of the universe involving spheres interlocked one with another. This model, though brilliant, was unfortunately on the wrong track. Professor Hoskin also described the contrasting brilliant pragmatic approach of those other watchers of the skies, the Babylonians, in solving their astronomical problems.

In a passage in which he considered the work of Hipparchus, possibly one of the most out-standingly capable Greek astronomers and mathematicians of ancient times, the

speaker went on to describe the *Almagest* of Ptolemy, an achievement that became the definitive work in astronomy for fourteen hundred years. Copernicus saw in the *Almagest* an extraordinary mathematical achievement that was capable of revision to an acceptable standard of accuracy but was defective in certain ways.

The speaker concluded by saying that *De Revolutionibus* is clearly in the tradition of the *Almagest*. It offers a heliocentric cosmology and even some hints on the physics of the Earth's motion. It was, he said, about as far as Greek astronomy could go. Within two generations, the obsessional search for accuracy of Tycho Brahe, the telescope of Galileo, the dynamical laws of Kepler arrived to change the scene. Greek astronomy, culminating in Ptolemy and Copernicus, was not a sufficient condition for the development of modern science, but perhaps it was a necessary one.

IAU delegates once again packed the Ancient Odeon in Patras last night for the first of the four specially invited discourses: Professor Michael Hoskin speaking on astronomy in ancient Greece.

Introducing Professor Hoskin, the President of IAU Commission 41, Vice-President Professor Kharadze spoke of the history of astronomy and science. And he added a personal note that as a citizen of the province of Georgia, he cherished a long-abiding shared culture with the Greek people, for his homeland was the eventual destination of the Argonauts.

Beginning his discourse, Professor Hoskin noted that this was almost certainly the first time that such a lecture had been held in the Ancient Odeon. In the presence of the planets Mars, Jupiter and Saturn themselves, he entertainingly described the story of planetary motions, making Copernicus «for the purposes of tonight, an honorary Greek citizen», and «proving» that the Earth does not rotate by dropping —and catching— his twentieth-century clock.

A sincere regret

The members of the Transportation Subcommittee have received and accepted complaints about the inconvenience and the upset for which we accept responsibility.

Please believe that we have done our best concerning your transportation to the University, hotels and Odeon. We apologize sincerely and we will be grateful to you if you can suggest any changes that can possibly be done. We truly believe that your life will be easier from now on. Thank you for your understanding and have a good time in our country.

S. Kaplanis



M.A. Hoskin delivering his discourse on «Astronomy In Ancient Greece»

NEW PROBLEMS FOR CELESTIAL MECHANICS

Y. Kozai (Tokyo Astronomical Observatory)

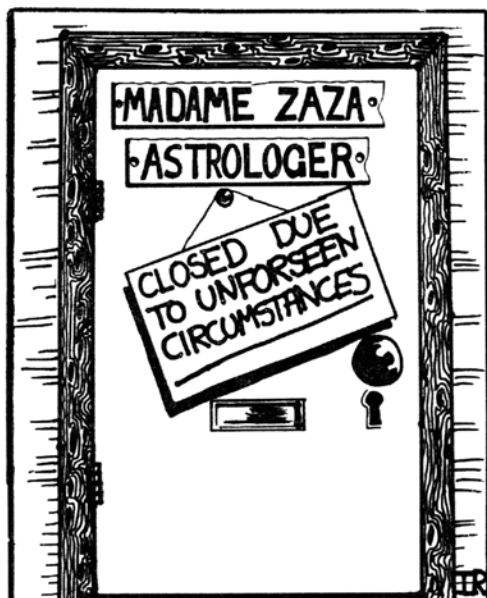
Everybody studying celestial mechanics and interested in its findings is fascinated by harmonic configurations of orbits of celestial objects in the solar system, by means of which major bodies including planets, asteroids and satellites can avoid close approaches with each other. In this sense the solar system is now in an equilibrium condition. One problem is how such a condition has been realized. In fact we know that there are many so-called commensurable relations not only among orbital motions but also between orbital and rotational ones in the solar system. Many papers have now been published trying to find mechanisms responsible for realizing such configurations by investigating qualitative properties of solutions of dynamical systems and by finding periodic solutions and studying their stabilities. However, most of the dynamical systems which have been investigated by this way are those of conservative forces.

Recent Voyager spacecraft observations have revealed several other commensurable relations hitherto unknown to us and such new findings have stimulated many people to study why such systems exist. A number of investigators are convinced now that the orbital and rotational configurations with commensurable relations have been brought

about by non-conservative forces due to tidal dissipations in planets and satellites. Several authors discuss that tidal dissipations are responsible for volcanic activities in Io, one of the Galilean satellites and also for some of the Saturnian satellites. It is very interesting to know that whereas in former days celestial bodies were treated as point masses for most of the cases in celestial mechanics without knowing any physical conditions about them, now celestial mechanics can tell us how the interiors of some of the satellites have been heated.

Nevertheless point-mass dynamical systems with conservative forces are still very stimulating targets in celestial mechanics. In the past five years or so several new theories for planetary and lunar motions have been published. Most of them have been developed by utilizing computers and by correcting errors which existed in older theories and by including many more terms of higher degrees and orders in the formulae expressing their motions. In this way the position prediction accuracies have been improved very much.

During this General Assembly several experts will be invited to give us review talks at Commission 7 meetings on some of these very interesting subjects.



35 ans d'activité de la Commission 38

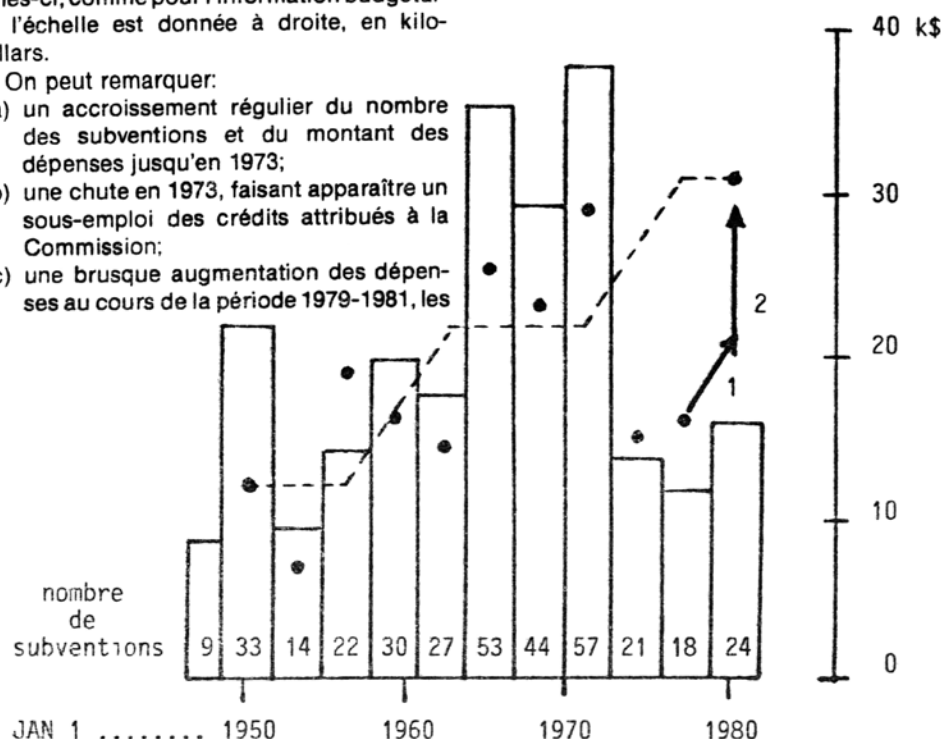
J. Delhaye, Observatoire de Paris, France

Le programme d'échanges d'astronomes géré par la Commission 38 de l'IAU peut sembler modeste si l'on mesure son importance par le montant des crédits qui lui sont affectés dans le budget de l'Union: 58.000 francs suisses pour la période 1979-1981. Il constitue cependant une contribution significative de l'IAU aux échanges entre observatoires, bien souvent au bénéfice de jeunes astronomes.

Depuis l'origine du programme, en 1947, 352 subventions ont été distribuées. La figure ci-contre en montre la répartition chronologique. La courbe en pointillé montre l'évolution du budget triennal de la Commission 38; les points représentent le montant total des «dépenses» par période de trois ans; pour celles-ci, comme pour l'information budgétaire, l'échelle est donnée à droite, en kilodollars.

On peut remarquer:

- un accroissement régulier du nombre des subventions et du montant des dépenses jusqu'en 1973;
- une chute en 1973, faisant apparaître un sous-emploi des crédits attribués à la Commission;
- une brusque augmentation des dépenses au cours de la période 1979-1981, les



Stellar populations joint discussion

On Thursday, August 19th, in hall CA (the Auditorium), there will be a joint discussion about evolution in old stellar populations in galaxies. Nine commissions support the meeting, reflecting the wide interest of the subject. The commissions of photometry, spectral classification and stellar spectroscopy use new techniques to get much more reliable information about brightnesses, colours, temperatures and element abundances of the stars. The detection of Lithium in old stars and the possibility of globular clusters being survivors from early epochs of the universe hold special interest for cosmologists. Naturally the day's programme is of profound interest to the commissions for galaxies, for galactic structure and for stellar constitution. Also, much of the evolution of stars is reflected in the enrichment of the interstellar matter.

While the topic for Thursday's joint discussion is of wide interest, we can also expect that it will illuminate some specific questions where a lot of research activity is currently taking place. One of these is the abundance scale of the globular clusters. While several results indicate that some globular clusters have metallicity values not much lower than those of stars in galactic disks, there are new spectral analyses that indicate a metal abundance lower by a factor 10. The abundance question as well as new models for stellar evolution are important prerequisites for determination of cluster ages. More reliable ages may in turn give the time scale for the evolution of the universe.

Another subject that will be discussed is the population characteristics of galactic nuclei. Do spectra of the nuclei of spiral galaxies tell us something about their ages or

dépenses au cours de cette période étant cette fois égales aux prévisions budgétaires

Cette augmentation n'est pas anormale, ainsi que j'ai essayé de le montrer sur la figure: la flèche 1 correspond à l'augmentation des tarifs aériens entre 1977 et 1981 en supposant qu'on n'ait attribué que 18 subventions en 1979-1981; la flèche 2 correspond à l'accroissement du nombre des subventions d'une période à l'autre (de 18 à 24).

Si la situation économique ne se stabilise pas, des mesures seront évidemment à prendre pour que la Commission 38 puisse poursuivre son activité

are differences between such spectra due to abundance differences?

Thursday's final session will be about galactic disks and their evolution. A number of recent abundance determinations concern interstellar matter as well as stars in the disks. Several theoreticians have used observations to study models for the evolution of these disks.

The various topics of the day's discussion will be presented by ten invited specialists who will review their own achievements as well as those of their colleagues. There will also be three open discussions in which it is hoped that some of the controversial questions will be aired.

Gösta Lynga, Institutionen för Astronomi, Lunds Universitet

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Editorial

NO APOLOGY

I am appalled by the number of astronomers who seem to spend their time apologising for the fact that they have chosen to be astronomers. Of course they are sometimes driven to it by those people who point out that if some selective disease swept away every doctor of medicine or every farmer, the world would immediately notice and be in danger whereas if the disease killed every astronomer it might be months before the world at large noticed their absence! This attitude — I have met it myself — is basically understandable and to some extent true. But consider the following...

Suppose that the human race had begun on a planet like Venus where the sky is never seen. Even if civilisation had developed in the way that it did, in the scientific and technological sense, the human race up until the advent of radio, rockets and highflying aircraft would have had no evidence that the Earth was a tiny part of the universe. The discovery of the universe at large would have had a traumatic effect on Man.

But in fact a little thought is sufficient to show that our scientific and technological civilisation would not have developed in the way that it has if the heavens had been absent from Man's view.

The discoveries of astronomers from the earliest ages have influenced and shaped

Man's deepest thoughts concerning his place in nature. Astronomy has played its part not only in pragmatic subjects such as timekeeping, navigation, dynamics and pure science but has influenced in fundamental ways religious concepts, philosophical and cosmological models. The development of Man's education as a thinking creature has been his developing relationship with the universe. Today, more than ever before, that relationship is being enriched by space age astronomy with its unprecedented and powerful technological aids.

We need not only food for the body but also nourishment for the mind. As astronomers we are in a singularly privileged position to provide that mental nourishment without which our race cannot come to maturity and surmount its adolescent and destructive misconceptions about itself and its planet. Think again about that hypothetical human race that began on a planet like Venus where the universe stops at the cloud-base and try to imagine its world outlook. And stop apologising about choosing to be an astronomer.

In any case, if there hadn't been a sky there would have been no International Astronomical Union and we would not have gathered here in international companionship in Greece where millennia ago our science began because Man saw the sky.

ASTROCOSMOS

Back issues of this potential collector's item (!) may be obtained at the press office, second floor, Building T as long as stocks last.

Karamouzis Ant. (optician)

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Our catering service is also operating the Wine Festival of the International Astronomical Union.

TODAY'S EVENTS:

LES EVENEMENTS DU JOUR: JOINT DISCUSSION II:

«Evolution in Old Stellar Populations in Galaxies»

(IAU Commissions 25, 28, 29, 33, 34, 35, 37, 45, 47)

08.30-10.30, 11.00-12.30, 15.00-17.30, Room CA, 19th August)

SOC	Commission(s)
* G. Lynga (Sweden), Chairman	37
J. Audouze (France)	35, 47
R. Bell (USA)	45
G. Cayrel de Strobel (France)	29
R. Fenkart (Switzerland)	33
* J. Hesser (Canada)	37
I. Iben (USA)	35, 37
M. McCarthy (Vatican)	25
M. Peimbert (Mexico)	28
S. van den Bergh (Canada)	37
B. Westerlund (Sweden)	28

* Editors
Programme
G. Lynga: Introduction: «The Concept of Old Stellar Populations».

Session I — Chairman M. McCarthy — 08.30-10.30 (Populations in the Halos of Galaxies).
B. Gustafsson: «Abundance Determinations in Globular Clusters — Difficulties and possibilities».
R.D. Cannon: «Ages of Galactic and Extragalactic Clusters of various Abundances».
F. Spite: «Chemical Composition of Halo Field Stars and Chemical Evolution of the Halo».
R.P. Kraft: «Do Halo Field Stars and Globular Clusters belong to the same population?».

Discussion
Session II — Chairman J. Graham — 11.00-12.30 (Populations in the Nuclei of Galaxies).
R.W. O'Connell: «Population Types in Nuclei of Spiral Galaxies».
D. Crampton: «Alternative Views on Population Types in Nuclei of Spiral Galaxies».
S. Faber: «Nuclei in Elliptical Galaxies».

Discussion
Session III — Chairman B.E. Westerlund — 15.00-17.15 (Populations in the Disks of Galaxies).
J. Mould: «Star-formation history of Dwarf Galaxies».
S. van den Bergh: «Stellar Population as a function of Hubble type».
R. Larson: «History of Star Formation in Disks».

Discussion
SUMMARY — K.C. Freeman

In Building A, IAU Secretariat:
17.30-18.30: Meeting of Finance Subcommittee.

In the Ancient Odeon of Patras:

20.30-22.00: Main Musical Event.

At EOT Swimming Resort, Aya,

Patras:
WINE FESTIVAL 20.00-24.00

GASTRONOMY CORNER



Στην υγειά σας!

The Greek Way

«Wine, oh Menelaus, was made by the gods...» wrote an epic greek poet. And, indeed, the art of wine-making is as old and legendary as Greek gods are.

Dionysus, the god, brought all sorts of celebrations which took the form of rowdy processions, accompanied by music and dancing and usually ending in an orgy of wine-drinking.

Greek Drama originates from these festivities.

The «Symposia» held by ancient Greeks were social gatherings where food and wine was consumed in large quantities. These poets and musicians entertained the «symposites» and great philosophers discussed and debated their immortal ideas.

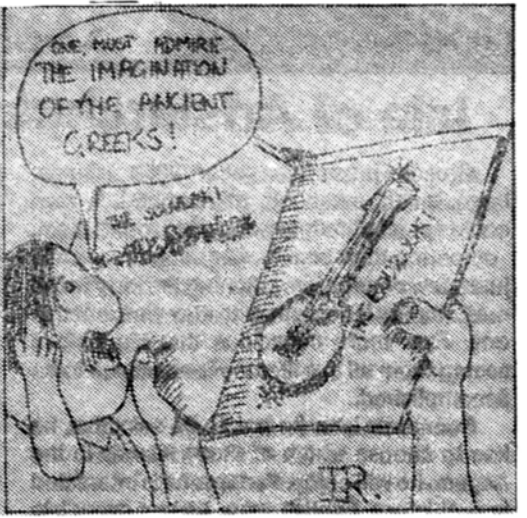
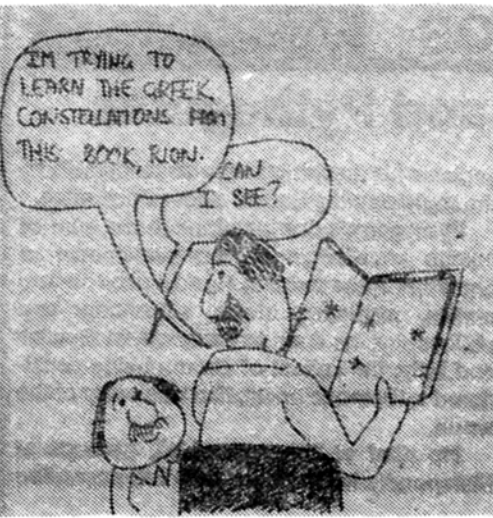
Ancient Greeks used to drink wine diluted with water, and for this purpose special ceramic pots called craters (κρατήρες) were used.

Ancient Greek wines were generally sweet. To preserve and improve them, several substances were added which seem strange by modern standards: potter's earth, powdered marble, salt and even sea water. Aromatic wines were popular. Many writers believe that the finest vintages were amongst the best wines ever produced.

In modern Greece the wine industry has grown to become a significant section of the economy. Today Greek wines travel all over the world. There is a large variety of wines to satisfy every taste.

First of all, you can drink retsina accompanied by a mezé in the picturesque tavernas.

Retsina enthusiasts regard Attica as the finest source of this wine. Properly made it should be a decent light, dry white or pale red wine, to which one percent resin is added during fermentation and later removed. This originated in antiquity, as a means of preserving it, but today's wines should be drunk young. «Red» retsina or «Kokkinelli» may surprise wine snobs even more than the white variety. I have heard that it is a popular



wine in some of the livelier Rive Gauche bistros in Paris. Andrew Cambas' firm produces one of the best retsinas.

For those who reject retsina here is a selection of wines to put to the test.

Outside Patras in the mountain foothills some kilometres from the city is the Achaia Clauss winery. The vineyards, which now cover 150 acres, were bought and the house founded in 1861 by a Bavarian, Gustav Clauss. He was the innovator of the luscious dessert wine, **Mavrodaphne**, one of their specialties today.

Like many Victorians, Clauss admired the Gothic, and his turreted «medieval» castle is a splendid sight, now housing some of the winery's workers. The view down to the distant city and sea is breathtaking, and it is not surprising that 50.000 people from all over the world visit the winery annually. Many of them have heard of Achaia Clauss' best-selling **Demestica** but a more subtle wine is the silky golden dry white **Santa Helena**.

Robola, has always been recognized by Greek connoisseurs as one of the finest white wines. Recently, it has become one of the most fashionable wines in smarter Athenian restaurants. Snob appeal, too often, is not commensurate with a wine's quality; happily, this is an exception.

Robola comes from Cephalonia, largest of the Ionian islands. It is a refreshing place to visit even in the great heat of high summer for its marvellous, unspoiled beaches, its green hills and forests.

From the vines of the slopes of Mount Aenos, Cephalonia's highest mountain range, come the **Robola** grapes. «They are unique in Greece, may be only grown here, for the wine is one of the 25 which our law has classified with an appellation of origin». So John Calligas, one of the winery's directors, explains to the winery's visitors.

They make it in limited amounts, only from their own grapes. **Robola** is equally good as an aperitif or to serve with fish, chicken or veal. It is a pale greeny-gold wine exquisitely light and very dry. It goes through several careful filtering processes to ensure its quality, is stored in specially cooled tanks and is ready to bottle after 3 months. Calligas make a notable dry rosé and have recently marketed **Monte Nero**. This is a deep crimson dry, fruity wine which matures gracefully. They also make good sparkling wine unusually delicate for that part of the world and their best is **Champ Heureux** which is extremely dry and light.

Another is **Castel Daniells**, a fragrant, rather

grapey, dry red, whose legendary first producer was a certain Lady Daniells, a rich Patras widow in the ninth century. According to local history, she took a soldier lover, Basil of Macedonia, and «trained him in noble manners, befitting his rank» (and which it appears he was somewhat lacking!).

Basil was a good pupil; he later became Emperor of all Byzantium. His mistress's coronation presents to him, a chronicle records, included 500 slaves, one hundred maidens skilled in embroidery, one hundred silken sheets of royal purple, and «princely quantities of Daniells wine».

For some years, Achaia Clauss have been vinifying a limited quantity of red wine for a special reserve, from **Mavroutis**, a grape grown in the mountains.

The result is **Chateau Clauss**. The 1971 is deep garnet, dry and smooth.

Another famous Greek wine firm is Andrew Cambas. He was its founder in 1882, buying vineyards from two monasteries at Kautra, in Attica, now about half an hour's drive from the centre of Athens.

Apart from the **retsina Mesoghia**, one of their most notable products is an extraordinary ten-years-old wine, **Cava Cambas**. Clear gold in colour, it is very lively, smooth and flowery.

Much younger best-seller is **Hymettus**, which comes from the slopes of the neighbouring mountain, also renowned for its honey. Pale greeny gold, dry and very drinkable, with a hint of the famous honey, it achieved the distinction of being chosen as «house wine» by the Grande Bretagne, the oldest luxury hotel in Athens. It is now served by the glass in the very dignified bar there as an aperitif.

By the bottle, it also appears on an extensive wine list in their lively and informal restaurant, the «GB Corner».

Another wine treasure is **Grande Reserve Boutari**, a fine well-balanced and mature dry red from Macedonia, made by a century-old family firm in Salonica. Salonica is a fascinating city, with its elegant waterfront, wealth of Byzantine churches, and colourful market, and with a very good choice of restaurants and tavernas.

The vineyard region where the Boutari firm has its splendid wineries is in Naoussa, about 70 miles west of Salonica on the lower slopes of the Mount Vermion range. In winter, Vermion attracts skiers and many visitors come to the archaeological site at Vergina to see the spectacular treasures exhibited there.

Naoussa 1971, a deep ruby red, dry and satiny is a most satisfying wine and Mr. Boutari's favourite.

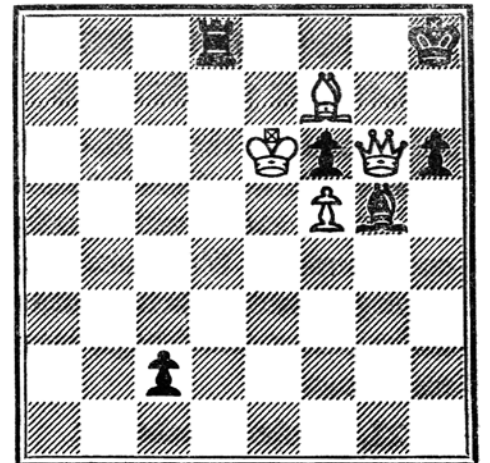
Rotonda is an agreeable very quaffable light red wine. «Easy for lunchtime and should appeal to the Coca-Cola generation», says Mr. Boutari, sipping his Naoussa. Finally the author strongly recommends **Nemea Olivapi** (Parparoussis), a fruity dry red table wine. For those who may wish to purchase their own wine to taste privately or to take back home, we give below a price list for most of the wines mentioned above. These are supermarket prices. You may expect to pay more at smaller shops.

Robola 185 Drh and 235 Drh.
Mesoghia Retsina Cambas 73 Drh.
Monte Nero 205 Drh.
Demestica 86 Drh and 72 Drh.
Castel Daniells 122 Drh.
Cava Cambas (10 years old) 250 Drh.
Grande Reserve Boutari 234 Drh.
Naoussa 144 Drh.
Rotonda 68 Drh.
Chateau Clauss 254 Drh.
Santa Helena 122 Drh.
Wine of Moreas (Achaia Clauss) 32 Drh.
Calligas Rosé 205 Drh.
Nemea Olivapi 155 Drh.

We recommend participants of the IAU General Assembly to avoid tasting all these wines in any single day, although we see no reason why their guests should not do so!

Helen Markellos

Chess Position 3



White to play and win

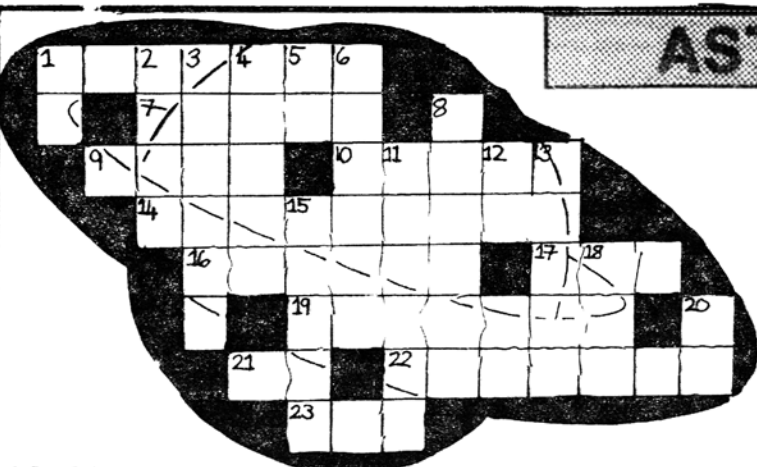
Solution to Chess Position 2:

1. R-Kt6, Q X R 2. Q X Q, Kt X Q 3. B-B6 and black mates in one.

V.V.M.

ASTROCROSSWORD

12. Add a 'T' to make it explosive.
13. Charge.
15. Desire to excess.
18. A mixed up International Astronomical Union.
20. With Dec. you can fix its position.

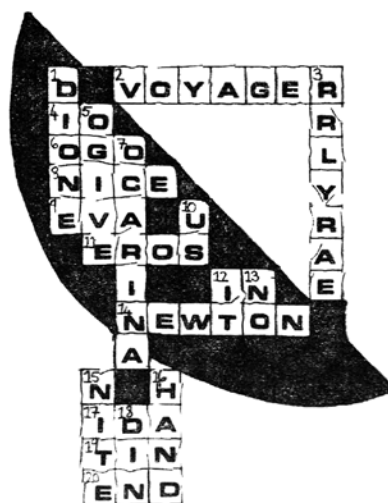


ACROSS

- 1 a Scorpii
7. Could not be better.
9. An asteroid that conquers all.
- 10 To finish before noon.
- 14 Take out the centre.
16. Add an 'S' and you can make progress.
17. Purchase
19. I've forgotten the clue here
- 21 Shorter than indigo, longer than gamma.
- 22 Collection of heavenly bodies.
- 23 Add an 'H' and it describes what it does

DOWN

1. A parsec contains 206265 of them.
1. A parsec contains 206265 of them.
2. That which man kills and ends up by killing him.
3. Small but handsome asteroid.
- 4 Replay
- 5 A 'T' before or after relates it to gastronomy
- 6 Skilled skiers excel at it.
- 8 Traditional goal of visiting extra-terrestrial
- 11 He's tight with money but that one's even more miserly



Rodopoulos Michalis

Cavo d'oro

Cafeteria - Spaggeteria

Iroon Polytechniou, Glyfada

Restaurant «AKTI»

Charcoal broiled fish is our speciality. We are located a short distance from town by the sea at Vrahnaika, in breezy and cool surroundings. Other Greek dishes available. Open to serve you at: 12.00-16.30 and 19.00-24.00.

SAMOS

Isle of Aristarchus and Pythagoras

Greece possesses over 2000 islands, large, small, inhabited, uninhabited. A man could spend a lifetime wandering round them, comparing their beauty, lingering on one isle just a few days before catching the ferry to the next, finding it necessary to stay weeks at this one. Ever more conscious that his task of seeing them all in a lifetime is one never to be accomplished.

Sooner or later he has to be selective, he has to choose which of those islands in the Aegean he will enjoy. Perhaps he is interested in prehistory. Foolish man. Almost every isle has its legends to be pursued and collected, again a never-ending task. Or, less intellectually, he wishes to compare the various wines produced almost village by village, from the ultra-sweet syrupy wine of Samos to the characteristic retzina of Santorini created from the grapes of vines grown in the volcanic soil of that turbulent island.

One isle that is surely worthy of an extended stay is Samos, famed not only for its lush greenery, its ancient ruins, modern picturesque villages and towns but also for its two world-famous citizens, Aristarchus and Pythagoras.

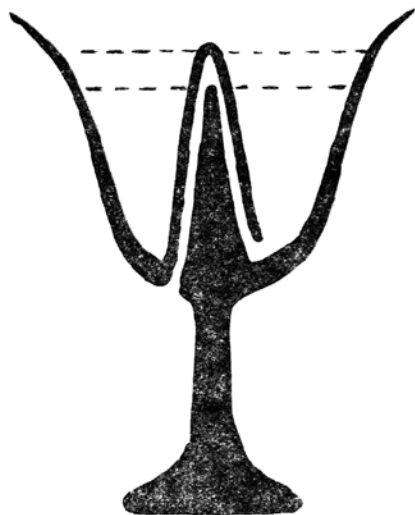
With that intellectual courage and originality characteristic of the Greek mind in its ability to detach itself from common-sense conclusions, Aristarchus accepted the Earth as a planet rotating on its axis and revolving about the Sun, a heliocentric model that not unnaturally was unpopular with most of his contemporaries. Judging by the bloody, tyrannical and egotistical history of the island with rulers such as Amphikrates, Polykrates and Syllon, the idea that the stage on which they acted was a minor part of the universe was too bitter a pill for them to swallow. It still is, of course, 2500 years after Aristarchus.

Pythagoras was born in Samos around the year 580 BC. He became a student in Lesbos and later was a student of Thales and of Anaxandrides of Miletus. He settled in Samos but was forced ultimately to quit the island

because his teachings were unacceptable to the regime ruling Samos under Polykrates.

Pythagoras's contributions to the sum of human knowledge are too well-known to enumerate here in detail. He advanced mathematics, medicine, music, astronomy and philosophy; he founded schools in Greece and Italy, the school of Croton being considered by some to be the first university of the world.

He died at the age of 80, perhaps at Metapontia in Southern Italy but according



The Pythagorean Cup, Samos

to other authorities at Croton, killed during the attack on his school by his opponents.

The island of Samos is well worth an extended visit. And as you walk there amid sunshine and scenic beauty, think about the island's two great sons who were also there so long ago and amid those same scenes formulated their great thoughts on Man and his nature.

The Pythagorean Cup

A souvenir sold on the Isle of Samos, home of Pythagoras, the great mathematician, philosopher and founder of a religious political movement, is a cup designed by him to circumvent greed. When the cup is filled to a reasonable level with wine, nothing happens. But if the greedy - or ultra - thirsty - insist that it is topped up beyond that level, the wine begins to flow from the cup and continues to do so until the cup is empty. Very disconcerting.

The cup seems to be a normal one except for a seemingly solid pillar in the middle. The pillar contains a channel with an entrance within the cup and exit at the bottom of the cup bowl. When wine is added so that the level rises beyond the channel top, a siphon is formed which operates until the cup is empty.

THE CONTRIBUTION OF ASTRONOMY TO CONTINUING FORMULATION OF A COSMIC PHILOSOPHY

(Welcome to the members of the XVIII General Assembly of the IAU)

By **CHRISTOS GOUDIS, Professor of Astronomy at St. Andrew's University of Patras**

*Ephemeral is the envelope of the Earth...
Eternal is the golden-blue brilliance of the Galaxy
Ephemeral is the Nothing
and eternal the world, the small, the Great!*

TO AXION ESTI, Odysseas Elytis

Astronomy is perhaps the only branch of science which has always an element of modernism, from the appearance of the human civilization till the present time. It is no exaggeration to say that man's interest in the stars is intimately associated with his own nature as a differentiated intelligent being who «looks above» (uevreç ány). This peculiar tendency of his (which is also the exact meaning of the Greek word «anthropos», man: the one who looks above) is perhaps the most determining property of his whole evolutionary path. It is the property that forces him to look at himself from a broader point of view, with respect to a point of reference in time and space which always changes. The continuous reevaluation of man's place in the cosmos, which comes as the outcome of his astronomical investigations, has played an influential role in shaping his broader philosophy.

The man of the era of the Ptolemaic Universe, of a small geocentric World, is the man-conqueror, the man filled up with his magnificence, the egocentric overlord of the Earth. The man of the Copernican era begins to crumble; the Earth is no more the centre of the Universe but a body revolving around something more important (perhaps more alive), the Sun. At this point we should stress that the broader acceptance of revolutionary concepts which change the established way of thinking is the result of a certain collective maturity of the human society, which in order to be reached requires long periods of time. Otherwise we could not explain how the ideas of the Greek Aristarchos of Samos, who lived four hundred years before Ptolemy, were literally ignored by his contemporaries, to be eventually accepted after eighteen hundred years with their reappearance through Copernicus (who himself knew and admired the Aristarchian System).

The man of the twentieth century has literally been shrunk to his cosmically insignificant dimensions. The Sun is no more than a common type of star among an inconceivable number of stars of our Galaxy, a star within a hundred or so billions of stars. And the Galaxy itself is no more than a cosmic grain within the hundred or so billion galaxies of the Universe. In such a vast space the

concept of the meaning of man starts to become complicated. The dethroned contemporary man, deprived of his mythologies, is forced to look at himself under the new cosmic data and wonder about the meaning of his existence. The World around him has changed dramatically; from the first cosmic neighborhood of Ptolemy and the small static, provincial universe of Copernicus to the vast, impersonal Universe of our days. The well-constructed, monotonous mechanical clock has vacated its place to the evolving, organic Universe, the Universe which once was born and therefore must sometime die.

The stars of the Galaxy, huge masses of hydrogen, consume themselves, transforming their hydrogen to helium and the helium to heavier elements. Many stars die a violent death, throwing away in a powerful explosion a part of their gaseous mass and leaving behind exotic stellar corpses: white dwarfs, neutron stars, black holes. From the gaseous remnants of the explosion, enriched with heavier elements, new, more complicated stars are born. And around them new planets. And on them? Life? Intelligence? For what? And the galaxies? These recede from each other, the residue from an old cosmic explosion, the explosion of the archetypal, primeval atom, the breaking of the modern Orphic egg. Contemporary Mythology? Perhaps. But the facts are here to stay.

Contemplation of such a discovery may help the man not only to create a modern World-view (Weltanschauung) but also to transcend his own Self through the formulation of a new way of life. Conscious tolerance towards our fellow-man, who travels for a while on this world hardly comprehending his purpose and destination, may be the message conveyed through the findings of contemporary Astronomy.

With such thoughts in mind we warmly welcome all members of the International Astronomical Community who have arrived at Patras to debate the difficult, perhaps unsolvable problems of a science well founded in Greek thought and traditionally associated with the Greek search for truth.

SAMOS PHOTOGRAPHY

Photos of the functions and activities of the I.A.U. are on display for sale in the concourse bldg. Next to the news stand.

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XVIIIth GENERAL ASSEMBLY



ASTROCOSMOS



August 20
Number 4



Patras: Greece 1982

Le 20 Août
Numéro 4

Editorial Office: T-block

Editor: ARCHIE E. ROY

Telephone: 991 465

The Executive Committee of the International Astronomical Union announces with profound sorrow that the death of the President of the Union, Professor M.K. Vainu Bappu, took place at 6 p.m., Patras time, on Thursday, 19th August, in Munich, Germany. Formal tribute will be paid during the period of the General Assembly at a time and place to be announced.

Editorial

As our readers will have seen, news has reached us of the tragic death of the President of the I.A.U., Professor Bappu. The Local Organizing Committee and the staff of ASTROCOSMOS express their deep sorrow at the loss of this fine and distinguished man.

TODAY'S EVENTS: LES EVENEMENTS DU JOUR: JOINT DISCUSSION IV:

«Exploration of the Solar System»
(IAU Commissions 16, 44)

09 30-11 00, 11 30-13 00, 15.30-18.00, Room AB, 20th August

SOC	Commission
G E Hunt (UK) Chairman	16
B A. Smith (USA)	16
T C Owen (USA)	16
J E Blamont (France)	16
A Brahic (France)	16
J E Guest (UK)	16
D M Hunten (USA)	16
M Y Marov (USSR)	44
H Masursky (USA)	16
G H Pettengill (USA)	
G L Tyler (USA)	
R von Eshelman (USA)	

Programme

Session I — Voyager 2 Encounter with Saturn.

F Scarf: «Magnetosphere of Saturn».

D Morrison: «Satellites of Saturn».

J Cuzzi: «Rings of Saturn».

T Owen: «Titan».

D Gautier: «Structure and Composition of the Atmosphere of Saturn».

R Beebe: «Meteorology of Saturn».

Session II — Chairman B.A. Smith — Pioneer Venus and Venera Studies of Venus Pioneer Venus and Venera Missions.

H Masursky: «Surface of Venus».

R Prinn: «Chemistry and Clouds of Venus».

T Donahue: «Atmospheric Composition and Evolution of Venus Atmosphere».

Results from Recent Pioneer Venus and Venera Missions

L Brace: «Interaction of Venus and Solar Wind».

V L Basukov: «Studies of the Surface of Venus from Venera Probes».

M Marov: «The Venus Nature: A Discussion on New Findings».

In Building A, IAU Secretariat:

17 30-18 30 Meeting of Finance Subcommittee

INVITED DISCOURSE

In the Ancient Odeon of Patras:

20.30 «Early Stages of Stellar Evolution» by G H Herbig

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL 20 00-24 00

Publisher: For the Local Organizing Committee, V V Markellos
Editor: A E Roy
Both at the University of Patras

Phototypesetting and Printing: P Constanti-nopoulos, 115 Maizonos Str - Patras

CHANGES IN THE FINAL PROGRAMME COMMISSION MEETINGS

The following changes have been made in the Final Programme of Commission Meetings, as distributed to participants, between 1 August and 15 August. Further alterations will be posted on Announcement Boards and given in the daily programme sheets.

Commission 4
Add 044 Scientific 21 August, Session 1, 2 B1
045 Scientific 23 August, Session 1, 2 B4

Commission 7
070 located in B2, not B3
071 located in B2, not B3
243 Occupying Sessions 1 and 2

Commission 8
082 Room B3, 25 August Sessions 1 and 2
243 Occupying Sessions 1 and 2

Commission 9
090 Room T15 18 August Sessions 3 and 4
093 Occupying Sessions 1, 2 and 3 (Room T15).
094 - Occupying Session 4 only
095 Occupying Sessions 1, 2, 3 and 4

Commission 24
243 Occupying Sessions 1 and 2

Commission 28
Delete 2nd entry meeting No 332

Commission 33
243 Occupying Sessions 1 and 2

Commission 34
150 Room AA, 20th August, Session 4

Commission 40
243 Occupying Sessions 1 and 2

Commission 44
441 Room T13
243 Occupying Sessions 1 and 2

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ASTRONOMY COMING TO GRIPS WITH ITS IDENTITY CRISIS

The IAU and in particular, Commission 5, the commission concerned with documentation, have been grappling with the problem of astronomical nomenclature. Over the last decade the identity crisis reached chaotic proportions due to the rapid rate of discovery



of new types of astronomical objects. To bring a little order out of chaos, the following recommendations were presented at the previous General Assembly of the IAU held in Montreal in 1979. 1. Authors should use at least two designations for principal objects in their studies. One of these should be a designation containing at least a rough positional information, as for example, does the HD catalog (which is ordered by 1900 right ascension); alternatively, the coordinates of the object may be given. 2. All the standard catalog abbreviations should be collected and published by the IAU. A

preliminary draft of such a compilation by Fernandez, Lortet and Spite is now ready for review at this General Assembly and will be submitted for publication by the end of the year (most likely as a separate supplement of the journal, *Astronomy and Astrophysics*) 3. A guide to the «current designation practices» of particular types of objects should be assembled to serve as a standard reference work. Dr. Jaylee Mead of the NASA stellar data center has been collecting this information and a progress report is available. 4. The following designation hierarchy was recommended for stellar objects: the star name (e.g. Sirius, Vega) for the few brightest stars, the Bayer letter, Flamsteed number, HR, BSC, HD'BD or CoD or CPD, and finally some catalog designation with accurate positions and possibly a finding chart. 5. For nonstellar objects, the NGC or IC number should be given, then a designation on the Parkes system using right ascension and declination (1959) or for objects of pronounced Galactic distribution within our own galaxy, using galactic longitude and latitude.

The above recommendations do not address the subject of sub-condensations or different kinds of objects within a given larger source, a common occurrence in the interstellar medium. Some of the commissions are tackling this problem. To highlight the confusion, progress, and need for care in making astronomical designations, ASTROCOSMOS will publish a few nomenclature traps and poetry in future editions.

BULLETINS

Commission 37 — Star clusters and associations

General meeting

Our general meeting will be held on Monday, August 23rd at 9.30 in room DB. There will be an administrative agenda followed by scientific sessions on open clusters and globular clusters.

The business will include membership questions and plans for future meetings in which our commission will take part. We shall also discuss a proposal about the principles for numbering members of clusters. If you want anything else to be brought up, please put a note in my letter box.

Chairmen for the scientific sessions are P.E. Nissen for open clusters and J. Mould for globulars. These sessions will be poster sessions to which the chairmen will give an

introduction. After inspection of the posters, i.e. 12.00, there will be open discussions of the papers. Suitable time for mailing your poster will be on Friday afternoon between 15.00 and 18.00 or Monday morning between 8 and 9.30.

Cluster cores

A session about cluster cores will be held on Wednesday, August 25th at 11.00, in room A1. Chairman will be D. Heggie.

Gösta Lynga

Working Group on Internal Motions of GALAXIES, Commission# 2F:

Owing to time-table conflicts, the meeting of the working group has been rescheduled to 24 Aug. The meeting will be merged with that of the WG on Photometry of Galaxies — 24 Aug., Sessions 3 and 4, Room B1.

Participants who wish to make contributions should have a note either on the commission notice board or in my box in the USA section S.T. Gottesman, Chairman WG.

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LES VITESSES RADIALES AUX PRISMES-OBJECTIFS DE FEHRENBACH ET LE PROJET HIPPARCOS

M. Duflo, Observatoire de Marseille
Place Le Verrier, 13248 Marseille,
Cedex 4. France

Le satellite européen HIPPARCOS devrait fournir les positions d'environ 100.000 étoiles avec une précision encore jamais atteinte (0",002). Pour un certain nombre de ces étoiles, les plus proches et les plus rapides, nous connaissons les parallaxes et les mouvements propres avec également cette grande précision. Il est évident que si la vitesse radiale de ces mêmes étoiles était connue, les études cinématiques et dynamiques de la galaxie seraient nettement améliorées.

Pour les étoiles froides, de types plus avancés que F1 I ou F5 V, la méthode photoélectrique par corrélation de Griffin donnent des résultats de vitesse radiale de grande précision. Le CORAVEL, issu d'une collaboration Genève-Marseille (MAYOR, BARANNE) utilise cette méthode.

Un groupe franco-suisse a été créé pour assurer la mesure des étoiles du programme HIPPARCOS. Le CORAVEL installé sur le télescope suisse de 1 m situé à l'Observatoire de Haute Provence mesurera les étoiles de l'hémisphère Nord. Le deuxième CORAVEL existant sera utilisé dans l'hémisphère Sud.

Pour les étoiles chaudes, Ch. FEHRENBACH, M. DUFLOT et l'équipe des prismes-objectifs (PO) ont déjà commencé à choisir des champs stellaires où se groupent des étoiles de magnitude inférieure à 9, dont la vitesse radiale est inconnue. Dans ces champs, chaque cliché de $4^\circ \times 4^\circ$ permettra la mesure de la vitesse radiale de 40 étoiles en moyenne, de tous types spectraux jusqu'à la magnitude 10.

Les étoiles froides mesurées par CORAVEL permettront l'étalonnage des mesures PO et, réciproquement, des mesures complémentaires seront apportées aux mesures CORAVEL permettant de confirmer stabilité ou variabilité des vitesses radiales, même si les mesures PO n'ont pas la très haute précision des mesures CORAVEL.

Toutefois la précision des mesures PO, sur les clichés obtenus au grand prisme-objectif

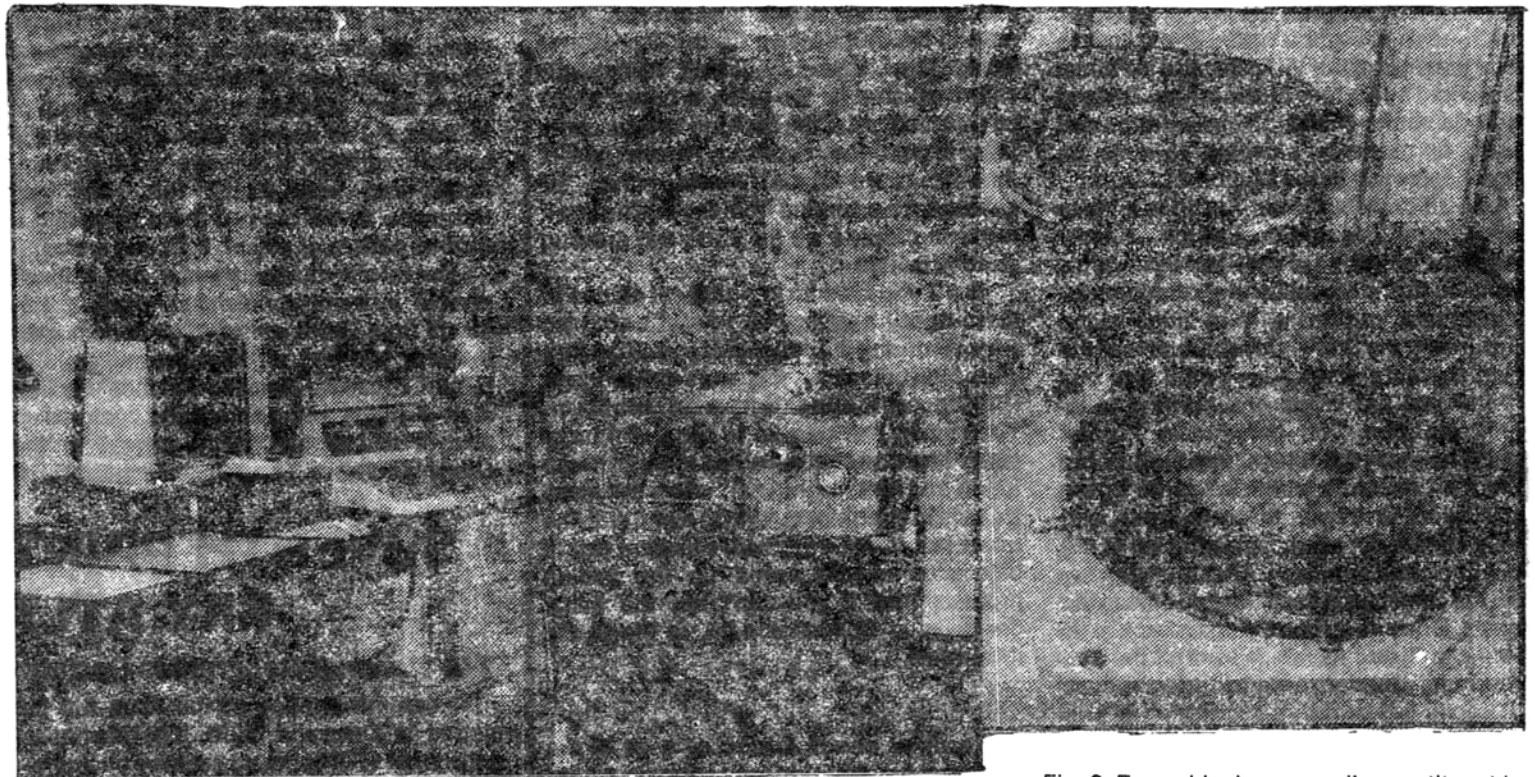


Fig. 1. Les deux verres du prisme-objectif de 60 cm dans leur barillet. Associé au télescope franco-belge de l'Observatoire de Haute Provence, ce prisme permet d'obtenir des clichés pour la mesure de la vitesse radiale de toutes les étoiles d'un champ de $4^\circ \times 4^\circ$, jusqu'à la magnitude 12 (méthode FEHRENBACH). Observatoire de Haute-Provence du Centre National de la Recherche Scientifique.

de 60 cm associé au télescope de Schmidt franco-belge de l'observatoire de Haute Provence est surprenante, 4 km s⁻¹, pour une moyenne de 3 clichés et quel que soit le type spectral. Cette précision s'explique par:

- a) L'absence de toute correction de champ et de toute erreur due à des défauts de guidage, etc... Seule la turbulence atmosphérique limite la précision sans introduire d'erreur systématique.
- b) L'excellence des spectres, grâce à la

qualité de l'optique (prisme, lame de Schmidt, etc...).

- c) L'excellent contraste des plaques IIIaJ.
- d) La mise au point par Ch. FEHRENBACH et R. BURNAGE de la méthode de dépouillement qui permet de tenir compte de très faibles variations de dispersions, en fonction de la position de l'étoile sur le cliché et qui permet de ramener la dispersion d'un cliché donné aux spectres étalons de l'ordinateur.

Fig. 2. Ensemble des appareils constituant le MESUCOR, qui permet la mesure des vitesses radiales des clichés de prismes-objectifs. Observatoire de Haute Provence du Centre National de la Recherche Scientifique.

- e) La méthode absolument impersonnelle des mesures et calculs.

L'équipe des PO de Fehrenbach s'engage donc, pour servir le programme HIPPARCOS, dans la mesure des vitesses radiales du plus grand nombre possible d'étoiles brillantes (< 10). Une partie de son activité reste cependant liée à des problèmes spécifiques nécessitant l'obtention de vitesses radiales d'étoiles faibles jusqu'à la magnitude 12 au moins.

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The Newsletter of Commission 46 Education in Astronomy

Commission 46 encompasses a great range of interests in astronomy education, such as teacher training in countries where astronomy appears in the school curriculum, needs for astronomy in developing countries, the role of astronomy in interdisciplinary university courses, etc. In order to exchange ideas, the Commission started a Newsletter six years ago. Twelve issues have appeared. Recent issues contained:

- i) The National Reports from 33 countries, describing the highly diverse ways used in these countries to further astronomy education.
- ii) The Astronomy Education Materials, divided into three parts: Materials in English, Slavic languages, and all other languages. These list not only recently published books but also atlases, journals, lecture notes, films, sources for visual aids, astronomy organisations, etc. The materials are classified according to the appropriate audience, from popular to university astronomy students.
- iii) A collection of articles on Women in Astronomy. (It is hoped to reprint these articles in a future issue of ASTROCOSMOS).
- iv) Articles dealing with specific problems of classroom teaching, with microcomputers,

with the role of astronomy in interdisciplinary courses, etc.

v) Announcements of Commission activities: International Schools for Young Astronomers, availability of movies and slides, education-oriented sessions at IAU regional conferences, the Working Group on Educating Astronomers from Developing Countries, and this Newsletter.

Most of the recent issues have been supported financially by the IAU. The Astronomy Education Materials were supported by a grant by ICSU to the IAU. Therefore, the Newsletter is available at no cost to subscribers. The only requirement is sufficient interest to read it. Most subscribers are individuals. (Membership in the Commission or even in the IAU is not required.) Subscriptions by libraries are welcome.

If you wish to receive the Newsletter, or if you wish a colleague or library to receive it, please put the name and address in Donat G. Wentzel's mailbox or send by mail to Astronomy Program, University of Maryland, College Park MD 20742, USA. Back numbers will be distributed as long as they are available.

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Naked-eye comet puts in appearance at I.A.U.

A masterpiece of good timing—or perhaps an intercession on the part of the Greek gods?—has brought a naked-eye comet to grace the skies of the IAU delegates in Patras. Discovered by Rodney Austin in New Zealand on 18 June, the comet, officially designated 1982g, is currently plunging towards its closest approach to the Sun on 24 August.

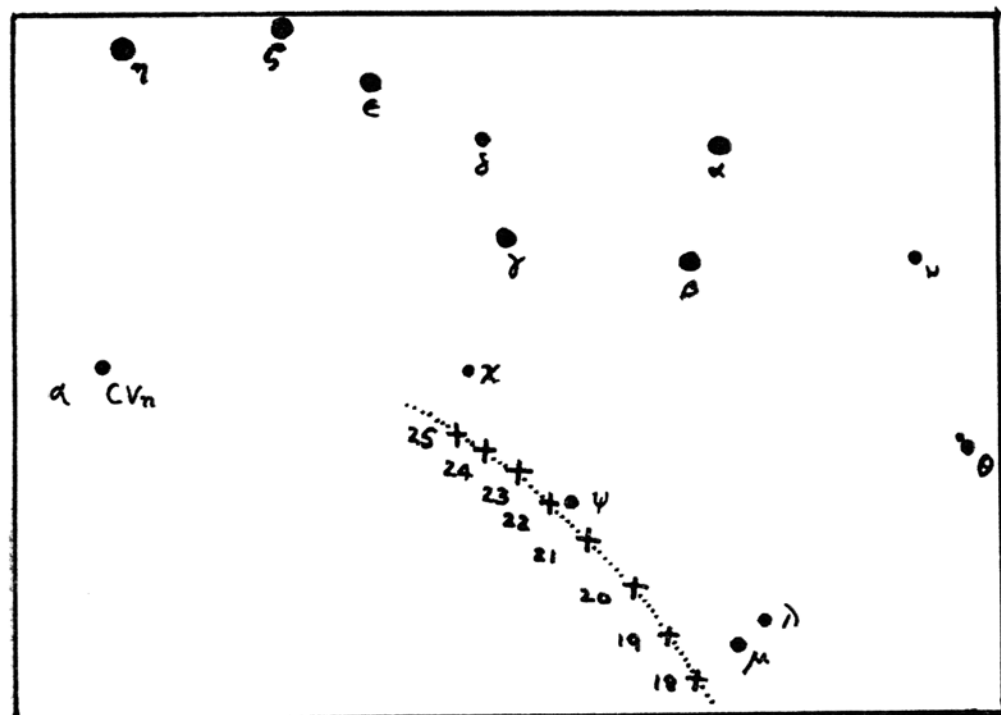
Like all comets, Comet Austin is a loose ball of frozen gas and dust which normally lives at the very edge of our Solar System. It's estimated that many millions of comets make their homes out there in a huge cloud surrounding the Sun—probably a relic of the Solar System's formation—until the odd gravitational tug sends one hurtling in towards the Sun. The unfortunate comet doesn't normally fall straight into the Sun, but suffers an uncomfortable ride as its frozen outer layers first melt, then evaporate, and finally stream out in a spectacular tail at the comet's closest approach. After rounding the Sun, the comet finds itself trapped among the planets. It can never escape again back to its home cloud, and its fate is to orbit the Sun forever until it is worn away to dispersed dust.

Despite last century's succession of brilliant comets—many of which were regarded as portents of disaster—the twentieth century has put on a pretty poor show so far. Apart from Halley's Comet in 1910, another very bright one in the same year and a few bright

sparks in the 1950s, there have been only two reasonably bright naked-eye comets in the past decade, Comet Bennett and Comet West. Comet Kohoutek, enthusiastically predicted by the press to become «the brightest comet of the century» spectacularly failed to put on any fireworks. We can't expect fireworks from Comet Austin, either, for although it's emerging from the Sun's glare it is moving away from the Earth and growing steadily fainter.

But if you have an idle moment on one of these heady evenings as you sit under the stars savouring the delights of souvlaki take a close look below the seven stars of the Plough (Big Dipper), the brightest part of Ursa Major. You should just be able to see a dim fuzzy patch (the comet is expected to be between fourth and fifth magnitude), which will move steadily to the left from night to night. With the rather hazy skies we've had recently, a pair of binoculars should speed up the finding process. And if you can't see the thing, complain to Commission 15, or blame the local wine!

The path of comet Austin, as seen in the northwestern sky fairly soon after sunset, on successive days of the IAU. The stars of Ursa Major are labelled by Greek letters (of course!)



MAIN MUSICAL EVENT — CONTEMPORARY GREEK MUSIC

At the Ancient Odeon of Patras, a location becoming increasingly familiar to the participants to the Eighteenth General Assembly, a transformation took place from the world of ancient Greek learning to the dramatic audio—and visual—spectacle of contemporary Greek music. Last night Greek contemporary music demonstrated that it follows a path of its own. It has derived inspiration from the short «tradition» of western contemporary music and from Greek folk song and Byzantine music but has fused them into a distinct pattern of sound, light and action.

Led by a Byzantine chanter, half a dozen diverse instruments blended together elements from Greek music of all periods over the past two and a half thousand years in Dimitri Terzaki's «Nomo». Stefanos Vassiliadis's «En Pyri», on the other hand, conjured up sounds and sights totally strange to the Odeon's builders. To a scintillating display of

intertwined with the electronic sounds on tape.

The visual spectacle continued as Stella Gadeli sang, danced, acted and played a variety of flutes in «Parastasi» by Nicos Mamangakis, again accompanied by complex background of electronic music on tape. And the thespian art played a major role in Jani Christou's last work «Anaparastasi 3: the Pianist», featuring a pianist who is unable to communicate with his piano. Vocal and instrumental ensembles and taped sounds provided a powerful curtain of sound behind this emotional struggle, and the audience felt nothing but sympathy for the actor when he finally turned to them and admitted that he had lost the stylised battle.

Even those delegates who arrived saying that they had little time for contemporary music left the Odeon feeling that they had thoroughly enjoyed this new, unique and

SEVENTH PRINTING OF FAMOUS SKY ATLAS BEGINS

The National Geographic Society — Palomar Observatory Sky Survey

A seventh printing of the Atlas will be started in December 1982. The Sky Atlas consists of 1872 unbound negative photographic copies of the survey plates on medium-weight resin-coated paper of 14 X 17 inch size. Since the Atlas is made available at a price that covers only the cost of production and handling of the prints, it is not possible to state a fixed price in advance. Estimates based on past experience and projected costs for labor and material suggest that the cost will be approximately \$7,600, U.S. FOB Pasadena. The Atlas will be produced in eight sections, over a period of two years, and you will be charged \$950 for each section, plus postage. The final amount of the eighth invoice will be adjusted either upward or downward in order to reflect the actual cost of printing the Atlas.

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Prospective customers for the Palomar Sky Atlas are advised that a second Palomar Sky Survey will start in late 1984. It will cover the northern sky above declination -30° . Each

field will be photographed using IIIa-J and IIIa-F emulsions. It is expected that photographic copies will be made available on glass and paper or film. The second survey will be released in installments, with the first shipment scheduled for mid-1986.

The International Halley Watch

Those registered for the conference have received a copy of the first IHW Newsletter in their mailbox. On Saturday there will be a special session of Commission 15 called «Comet Halley Observing Plans» devoted to the IHW. The Discipline Specialists for Astrometry, Large Scale Phenomena, Near Nucleus Studies, Photometry and Polarimetry, Spectroscopy and Spectrophotometry, Radio Studies, and Infrared Spectroscopy and Radiometry will be present along with Lead Center personnel to answer any questions you may have about the organization and its goals. Following a general introduction and a question and answer session, the meeting will be split into smaller groups around each IHW Discipline Specialist and Lead Center personnel to permit detailed individual technical or philosophical questioning.

The special session on the IHW will begin at 9.30 AM in room AE on Saturday, August 21.

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flexicover 0-85274-466-8 £9 95

A E Roy and D Clarke These two textbooks, now in updated editions, continue to meet the need for a comprehensive and systematic treatment of astronomy, including the physical and mathematical groundwork so often omitted from other textbooks. *Reviews of the first editions* The two volumes are very successful in giving a clear exposition and in driving points home. *Nature* A well written pair of attractively illustrated books, and with their practical approach they should be welcomed both by teachers of first year university or polytechnic classes and by serious amateurs. *The Observatory*



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XVIIIth GENERAL ASSEMBLY



ASTROCOSMOS



August 21
Number 5



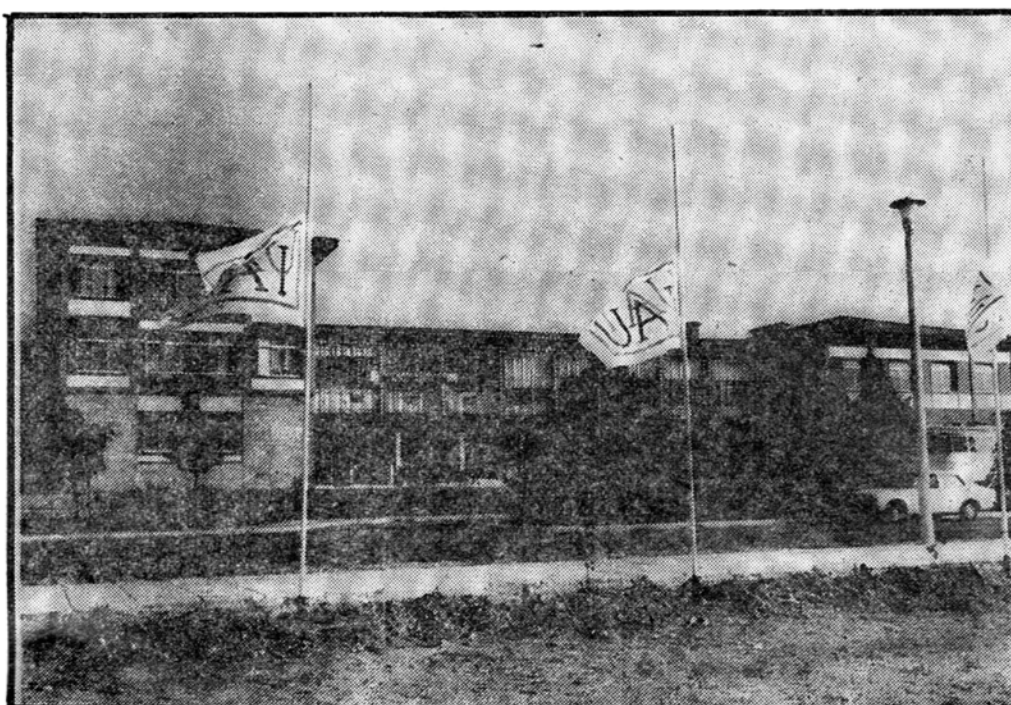
Patras: Greece 1982

Le 21 Août
Numéro 5

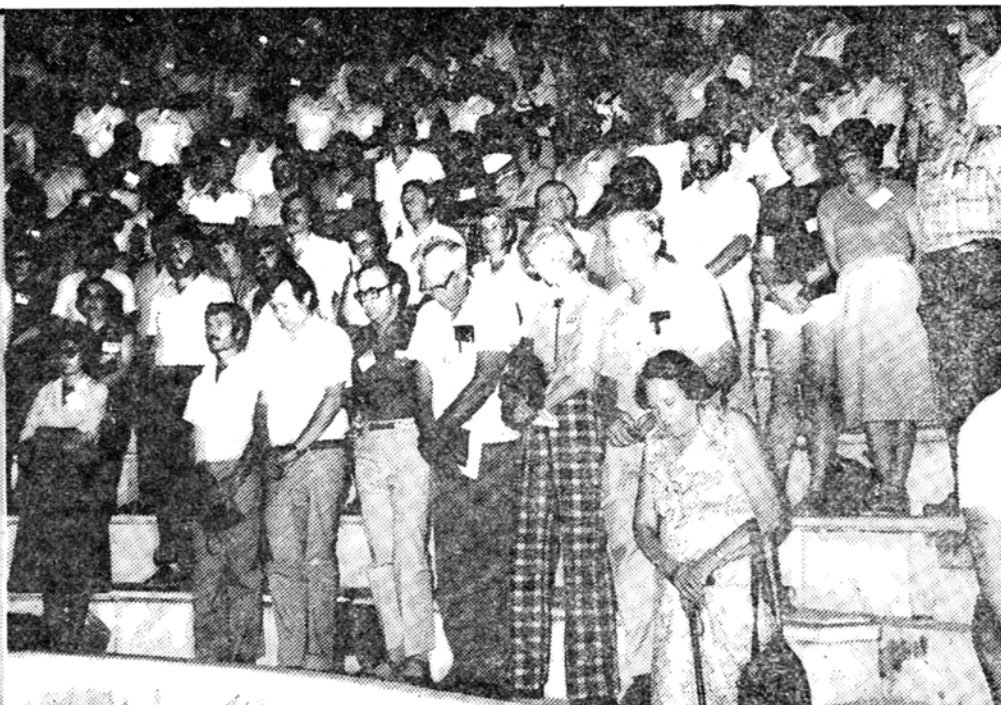
Editorial Office: T-block

Editor: ARCHIE E. ROY

Telephone: 991 465



The National Organizing Committee for Astronomy in Greece expresses its deepest condolences to the wife and family of Professor Bappu. As a mark of respect the flags of the IAU are being flown at half-mast.



Participants observe a minute's silence in the Ancient Odeon of Patras as a tribute to Professor M.K.V. Bappu.

Prof. M.K. Vainu Bappu (1927-1982)

Manali Kallat Vainu Bappu was the main architect of the revival of Astronomy in India in the present age. His life exemplified a total devotion to the cause of building up a sound base for astronomical research in the country.

Vainu Bappu was born on 10th August 1927 in Hyderabad, India. His father was an astronomer at the Nizamiah Observatory. Vainu's introduction to Astronomy was in his early childhood when he loved to accompany his father to the telescope dome. He showed his ingenuity in fabricating observational tools. His first scientific paper was published when he was sixteen — a paper describing the spectrum of the night airglow obtained by means of a spectrograph fabricated by himself. Through his bedroom window he had to expose the plate for six nights; he often jokingly mentioned that that was the longest exposure he had used in his experiments.

Bappu got his master's degree in Physics from Madras University in 1948. His heart was set on studying Astronomy but no facilities existed in India at that time. Circumstances however provided the chance; Harlow Shapley was visiting India. Young Vainu met him in Hyderabad. He was admitted to Harvard University by his efforts.

Vainu was delighted; that was all he wanted — modern telescopes reaching far into the wide expanse of the heavens. In January 1949 came his first success-discovery of the comet «Bappu-Bok-Newkirk». It was Bappu who first pointed out the unknown object on the plate taken on the previous night; his colleagues Gordon Newkirk and Professor Bart J Bok helped him determine the orbit.

In 1952 he completed his Ph.D. on studies of stellar spectra and immediately received an offer of a fellowship at the Hale Observatories, the first Indian to receive a Carnegie

Fellowship there. Two years later came his monumental achievement, the discovery of the «Wilson Bappu Effect».

Bappu returned to India in 1955. He was chosen by the U.P. State Government as the first director of a new observatory. The venture was planned to revive astronomical studies at the old 18th Century Observatory at Varanasi. It was transformed by his magic touch. He selected the new site Naini Tal, up in the Himalayas, and started a modern observatory, and a school of young astronomers. Four years later he handed over charge of the new observatory to them, and came to Kodaikanal, the largest astronomical unit in the country.

Kodaikanal Observatory was originally established at Madras in 1792 and had scientists like Norman Pogson and John Evershed among its former Directors. Activities had been at a low ebb until the independence of India and then the tempo speeded up. The enthusiasm and dynamic touch of Bappu transformed the entire set-up. Old telescopes were taken out of storage and put into regular use; a new one metre telescope from Carl Zeiss was ordered. Bappu convinced the authorities that he was capable of creating a new modern school which could match its performance to any other organization in the world.

His life-long dream was that of a large telescope for India, considering financial restrictions, he had approached his goal cautiously and patiently. He had undertaken a project of building up a 2.34 metre telescope completely in India, the telescope will see the first light in late 1983 and it is a great pity that it will be a posthumous event.

Bappu received many national and international recognitions. Besides those mentioned above he was elected a Foreign Fellow of

the Belgian Academy of Astronomers and an Associate Fellow of the Royal Astronomical Society. He had received the prestigious Bhatnagar Award of India in 1971 and was decorated by the National Award of Padma Bhushan by the President of India in 1981. He has been recently awarded the S.N. Bose medal of the Indian National Academy for his achievements in physical sciences which is due to be formally presented in January next year.

Bappu was elected Vice-President of the IAU for 1967-73 and elected as its President for the triennial 1979-82. In his sad and unexpected departure the Astronomical Community has lost one of its most charming and vivacious personalities.

TODAY'S EVENTS: LES EVENEMENTS DU JOUR:

In Building B, Drafting Room:
15.00-16.30: Meeting of Finance Committee,
16.30-18.00: Meeting of Official Representatives.
In Building A, IAU Secretariat:
18.00-19.00: Meeting of Resolutions Committee.
At EOT Swimming Resort, Aya, Patras:
WINE FESTIVAL: 20.00-24.00

ASTROCOSMOS

Back issues of this potential collector's item (!) may be obtained at the press office, second floor, Building T as long as stocks last.

PROFESSOR M.K.V. BAPPU PRESIDENT IAU, 1979 - 82

A brief meeting will be held in the CONCOURSE AUDITORIUM (CA)

at 13.00 on Monday, 23rd August 1982, in order to pay a tribute to the memory of our esteemed colleague, friend and President, Vainu Bappu.

The speakers will be:

Professor E.K. Kharadze — on behalf of the IAU
Dr J.C. Bhattacharyya — on behalf of the Indian National Science Academy
Academician J. Xanthakis — on behalf of the Greek National Committee for Astronomy
Professor C.L. Goudas — on behalf of the Local Organizing Committee
Professor A. Blaauw — as Past President of the IAU
Dr H.J. Smith — as a close friend

Patrick A. Wayman
IAU General Secretary
(0370 IRELAND)

Publisher: For the Local Organizing Committee, V.V. Markellos
Editor: A.E. Roy
 Both at the University of Patras
Phototypesetting and Printing: P. Constantino-
 poulos, 115 Maizonos Str. - Patras

Books Going Cheap

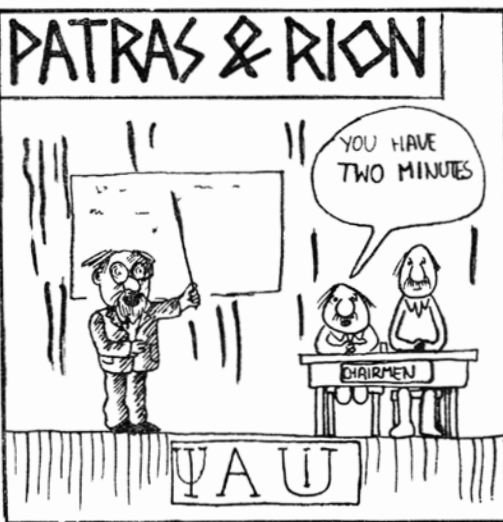
Simon Mitton, selling books from the Cambridge University Press, tells ASTROCOSMOS that he will be selling off his remaining stock at special cheap rates to IAU delegates on Saturday — reductions of 20 per cent were mentioned. But if you are interested, get there early. Simon warns us that the stock is not likely to last long!

THE AUSTRALIA TELESCOPE

Paul Wild, Chairman, C.S.I.R.O., Australia

The Australian Government announce last Tuesday that it will supply \$25M for the construction of a synthesis radio telescope. The telescope will be known as the Australia Telescope. It will be completed in 1988 and be associated with Australia's bicentenary celebrations to be held in that year.

The telescope will be officially a national facility but in practice, surely, an international facility. It will be constructed and operated by the Commonwealth Scientific and Industrial Research Organization (CSIRO) which currently operates the Parkes 64 m



MORE ON THE IDENTITY CRISIS

Q.: What is the maximum number of different names that the same star may have?

A.: No limitation.

ex.: 22 names for HD115968 (Griffin, 1981 J. Astrop. Astron. 2, 309-313). You may select the star by any criterion and assign a new number.

For a nonstellar object, it is even worse since you do not see the same thing at different wavelengths, sensitivity or spatial resolution.

There once was an astronomer named McPhee

who sent a student to observe NGC 6334 B. Coordinates for water source B were dialed in Where continuum source B should have been. A sad state of affairs, don't you agree?

POSTSCRIPT:

Encouraging Activity re ISM Nomenclature

There are two excellent catalogues which include references for the various acronyms used and another is in the works.

«Index of Discovery Lists of True, Probable, and Possible Planetary Nebulae» by A. Acker and J. Marcot, Observatoire de Strasbourg 1982.

«Catalog of Infrared Observations» by D.Y. Gezari, M. Schmitz and J.M. Mead NASA Tech. Memorandum 83819, April 1982.

«Catalog of Molecular Clouds» — L. Snyder at U. of Illinois.

Dr. Hélène Dickel coordinates the working group on interstellar nomenclature for Commission 34. She reports the following items which appeared in correspondence on ISM nomenclature (italics is hers).

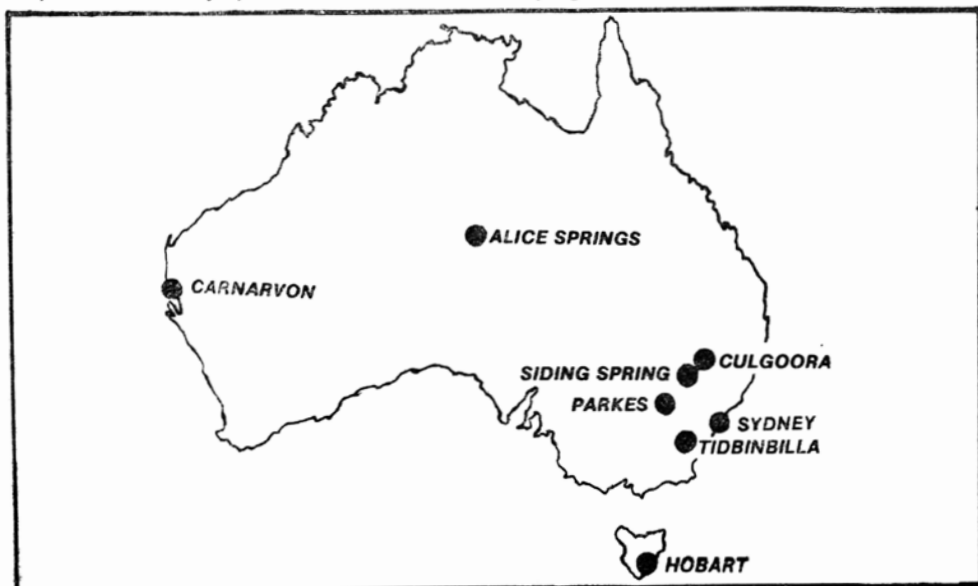
Re «the current situation»: The following was excerpted from the description of designation practices for infrared sources.

«When spatial resolution is greater than can be handled by galactic coordinates, the common practice is to denote individual components by IRS (Infrared Source), then sequential numbering, e.g. W 3 IRS 1, 2... Unfortunately often the numbering does not appear in any sensible order such as increasing right ascension, but is rather determined by random sequences for reasons known only to the authors (!)».

The reaction of a member of the working group when asked for «humorous papers» on ISM nomenclature for ASTROCOSMOS:

«As for humor, considering the total mess about names, I'm more to a crying stage. A great example is the molecular flows of Orion. Try explaining all that nomenclature with a straight face».

On «a more hopeful sign»: «How delightful to find out that some people have taken upon themselves to sort out nomenclature to the Interstellar Medium. I just made up **ORIMCI** as a logical alternative to OMCI (ugh!) and happily my co-authors acquiesced without comment. Let me know what the working group decides. I'll happily go along with any rational scheme».



radio telescope and the Culgoora 3 km diameter radioheliograph.

The telescope will probably be an array of five variably spaced dishes of 22 m diameter on a 6 km east-west base line to be located at the Culgoora Observatory (500 km NW from Sydney). This array will operate as a conventional synthesis telescope. A further dish will be installed at Siding Spring Observatory about 100 km south of Culgoora. This and other dishes already existing at Parkes and Canberra (the Tidbinbilla NASA dish) will combine to form a VLBI synthesis instrument with base lines up to some 600 km. The VLBI system may be further extended to

(jointly with the Cambridge group, in the late 1940's and following the pioneering discoveries of Jansky and Hey). The Australian Government is convinced that the proposed telescope is necessary to retain the country's position in the forefront of radio astronomical discovery.

On the night of Wednesday last the Australian contingent at the IAU (augmented by some international friends) celebrated this event, unique in Australia's history of government-funded basic research. But what has been most moving is the obvious delight displayed by all our international colleagues who greeted the news as though it applied to their own country.

Paul Wild
 Chairman, C.S.I.R.O., Australia

Karamouzis Ant. (optician)
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Our catering service is also operating the Wine Festival of the International Astronomical Union

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BIRTHDAY PARTY BEING PLANNED

Frank K. Edmondson

The Association of Universities for Research in Astronomy Inc. (AURA) was incorporated on October 28, 1957; Kitt Peak was chosen on March 1, 1958, and Cerro Tololo was chosen on November 23, 1962. The pair of 25th birthdays (AURA and KPNO) and the 20th birthday (CTIO) will be celebrated at a special AURA meeting in Tucson, Arizona on February 14-16, 1983. The Space Telescope Science Institute, also operated by AURA, will be only two years old at this time. The Sacramento Peak Observatory is also operated by AURA.

The plans for the celebration are being

made by a small AURA Board Committee: Albert B. Weaver (University of Arizona), W.A. Hiltner (University of Michigan) and F.K. Edmondson (Indiana University) Chairman, with assistance from D.F. Welch and M. Fufts of the AURA Corporate Office.

Invited guests will include early and present members of the National Science Foundation staff, members of the original AURA Board, participants in the Kitt Peak site survey, KPNO employees with more than 20 years of service, members of Congress and other government officials.

Frank K. Edmondson

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GASTRONOMY CORNER



GREEK COFFEE

To make this properly, you should use a «high-waisted» long-handled Greek coffee pot, usually in copper. This is called here in Greece «Briki».

For 1 serving allow 1 1/2 demitasse cups of water, 2-4 level teaspoonfuls of sugar and 1 1/2 level teaspoonfull of coffee, ground to fine powder.

Place the water into the pot (or pan). Add sugar. Bring to the boil. Pour some of the water into the demitasse cup, half-filling it. Leave on one side. Add coffee to the rest of the water and sugar, stir round and bring to the boil. Take off the heat, pour back the water from the cup then cover the pot for some seconds. Pour into the demitasse cup and serve.

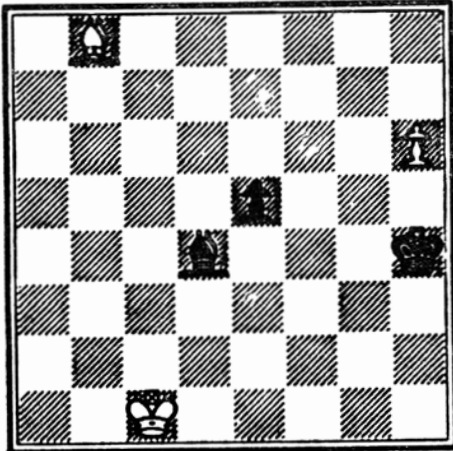
Greek coffee is usually drunk sweet, but those who dislike sweet coffee or are on a diet can use less or no sugar.

NOTE:

You can buy pots and bags of ground coffee in the grocer's or supermarkets here in Patras.

Helen Markellos

Chess Position 4



White to play and win

White can promote his pawn by a fine series of preliminary moves.

Correction: In solution to Chess Position 2 for «black» read «white».

Solution to Chess Position 3:

1. B-Kt8!, R X B 2. K-B7, R X Q 3. P X R etc. V.V.M.

VOYAGER SATURN pictures NASA did not dare publish. Number 2.



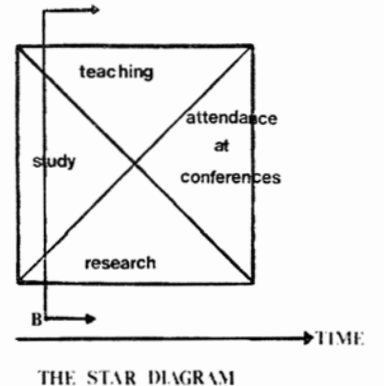
THE STAR DIAGRAM

Perhaps the three most significant relationships discovered in astronomy in the twentieth century were the mass-luminosity relation, the cepheid period-luminosity law and the Hertzsprung-Russell diagram. The product of much observation and study, they summarise an enormous number of astrophysical properties, making sense of stellar evolution and behaviour.

ASTROCOSMOS is now proud to present the fourth important relationship — the STAR diagram, recently discovered by much obser-

vation and study of the careers of astronomers. It demonstrates the natural evolution of an astronomer in his activities of Study, Teaching, Attendance at conferences and Research.

The proportion of his life devoted to these activities is given by the intersections line AB makes with the appropriate activity regions in the diagram. As his career progresses, line AB moves in the direction of the well-known



ASTROCROSSWORD

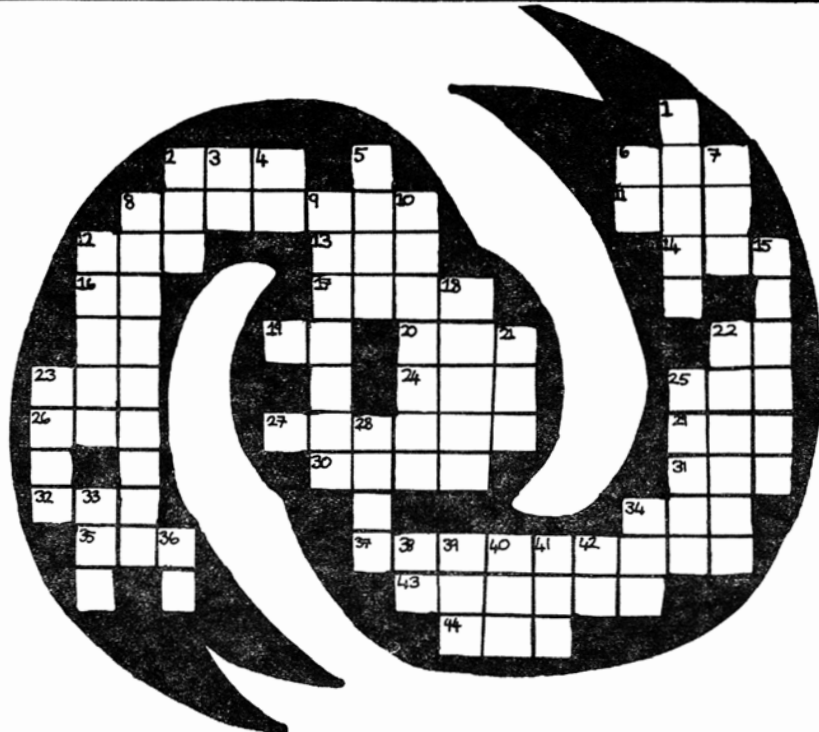
ACROSS

2. Wager.
6. Famous TV doctor.
8. Bicycle used once every 19 years?
11. Italian 'my'.
12. Staff.
13. She quits the vehicle again.
14. Returning from 4D.
16. Italian Moon taken personally.
17. We try to get rid of it.
19. Ephemeris Time.
20. Chop bits off 'a circle'.
22. It chills me if I add to it.
23. A catch clue.
24. Wash in it or grow plants in it.
25. Name & classify.
26. Refreshing drink but too much of it will spin your head.
27. Another drink when properly prepared in this way is just as refreshing but not so inebriating.
29. Anger.
30. Better go this way than the opposite.
31. Add a 'Rin' to it and another one and you've got a star as famous as Sirius.
32. Shortened form of Thomas.
34. Some dancers wouldn't be seen without it.
35. If added to 'bar' does it mean a contour through all serving the same number of drinks.
37. Jaws.
43. Spectacular in its passing if close enough.

33. Add 'tea' to provide power.

DOWN

1. Velocity and the Doppler effect produce it.
2. Hope you got a comfortable one.
3. Alien or Gallic 'and'.
4. An approach.
5. Not recorded.
6. Two letters back-to-back.
7. Needed to take a dinghy out and back.
8. Serene smiles?
9. The ringless one of the four?
10. A remarkably deep lunar crater.
12. β Orionis.
15. Atomic weight 16.
18. Essential among humans & nations.
21. British decoration.
22. Also essential among humans & nations.
23. They also serve who only stand and...
25. Kept its face concealed from the Voyagers.
28. Hesiod spent much of his life on one.
33. Black gold.
34. A tall tree.
36. Alternatively.
38. The Sun has not reached the meridian yet.
39. No second-hand car salesman would have them in stock.
40. When will it arrive?
41. In England it's turned around so that everything can stop for it.
42. Another approach.



THE LOST ONES — AND THE LOSERS

by D. Mc Nally, University of London Observatory, Mill Hill Park, London NW72 QS, United Kingdom.

«Some drink of the waters of the fountain of knowledge; others merely gargle!»

Let me raise the question — are we making any impact at all in advancing awareness of astronomy in the public at large? I raise this question in the light of some experience that I have become aware of in the teaching of Astronomy and Space at a UK College of Further Education

(A College of Further Education provides for continuing education. On a formal basis it provides education to overlap secondary and tertiary education and to supplement the educational experience in certain forms of professional training. It also provides cultural evening classes from flower arranging to navigation for small boat sailors. They are valuable centres of community education)

Because of the dreadful state of unemployment among school leavers (at 16) a particular College of Further Education decided to mount a course for school leavers to

prepare them for the world of work. A major component of the course is to identify and rectify deficiencies in basic education such as mathematics and literacy. A further component was a study of science to make the students aware of the world around them both industrially and environmentally. As part of this, there was a contribution on Astronomy and Space. By and large the response to science was poor. To set the scene very few of the students knew what fuel heated their own homes. The problem is just not astronomy alone but seems to confront the whole of science education. It should be pointed out that the students on this course already have some academic qualification

A lack of knowledge

The knowledge of astronomy among the

students on the course was abysmal. There was a glaring lack of fundamental knowledge but what was worse, no interest whatsoever. One might have thought that with the emphasis on space in the media some of it would rub off. These students had little or no interest in serious science on TV or in the newspapers. A slide show of the usual colourful astronomical slides evidenced little interest either scientific or artistic. The students simply could not see where astronomy might impinge on their everyday lives. There were exceptions. Holidays in Florida produced a mild response to Zone Time and complete surprise to learn that the same time did not pertain worldwide. Great interest was aroused by the revelation that the Romans regarded months with 31 days as lucky and with 30 days as unlucky. But as for the rest — utter apathy. Why worry about calendrical regulation — it was silly to suggest the seasons got out of step with the calendar — after all everyone could see it is spring in April (Northern Hemisphere types to a man in this class). Perhaps with people who had difficulty understanding a train timetable, calendrical regulation is a detail.

The task for the foreseeable future is great. In some respects we are the victims of our own success. We have done some things so well that the problem has disappeared from view. But some of our exciting problems of today are not penetrating the masses. We are getting through to the astronomically aware but then we always did. We are getting through to those with wide general interest. We are not getting through to the masses but that is not possible. It should however be possible to get through to students accepted for courses at a College of Further Education. It is clear that we are not

The education desert

The problem is not one that is confined to astronomy — it is a consequence of the state of education in the UK. In the first place, these particular students should not be at a College of Further Education. The College is reme-

ding the deficiencies of school. What the students are being taught they should have learnt at school — much of it at primary school. To some extent we are not concentrating on fundamentals. It is easy to dilute teaching with new matter since it is both topical and exciting. Education has to serve several purposes. One is basic skills in communication, literacy and arithmetic (I nearly wrote mathematics). High on our priorities should be some basic understanding of science. Clearly in the UK, and I suspect elsewhere, we have not provided sufficient attention to these basic requirements.

But we, as astronomers, have also failed. We have not taken a sufficiently strong stance to ensure that astronomy forms some part of basic science. For a young person with some academic qualification to be unaware at 16 of latitude and longitude, the reasons for night and day, the seasons and the calendar is, in my view, unacceptable. What point is there in going further to discuss phases of the Moon, the planetary system, and the nature of the Sun — again topics of which a tolerably educated 16 year old should be aware.

For us in Commission 46 there is no cause for complacency. We have not yet even won a battle in this war — in fact we have not truly seen the enemy. Yet we know that education must face philistinism and barbarism. That philistinism and barbarism does not begin with politicians and administrators — it starts in our own Union with our colleagues who see no point in promoting astronomy in education and even worse, those few colleagues who believe that astronomy should be vigorously ejected from education. Do we really want education which leaves those in its higher reaches unaware of basic astronomical science.

While we take stock of past achievements — and there are many which should encourage us, let us also remember those school leavers at a College of Further Education somewhere in the UK and remember the vast amount which remains to be done.



The Chairman of the Local Organizing Committee (prof. C.L. Goudas: right) and the Chairman of the Registration Sub-Committee (prof. C. Makris: left) try to convince themselves that registration has been successfully completed.

PROPOSAL FOR AN INTERACTIVE EXPERIMENT WITH A COMETARY MASER

R.P. Norris and J.E.B. Ponsonby

The University of Manchester

Nuffield Radio Astronomy Laboratories

Jodrell Bank - Macclesfield - Cheshire SK11 9DL

Introduction

Maser action has been observed in the 18 cm lines of hydroxyl in the coma of comets. The lines are characteristically of order 15 KHz wide, the amplification is low and the masers are unsaturated. The total power emitted by a comet in one of these lines is typically only 30 W, so that the total isotropic cometary emission in each line is ~ 3 mW Hz.

In principle, any maser can be significantly perturbed by an external signal suitably injected into it with a power comparable to its own emitted power. The possibility therefore arises of perturbing the OH masers in comets by means of signals transmitted to them from the Earth. In such an experiment, a portion of the maser emission would be switched off by means of radio waves transmitted from Earth, and then the subsequent recovery time

(10³s) of the maser could be studied. This experiment would provide a direct measurement of the pumping rate, and a stringent test of the proposed pumping mechanisms for comets (Biraud et al 1974, Mies, 1974, Despois et al 1981, Elitzur, 1981). In addition, it allows an accurate (~ 5 Hz) measurement of the test frequency of the OH molecule

The Proposal

We propose to transmit an 18 cm signal with a bandwidth 5 Hz which will saturate the maser in a direction away from the Earth, causing the natural cometary maser directed at the Earth to switch off. Only those molecules lying in the narrow velocity range corresponding to our transmitted signal are affected so that only a small portion (~ 5 Hz)

of the wider (~ 15 KHz) cometary signal will be perturbed.

The choice of power, bandwidth, and telescope are inter-dependent. Here we describe a suitable combination.

10 kW of power in a 5 Hz bandwidth transmitted from the Jodrell Bank Mk 1A telescope will stimulate a transition in each OH molecule at a distance of 1 au on a timescale of 1000s, which is comparable to the natural pump rate in a comet. Assuming that the unperturbed cometary maser has a flux density of 0.5 Jy at the Earth, the perturbation of the maser could then be detected at the 3 σ level using the Mk 1A telescope after an integration time of 2.10⁴s. In order to study the shape of the response, divided into \sim bins, at a 5 σ level and assuming a 50% transmitter duty cycle, an estimated observing time of ~ 4 weeks is required.

There are several comets every year which are potential candidates for this experiment, but we do note the imminent return of Halley's comet which we consider admirably suited to this form of investigation

Objectives

The primary objective of this experiment is to investigate the recovery time of the natural emission. An approximate solution of the time dependent equation of radiative transfer through the comet is easily obtained, and indicates that the emission should recover on the time scale of the interval between $\pi \rightarrow \Sigma$ transitions ($\sim 10^3$ s, Despois et al 1981). However, the exact form of the recovery (which we have not yet calculated) will

depend on the pump and collision rate, and so the experiment will enable a measurement of these as well as a test of the pump mechanism.

A secondary objective is to measure the natural rest frequencies of the OH molecule. The frequency of the narrow (~ 5 Hz) perturbed portion of the cometary signal, which is determined by the frequency of the external signal, is of course doppler shifted on reaching the comet. In addition the observed perturbation is also doppler shifted so that the geometric mean of the frequencies, which is the rest frequency of the OH line, can be measured to an accuracy of ~ 5 Hz. Since this frequency is at present known only to an accuracy of ~ 200 Hz, this will represent a considerable improvement which will be of value to other OH observers.

Effects of the experiment on the comet

The experiment will affect the 18 cm cometary OH radiation, and so clearly can only be done with the agreement and support of other cometary and OH observers. However, it is probable that **only** the 18 cm radiation will be affected, and there should be no observable effect on the comet in either the

visual, infrared, or ultraviolet wavebands

In addition, we note a natural safeguard. Cometary OH molecules have a lifetime of $\sim 2.10^6$ s (Despois et al. 1981). Consequently, this experiment can have no effect lasting longer than a few days.

Legality

A possible obstacle to this experiment is that it requires the freedom to transmit at frequencies dictated by nature in the 18 cm protected radio astronomy band. This requires the consent and support of other astronomers in order that we may obtain permission from the radio regulatory authorities. Simple calculations of the level of scattered radiation show that there is unlikely to be any interference problem to any other radio astronomer observing at 18 cm, even if making narrow band spectral line observations

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SIMOS PHOTOGRAPHY

Photos of the functions and activities of the I.A.U. are on display for sale in the concourse bldg. Next to the news stand

Rodopoulos Michalis

Cavo d'oro

Cafeteria - Spageteria

Iroon Polytechniou, Glyfada

Bali Hairdressing Salon

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200, Corinthou str. (1st floor).

XVIIIth GENERAL ASSEMBLY



ASTROKOSMOS



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Number 6



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Numéro 6

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Editor: ARCHIE E. ROY

Telephone: 991 465



Participants enjoy themselves at the Wine Festival, one of the continuing and highly successful events of the I.A.U.

NEW INTERFEROMETRIC TEST SYSTEM FOR TELESCOPE MIRRORS

by Michael Smyth, University of Edinburgh Department of Astronomy,
Royal Observatory, Edinburgh, U.K.

Solid-state image devices are increasingly replacing the photographic plate as astronomical detectors; and desk-top microcomputers are taking over many of the tasks until recently assigned to large computers. A combination of these technologies is proving useful in the figuring of the new generation of large telescope mirrors. Developed in collaboration between the Department of Astronomy of the University of Edinburgh, Scotland, and NEI Grubb Parsons of Newcastle, England, the system comprises a silicon diode array detector attached to a wavefront shearing interferometer and linked to a microcomputer.

The wavefront shearing interferometer is widely used in the manufacture of large optical components, and since this involves many cycles of testing and polishing it is important to minimize the duration of testing and data processing. The accuracy achievable during manufacture is limited by the accuracy of the test procedure, and the new combination of precise photometry and integral data processing yields significant advantages.

In the past, the interference fringes across the image of the mirror under test were photographed, maxima and minima in the interference pattern were located, and the coordinates transferred to a computer where the interferogram phase errors and other desired data (such as wavefront profile or the pitch distribution on a lap designed to correct the observed errors) could be calculated. Photography, measurement of the photograph, and transfer of data to the computer were separate processes, giving limited accuracy and spatial resolution and a long cycle time.

The newly developed system images the fringe pattern into a silicon diode detector array which senses the intensities at 512 points across a diameter of the mirror. The 512 intensities are stored in the microcomputer, and the measurements are repeated for a total of five stepped phase values. Within 10-15 minutes of measurement and computing time, the microcomputer displays a plot of relative phase across the mirror diameter. Interactive graphics allows 360° phase discontinuities to be removed, and the display can be "folded" to allow comparison and superposition of points equidistant from a selected centre of symmetry. Under the conditions of routine measurement, with unsilvered glass surfaces, the relative phase precision is of order of 0.01 wavelength. The phase data are stored on a floppy disk for subsequent processing.

A summation procedure is used to convert the relative phases into wavefront errors. The final precision of wavefront measurement depends on the shear used, but is typically 0.03 wavelength. Expressing the errors in more familiar astronomical terms, with a shear value of 100mm the phase precision of 0.01 wavelength is equivalent to 0.01 arc second.

The system is being used for testing several large astronomical optical systems in production at Grubb Parsons, including the 4.2 metre mirror of the Herschel Telescope, the largest optical telescope ever to be produced in Britain.



Professor Hanbury Brown (left) and Professor McCrea (right) cool off between sessions

QSOs AND OTHER PECULIAR EXTRAGALACTIC OBJECTS

by G. Burbidge and A. Hewitt

In the coming year, we are planning to produce two catalogues of extragalactic objects which are not stars or normal galaxies.

1. The first catalogue will provide a complete compilation of all extended extragalactic objects which either contain abnormal components, or which are not normal galaxies of stars. Thus we confine ourselves among the types called N galaxies, emission-line galaxies, Markarian galaxies, Arakelian galaxies, Seyfert Galaxies, and compact galaxies to those objects with nonthermal continua and strong emission lines. All observations of radio, infrared, optical, ultraviolet and x-ray fluxes will be included together with variability and line structure.

2. We plan to publish a supplement to the QSO catalogue of Hewitt and Burbidge 1980, Ap. J. Suppl. 43, 57.

If you have reprints, preprints or unpublished observations of objects which should be included in either catalogue, please send material to A. Hewitt, Kitt Peak National Observatory, P O Box 26732, Tucson, Arizona 85726-6732, USA. Deadlines for receipt of material are

For the Catalogue of peculiar non-stellar extragalactic objects — December 31, 1982.
For the Supplement to QSO catalogue — June 30, 1983.

We hope to publish these catalogues in late 1983 and early 1984, and copies will be available on tape.

Please pass this request to your colleagues.

The Soviet Comet Probe

The audience at Commission 16 on Tuesday morning heard the latest news of Russia's Vega programme—given by Professor Mikhail Marov, who had himself just received it from Moscow. The launch date will be in December 1984. The flight to Venus will last from 174 to 176 days; two days before encounter the Venus lander will be released. At this time Halley's Comet will be in the region between the orbits of Saturn and Jupiter. The flight-time between the Venus and Halley encounters will be about 270 days: the fly-by, at a minimum distance of 10000 km is scheduled for 1986 March 8, roughly a month after Halley has passed perihelion.

At the moment all the Soviet plans seem to be proceeding well. In view of the cancellation of the NASA probe, we depend entirely upon Vega, Giotto and Japan's Planet A. Otherwise we must wait until AD 2061!

NASA-CNRS MONOGRAPH SERIES

The NASA of the United States and the CNRS of France are publishing a series of monographs «Nonthermal Phenomena in Stellar Atmospheres». Each volume contains a comparison of normal stars in a given spectral class and at least one kind of peculiar star of this class. It focuses on

(i) a current, ordered summary of these stars across the spectral range from x-ray to radio, placing in focus those characteristics which are apparently non-thermal;

(ii) a confrontation between these observations and classical, theoretical models;

(iii) the gross outlines of preliminary attempts at empirical modeling of these observations, which may eventually serve as basis for a more complete theory of stellar atmospheric structures and of the origin of these fluxes of matter and energy producing it.

With its focus on observations, its volume emphasizes the series goal of providing a basis for observational planning during the 1980's terrestrial and spatial projects.

Volumes appear at the rate of two per year. The first, **The Sun as a star**, edited by S.D. Jordan, appeared in July 1981. The second, edited by A.B. Underhill and Vera Doazan, appeared in May 1982.

TABLE OF CONTENTS

Part I-B Stars by A.B. Underhill.

Understanding and introducing the B stars. Observations of normal main sequence and B giant stars. Observations of B-type supergiants. Special types of B stars (by J. Rountree Lesh). Model atmospheres. The

TODAY'S EVENTS:

LES EVENEMENTS DU JOUR:

Sea, Sun, Sleep, Nourishment, Refreshment and Recuperation (whenever you like!).

In the Ancient Odeon of Patras:

20.30-22.00 Performance of the Ancient Greek Tragedy «ANDROMACHE» of Euripides.

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL: 20.00-24.00.

Publisher: For the Local Organizing Committee, V.V. Markellos

Editor: A.E. Roy
Both at the University of Patras

Phototypesetting and Printing: P. Constantinopoulos, 115 Maizonos Str. - Patras

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evolution of massive stars. Unsolved problems.

Summary.

Part II - Be Stars by V. Doazan

Introduction to Be stars. Ground based observations and ad hoc models. Data obtained from spacecraft. Global picture of a Be star (in collaboration with R.N. Thomas).

Orders may be sent to either.

CNRS

15 Quai Anatole France
75700 Paris

or

NASA

c/o S.D. Jordan

Goddard Space Flight Laboratory; Building 21 Greenbelt Maryland - USA
USA

The Largest Lunar Basin?

Despite all the Surveyors, Orbiters, Lunas and Apollos we are still far from a full understanding of the Moon. In Commission 16 E.A. Whitaker, from the Lunar and Planetary Laboratory in Arizona, presented evidence for a basin which seems to be the largest known. Some craters (such as Compton) have both central elevations and inner rings of peaks; larger structures such as Mare Orientale, show very obvious concentric rings. The Mare Imbrium is associated with a ring system, but it has not been previously recognised that there are clear indications of a very large outer associated ring which includes the Oceanus Procellarum: Mr. Whitaker referred to it as the Procellarum Basin. It is undoubtedly very ancient, and if produced by a plunging meteorite the global devastation must have been far greater than for the Imbrium event itself.

At the same meeting Patrick Moore (U.K.) gave an account of recent research into Lunar Transient Phenomena - slight localized events generally believed to be due to gaseous emission. Previous result that the phenomena occur mainly in regions around the peripheries of the circular maria, or areas rich in clefts has been confirmed. Regular monitoring is producing useful data, but the main target is to obtain a good spectrogram. So far only one exists (Kozyrev's of the 1958 Alphonsus event). At the moment the data are very incomplete but the reality of the events is now generally accepted.

ASTROCOSMOS

Back issues of this potential collector's item (!) may be obtained at the press office, second floor, Building T as long as stocks last.

SIMOS PHOTOGRAPHY

Photos of the functions and activities of the I.A.U. are on display for sale in the concourse bldg. Next to the news stand.

Evangelatos Spyros Restaurant A GASTRONOMICAL TREAT!!!

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Editorial

LATE NIGHT FINAL

An earthquake occurred around 2 a.m. on Tuesday, August 17. According to the Institute of Geodynamics in Athens, it had an intensity of 6.1 on the Richter scale and its epicenter was located 450 km S-S-W of Athens.

Your editor and the printing staff of ASTROCOSMOS noticed it. They were busy putting the finishing touches to the following day's number of the paper and with customary devotion to duty continued their task after remarking that the overhead lights had begun to perform a mild Galilean pendulum dance.

The IAU is of course holding its General Assembly in an earthquake area. Perhaps the most famous example of the art of Poseidon, the God of the sea and of earthquakes, was the explosion at the Greek island of Thera about 1450 BC. Anyone visiting that island - sometimes called Santorini - cannot fail to be awed by the huge flooded caldera and the huge 400 metre high cliff running round the inside of the crescent-shaped island.

It is supposed by many that the cataclysm at Thera was responsible for the collapse of

the Minoan civilisation, justly called the first great civilisation of Europe and enshrined in those Greek legends of Theseus and the Minotaur and Daedalus, King Minos's great engineer.

You will remember that when Daedalus fashioned the famous wings of feathers and wax with which he and his son Icarus escaped from Minos's prison, he warned Icarus not to fly too near the Sun or his wings would melt. Icarus paid no attention - an early case of generation gap - and paid the penalty.

The explosion at Thera has been estimated to have been an order of magnitude more severe in its effects than the historic eruption at Krakatoa in 1883 which was heard over one-thirteenth of the Earth's surface, sent tsunamis right round the world, put so much dust into the atmosphere that the Sun went out for fifty hours over one million square kilometers and caused the deaths of 36,000 people. Unfortunately, although we can say that something like the Thera cataclysm happens in this area about once every ten thousand years we cannot give any reliable prediction as to when the next one is due. If however it does happen during the General Assembly you may be sure that your devoted staff of ASTROCOSMOS will draw your attention to it.

Letter to the Editor

Dear Editor,

I would like to protest against the «votes» at the General Assembly on Tuesday the 18th August. Significant decisions had already been made by national representatives and the Assembly was asked to «vote» by applauding them. While it was normal to applaud certain decisions like that solving the problem of the representation of China, the participants did not possess much information about other questions. In any case, a «vote» by applause is completely undemocratic. I hope the IAU will not continue this type of sham.

Yours sincerely,
Michael Friedjung
France

Sky and Telescope

«Sky and Telescope» has for over 40 years been the leading popular astronomy magazine in the world. In the years to come we hope to report even more fully international astronomical news. If you think your research is of general interest to the astronomical community, please send us a preprint. We are always open to suggestions for articles of any nature.

L.J. Robinson (0235)
Editor «Sky and Telescope»

Wine Festival

The Local Organising Committee of the 18th General Assembly of the University of Patras has organised a wine festival to entertain our honoured guests.

It will be open every evening from the 10th until the 26th of August 1982 between 20.00 and 24.00.

The entrance charge for registered participants is \$2 and for the non-registered \$4. Special wine glasses and wine carafes will be on sale inside the festival area.

Greek specialities (*souvlaki*) and soft drinks will also be available at a cantina at reasonable prices. Participants will also be able free of charge to drink wine from different parts of Greece.

An Orchestra «The Planets» will provide music for the occasion. There will also be contributions from local choirs.

Buses and coaches will be available to take participants from their hotels to the Wine Festival and back to their hotels. The last bus will leave the Festival at 00.10.

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Diffraction Limited has been largely involved in meeting the specific needs of astronomers. Our top priority has been to bring down the normally prohibitive design and fabrication costs for certain «one of a kind» items such as Schmidt Optics. For instance, we are making two 500 mm Schmidt Systems for Kuwait, one of which is a Flat-Field Schmidt Cassegrain (F/3.5) that covers a 7° field! Please don't hesitate to write or call for more information. (Tube assemblies available upon request.)

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WOMEN IN ASTRONOMY

INTRODUCTION

by John R. Percy

Very recently a number of essays on this subject was compiled by Dr. John R. Percy, Department of Astronomy, University of Toronto, Toronto, Canada M5S 1A7, who comments

What is the status of women in astronomy in different parts of the world? What percentage of astronomers are women? What special problems do women encounter when they train to become astronomers? How can these problems be solved? These are questions which should be of interest and concern to Commission 46, Teaching of Astronomy, because able, interested women are an important source of «manpower» for astronomy, now and in the future, and no unnecessary barriers should be placed in their way.

I have solicited short articles on «women in astronomy» from various parts of the world. Four articles were submitted, they are printed below, and represent the current status of women in astronomy in four of the more astronomically-active parts of the world.

It is apparent, from these and other articles, that there are many factors which may affect the status of women in astronomy. These range from possible (but controversial) differences in natural scientific and mathematical ability, through social factors mitigating against women becoming interested in science, to problems associated with combining marriage, child-raising and a scientific career. Nevertheless, women enter careers in astronomy in reasonable proportions especially in Europe. However, in all the countries surveyed, women are often prevented by various factors from reaching the highest levels of the astronomical community. There are exceptions, of course. Drs. Edith Müller (Switzerland), Margherita Hack (Italy), Irmela Bues and Waltraut Seitter (Federal Republic of Germany, and Margaret Burbidge (USA) are prominent examples.

More detailed discussions of the status and problems of women in astronomy (at least in North America) are contained in the references below.

Cole, J R 1981 *American Scientist* **69**, 385
Kistiakowski, V 1980 *Physics Today* **33** 2, 32
Liller, M H 1980 *Bulletin of the American Astronomical Society* **12**, 624
Percy, J R 1981 *Journal of the Royal Astronomical Society of Canada* **75**, 210

WOMEN IN ASTRONOMY IN FRANCE

Dr. Lucienne Gouguenheim

Laboratoire d'Astronomie, Université de Paris-Sud
Centre d'Orsay, 914 05 Orsay, France

French astronomers belong to three different groups: National Centre for Scientific Research (CNRS), observatories (civil servants full time in astronomical research) and universities (civil servants). The highest wages are obtained at CNRS, the lowest in observatories.

Each of the three groups is divided into four ranks, they are indicated in Table 1 by increasing level. The two lower ranks constitute the lower category (B) and the two higher constitute the higher category (A). The population of each rank is given in Table 2.

Table 1

Cate-gory	Rank	CNRS	Universities	Observatories
B	1	Attaché de Recherche	Assistant	Assistant
	2	Chargé de Recherche	Maître Assistant	Aide Astronome
A	3	Maître de Recherche	Professeur (2nd class)	Astronome adjoint
	4	Directeur de Recherche	Professeur (1st class)	Astronome

Table 2

Rank	CNRS*			Universities			Observatories		
	Tot	W	% (W)	Tot	W	% (W)	Tot	W	% (W)
1	48	9	19	20	4	20	a) 9	4	44
2	129	43	33	37	17	46	b) 51	10	20
3	43	10	23	9	3	33	65	18	32
4	15	2	13	16	1	6	32	4	12

* including External Geophysics
a) lower category, b) higher category

General Comments

In the last five years the number of positions in any of the three groups has considerably decreased. As a consequence very few women have been engaged: none in the universities, 4 among 23 in the observatories and 4 among 42 at the CNRS. Up to now, access to category A was the more difficult. The larger percentage of women in rank 2 is a direct consequence of this difficult access to rank 3.

A more detailed investigation has been performed in the observatories. Among the 34 astronomers who entered rank 2 less than 10 years after entering rank 1, there are only 7 women. But among the 18 astronomers who entered rank 2 after 10 years or more, there are 7 women.

A similar result is obtained concerning the access to the higher rank. Only one woman among 18 astronomers entered rank 4 after less than ten years and four of them, among 13, entered after 10 years or more.

The distribution of ages is also informative.

Rank	Astronomers born after 1935		Astronomers born before 1935	
	W	M	W	M
3	2	27	12	11
4	1	5	3	23

This illustrates the greater difficulty for women to attain higher ranks.

Level of responsibilities

French astronomers receive their funding from the Ministry of Universities and from the CNRS. There are eight observatories depending on the Ministry of Universities and 29 laboratories depending on the CNRS. Only two laboratories and no observatories are directed by women.

WOMEN IN ASTRONOMY IN THE U.S.

Dr. Caty Pilachowski

Kitt Peak National Observatory
Box 26732, Tucson, AZ 85726, U.S.A.

Women astronomers in the United States comprise almost 9% of the membership of the American Astronomical Society. This percentage is down from a maximum of about 17% in the early 1940's, but the figure has been slowly increasing since the early 1970's. The total is now approximately 300 women. The representation of women on college and university astronomy faculties is more dismal. Fewer than 5% of the tenured or tenure-track professors of astronomy in the U.S. are women, a total of fewer than 30 women. Women are especially underrepresented in high ranking professorial representation positions, although the age distributions for men and women in astronomy are similar. By 1979, the average salary differential between men and women had increased to \$3,500 from \$3,300 in 1973.

The AAS has twice appointed an *ad hoc* Committee on the Status of Women. The reports of these Committees are published in the *Bulletin* of the AAS (12, 624, 1980; and 6, 412, 1974) and those reports are the source of the data presented here. The AAS has since appointed a standing Committee on the Status of Women to help promote the full participation of women in the AAS and in the U.S. astronomical community.

One of the problems most frequently faced by women in astronomy is the difficulty of being part of an «astronomical couple». Fully half of our women astronomers are married to other astronomers or to spouses working in a closely related field. A woman astronomer must often take whatever employment she can find near her husband's place of work. Frequently these positions are lower ranking lecturer or research appointments. Affirmative action procedures in the U.S. occasionally compound this problem because such procedures increase the difficulty in hiring astronomical couples.

The National Science Foundation proposed two new programs to increase the participation of women in astronomy research. The first provided research initiation funds for women who recently received their doctorates or who are re-entering the research community after career interruption. The second supports visiting professorships for women for up to two years at academic institutions. Unfortunately funding for both programs has been withdrawn.

During the 1970's, the recognition of the contributions of women to astronomy increased. More women are now serving as officers of the AAS, on astronomy advisory committees and as referees for journals. More women are asked to give invited papers at AAS meetings, and at least one woman has been honored with a prestigious Society award. However, this improvement has not yet been matched with a significant increase in the percentage of astronomers who are women or in their representation on astronomy faculties.

Continued on page 6

WOMEN IN ASTRONOMY IN THE U.S.S.R.

Dr. E. Kononovich

Sternberg Astronomical Institute

Moscow University, 117234 Moscow, U.S.S.R.

It is well known that in the U.S.S.R. women enjoy equal rights with men in all fields of social, political and cultural life. There is only one exception: it concerns women's nature and their family position and child care. In this respect women have special privileges. Possessing natural abilities equal to those of men, women have free access to science in the U.S.S.R. Their number is about 40% of the total scientific staff and in astronomy as well. It is rather difficult to specify the absolute number of women in astronomy, but one may suggest this number to be about, say, seven to eight hundred. About 30 to 40% of these women have a doctor's degree, nearly the same percentage as men. In this respect, women's scientific position is equal to that of men. Needless to say, women and men are paid equally.

There is a second doctor's degree which, being of a higher rank, is usually awarded to the most prominent scientists whose contribution includes the development of some new scientific trend. The number of specialists of such rank is about one tenth of all those holding a doctor's degree. Usually women cannot afford to devote all their life to obtaining this degree. Nevertheless one can find dozens of such highly qualified women among Soviet astronomers.

It seems that the reasonable and natural proportions of men and

women in science and astronomy in particular are due to the situation existing in the college and university educational system. In school, girls and boys study together. Their proportion corresponds to the natural demographic proportion, due to the obligatory nature of the educational system.

Astronomy is a separate course in the Soviet school programme, and boys and girls in their teens regard astronomy romantically. After graduating from secondary school, they can choose their future speciality. Boys and girls who prefer astronomy have equal chances to enter a university.

In the main universities (Moscow, Leningrad etc.), girls represent more than 25 to 35% of students in astronomy. This accounts for the existing percentage of women among astronomers.

There have been many outstanding women in Soviet astronomy. Their names are well known in many countries: V. F. Gase (1888-1954), N. N. Sytinskaya (1906-1974) and A. G. Masevitch in astrophysics, L. P. Tseraskaya (1855-1931), R. A. Bartaja and K. A. Barkhatova in stellar astronomy, A. Ja. Bougoslavskaya (1899-1960) in astrometry, N. F. Rein (1905-1942) and E. I. Kazimirschak-Polonskaya in celestial mechanics. We find women in all branches of astronomy.

Is there any branch which attracts more women than others? It is difficult to say. But there is evidence that many women solve problems in celestial mechanics, discover minor planets, novae and supernovae, and make many other contributions to observational study.

HERMES SUPERMARKET

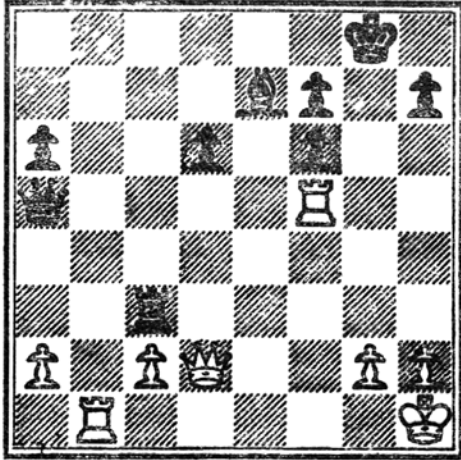
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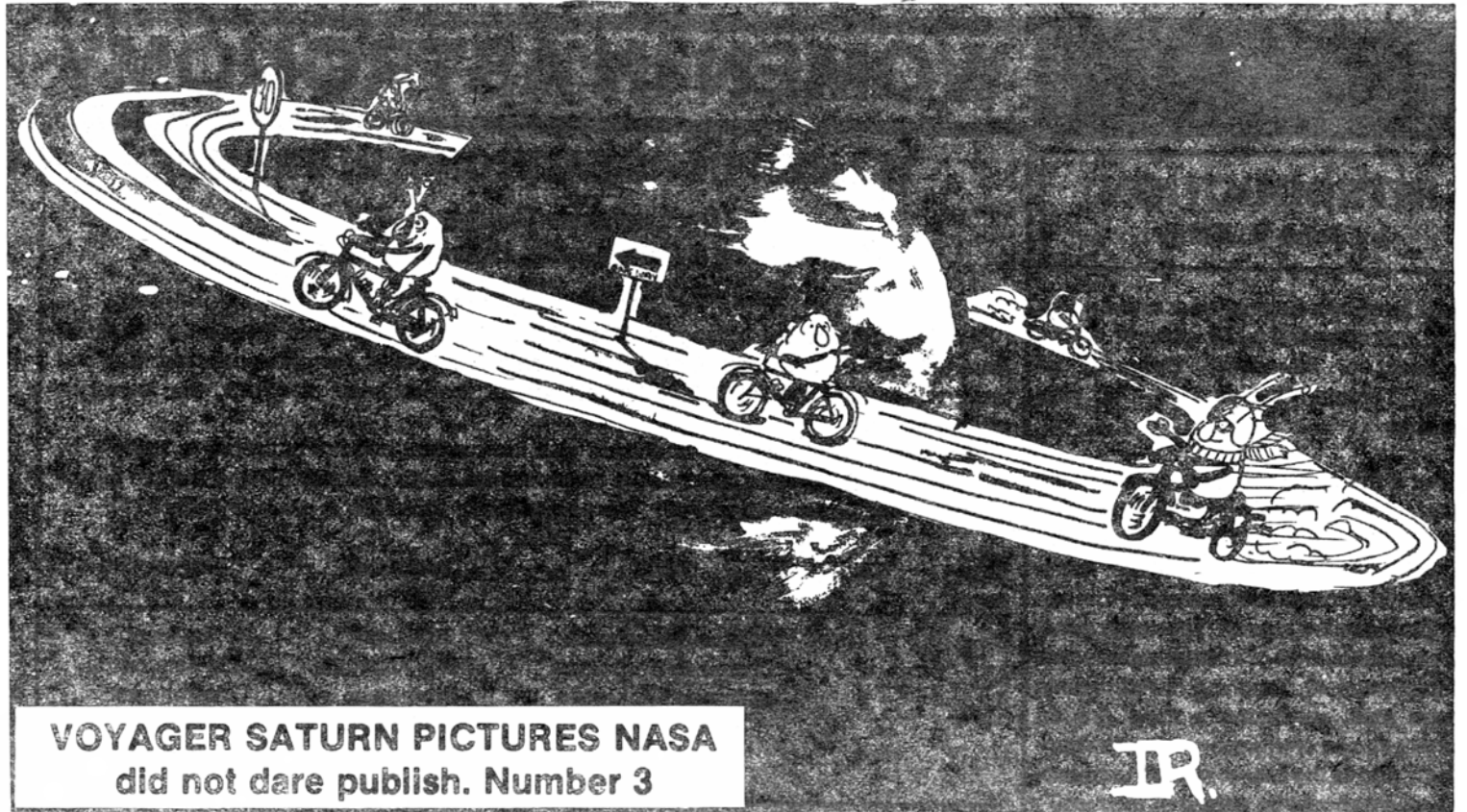
Chess Position 5



Black to play and win

Solution to Chess Position 4:

1. B-R7I, B-R8 2. K-K1I, B-B6 3 K-B2, B-R8
4. B-Q4I, B X B 5. K-Q3, B-R8 6. K-K4 and
the white pawn cannot be stopped.
V.V.M.



USEFUL ASTRONOMICAL PHRASES AND THEIR MEANINGS

Many people complain that it is difficult to understand astronomical lectures or papers because of the obscure jargon used. To alleviate such difficulties we give a

list of some of the more frequently occurring phrases with their scientific meanings.

PHRASE

MEANING

- After a little reduction.
- The computer trials verified the analytical formula.
- Obviously true
- Manifestly true.
- Certain.
- Probable.
- In full agreement with...
- 10 to the 40 within a factor of two.
- Revealing a slight deficit in solar neutrinos.
- Giving the reliable age of the Universe as 20.000.000.000 years.
- Exhaustive survey.
- Unanswerable objection.
- Trivial criticism.
- Considered opinion.

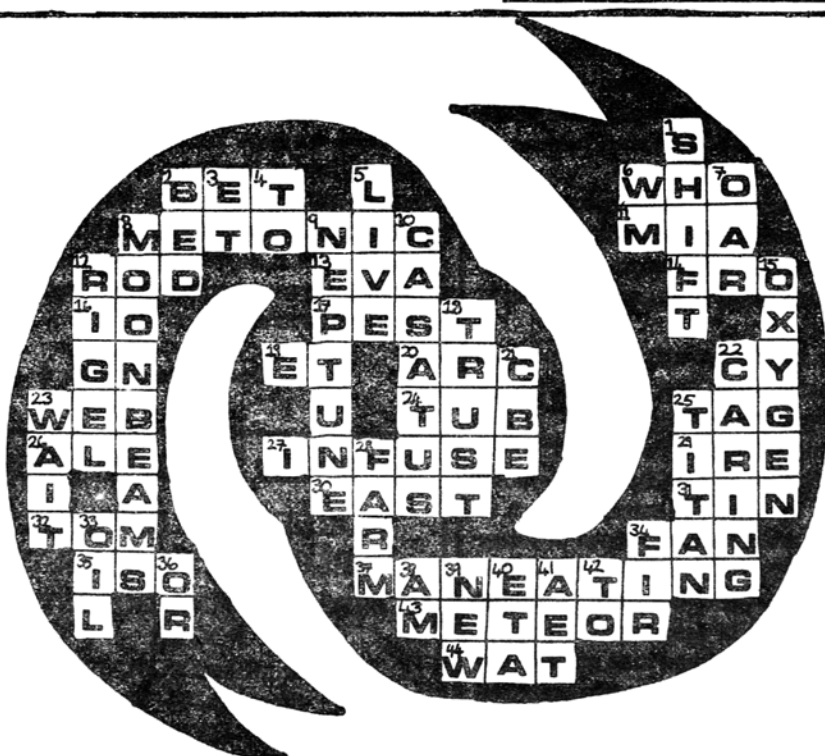
- After a week's hard slogging.
I had used the numerical integration procedure before Bill showed me the standard integral.
I can't find a proof but I have this feeling about it.
As for 3 but wave hands even faster.
Dubious.
Possible.
Yes or no, depending on what you want.
From 10^{20} to 10^{40} .
Where in hell are they?
We're pretty sure of the number of zeroes but the 2 could be anything between 1 and 3 we think.
A quick glance through the literature.
Trivial criticism.
Unanswerable objection.
My guess is...

Rodopoulos Michalis

Cavo d'oro

Cafeteria - Spaggeteria

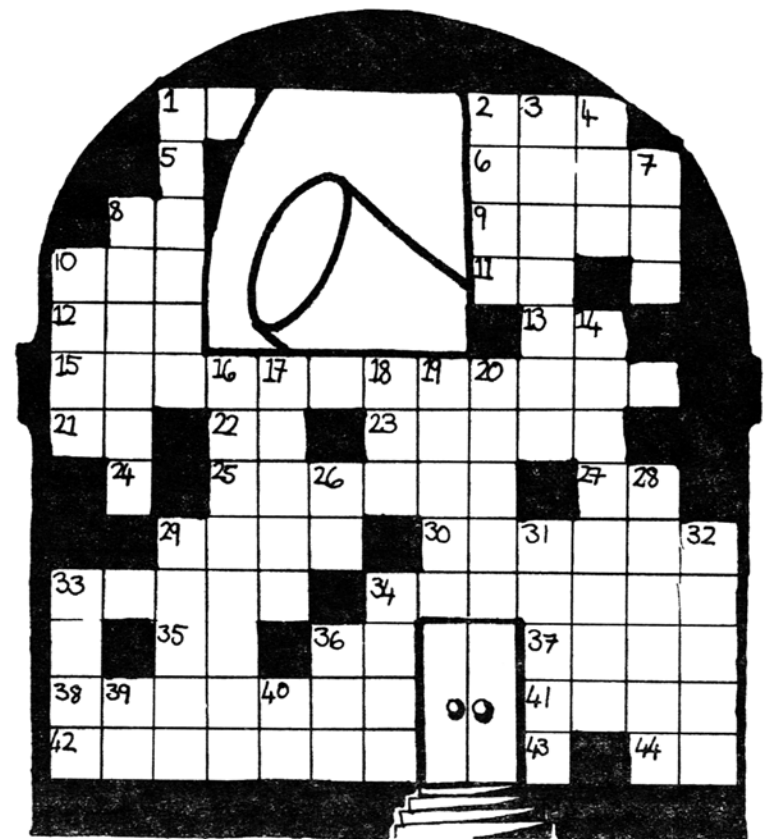
Iroon Polytehniou, Glyfada



ASTROCROSSWORD

ACROSS

- Exclamation
- Hard water
- Commonly used symbol for energy
- Fit of unconsciousness
- You can make it canine
- Musical work
- Greek «are»
- I can turn it into a pinch
- Strong emotion
- Reversed American greeting
- Relating to the universe
- «Now» in the mnemonic for spectral class
- A search for ET's
- White, B8, $m = 0.34$, binary; $d = 700$ ly
- The hottest
- Of the North or North wind
- They are neighbours to the Sun's position.
- You have to draw it somewhere
- Of the intellect
- Its song on Voyager's record may outlast it.
- Helps keep you balanced
- See I have a rhyme assisting, my feeble brain its chore resisting.
- GMT
- Scramble «omit» to get it
- Famous Czech composer
- To undress fruit or vegetables
- Geometrical shape - or dead parrot!
- With 44 it draws its own conclusion



DOWN

- Found in Greek churches
- Small wood
- Large Australian bird
- Burnt tree?
- Timely to add a meter
- Eastern staple food
- Football teams switch round then
- Characteristic of all transport
- Protective layer endangered by human inventiveness.
- Sometimes it's valuable
- Above the main sequence
- Eskimo's traditional house
- With reference to
- Immature cat
- Folded back part of coat
- In the west it is considered a romantic thing to do
- And often results in this
- Small bundle of straw
- Is NATO going the right way?
- The hopes of many
- Add a «B» and you've got a riot
- It's painful if you add it to the 6th, 7th and 4th of 42

GASTRONOMY CORNER



Moussaka

- 3-4 medium sized aubergines
- 3-4 courgettes (optional)
- 2 potatoes
- 1 medium onion grated
- 1/4 cup butter
- 1 1/2 lb minced meat
- 1/2 cup white wine
- 3 peeled and chopped tomatoes (or a 1lb can)
- Chopped parsley
- 3 cups bechamel sauce
- Salt and pepper
- 2 egg whites, lightly beaten
- Olive oil (or corn oil) for frying
- 2 egg yolks
- 1 egg
- 3 cups grated cheese

1. Cut the aubergines, courgettes, potatoes into slices 1/2 inch thick. Put the aubergines into salty water and leave on one side for an hour.

2. Sauté the onion in a little butter until soft and opaque. Add the mince, stirring with a fork to keep the meat broken up. Add the wine, tomatoes, parsley salt and pepper and simmer, covered for 30 minutes. Remove from heat to add the egg whites and stir well.

3. Rinse and dry the aubergines and the other vegetables and fry lightly in olive oil on both sides.

4. Grease an ovenproof dish, and line the bottom with half the vegetables. Spread on the meat mixture and cover with remaining vegetables. Beat the egg yolks with whole egg and stir into the bechamel sauce. Add 2 1/2 cups of grated strong cheese (such as kefalotyri) and pour over the vegetables covering the whole dish.

Sprinkle the remaining cheese on top and bake in a moderate oven for about 45 minutes or until the top is golden brown. (Serves 6).

Stuffing Summer vegetables

Summer vegetables such as vine leaves, aubergines, tomatoes, peppers, courgettes, are very common and plentiful this time of year in Greece.

Their unforgettable taste when they are cooked or simply served with olive oil and



A little-known episode in the observing life of William and Caroline Herschel (apologies to Honoré Daumier (1808-1879))

«Not there, you fool! There!»

seasoning is fully appreciated by Greeks and by tourists travelling in Greece.

Many vegetables can be filled with savoury stuffings to make delicious summer dishes, either hors-d'œuvres, or main courses. Left over pasta, rice or cooked lamb or beef mixed with other vegetables are also a good basis of filling. Another advantage of stuffed vegetables is that they are very easily prepared in advance when guests are expected.

Here are two recipes from the many ways of stuffing vegetables, very common in Greek cooking.

Stuffed Vine Leaves or Dolmades

Cooking time: 1 hour, oven temperature 325F, Gas Mark 3.

1/2 lb vine leaves. (You can use canned vine leaves because fresh young vine leaves are not easy to come by, or spring cabbage leaves. Greek manufacturers «Kyknos», «BEM»).

- 1 cup olive oil
- 1/2 lb chopped or grated onions
- 1 cup uncooked rice
- 1 cup hot water
- 1/2 lb minced meat
- 4 tomatoes chopped small or 1 can peeled tomatoes.

- Vine leaves or cabbage leaves
- 1 lemon
- Salt/pepper

Heat half a cup of olive oil and fry the onions until they are opaque; Add the rice and cook on medium heat for 3 minutes. Add all the remaining ingredients except for the rest of the oil, the lemon and vine or cabbage leaves. Simmer for 5 minutes. Put on one side to cool. Rinse the leaves in cold water. They must be fresh and young about the size of the palm of the hand. Drop them into boiling water and cook for 3 minutes; drain and rinse in cold water. Place the leaves rib sides up, on a flat surface, and in the centre place a heaped teaspoonful of the filling. Fold both ends of the leaves inwards and then roll into a small parcel. Don't fold too tightly as the rice must have room to swell. Pack in a flame proof dish or casserole close together in layers. Pour in the remaining oil, lemon juice, 1 1/2 cups of hot water and a spoonful of good quality butter. Then cover with a heatproof plate or lid or foil to prevent rolls unwrapping.

Simmer gently on top of the cooker or place in the oven for about 1 hour.

Serve hot as an hors-d'œuvres, or as main course

Baked stuffed aubergines (or peppers)

Cooking time: 40 minutes Oven temperature: 220C (425F)

- Gas Mark 7
- 4 medium sized aubergines
- 1 large onion, finely chopped

- 1 clove of garlic, finely chopped or dashed (optional)
- 1/2 kg (1lb) of minced raw beef
- 3 tablespoons of olive oil
- 1 can (400 gr or 14 oz) of whole tomatoes drained but with liquid reserved.
- 3 tablespoons of butter (or margarine)
- 1 oz of flour or 3 tablespoons of flour
- 1/2 pint of milk
- 2 eggs
- 4 tablespoons of thick cream (or evaporated milk)
- Salt and freshly ground pepper
- 4 tablespoons of grated cheese (kefalotyri or parmesana).

Halve the aubergines and scoop out the insides without breaking the skin. Brush the skins with oil inside and out.

Dice the aubergine flesh and sauté with onion and garlic in the heated oil. Add the minced meat and cook until the meat is browned. Allow to simmer for a few minutes.

Make a white sauce by melting the butter and adding flour to make a roux, then add milk gradually. Add to meat mixture, then stir in cream. Adjust seasoning. Stuff the aubergines' skin with the filling and sprinkle with grated cheese.

Transfer the aubergines to a heatproof dish. Coat with juice reserved from canned tomatoes and some olive oil. Bake uncovered for 35-40 minutes. Serve hot.

Hellen Markellos

RUBIK CUBE CROSSWORD

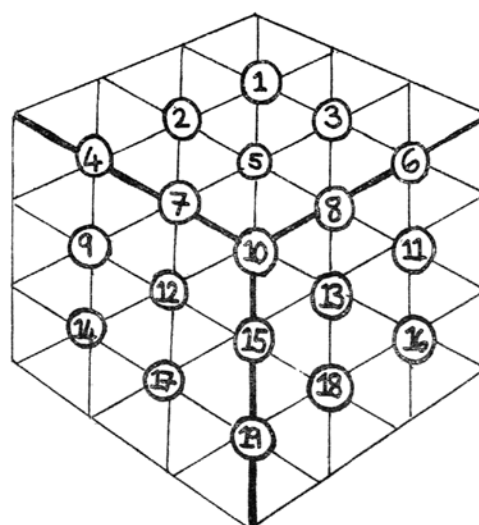
It was perhaps inevitable that the universally popular cube of Mr Rubik should influence the crossword maker. It certainly influenced the ASTROCOSMOS crossword maker for he has dreamed up the one you see before you.

Each clue answer is a six letter word which is placed in the six spaces surrounding the clue number in the Rubik Cube. But although the word's letters retain their correct order the word may be spelled out clockwise or anticlockwise and it may begin in any one of the appropriate six spaces: thus, the answer to clue 13 is ROTATE and it happens that to fit in with the answers to 8, 11, 16, 18, 15 and 10, it is spelled out in a clockwise manner, the letter R being placed in the bottom right hand space.

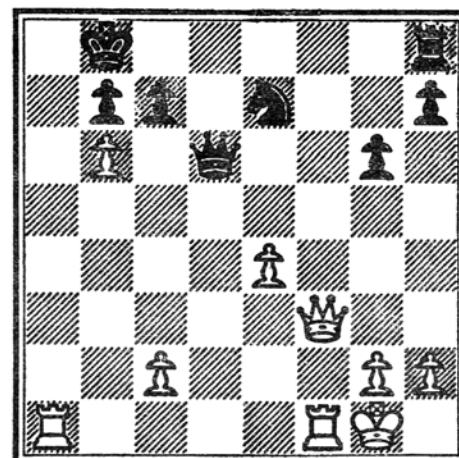
Simple, isn't it?

CLUES

1. Transform into greater depth.
2. Most people find it too fast a game.
3. Justifiably paid.
4. Yours truly of this paper.
5. Lose it and you calm down?
6. Not taken into account by astrologers before 1781.
7. Hail to thee blithe spirit, Bird thou never wert.
8. A neighbour of 6, appropriately.
9. A farmer at sea?
10. An implication or a feature of anything.
11. Many people like a puzzle that forces them to do this with it.
12. An acidic yogi?
13. To do this is a requirement when working with a Rubik cube or with this puzzle.
14. Meek and obedient.
15. Am not able to.
16. Transmits.
17. Seen during a total solar eclipse.
18. Mathematical device to put your head in a whirl?
19. Thresh.



Chess Position 6



White, to move, wins

Continued from page 3

WOMEN IN ASTRONOMY

THE EDUCATION AND ASTRONOMICAL CAREERS OF WOMEN IN POLAND

Dr. Cecylia Iwaniszewska
Institute of Astronomy, Nicolaus Copernicus University
Chopina 12/18, PL 87-100 Torun, Poland

The education of children begins of course at home and later is continued at kindergarten and preparatory schools. There is no separate educational system in Poland for boys and girls. It is now the most common family model for both parents to work and the care of children to be left to state institutions. Although new regulations give mothers the benefit of a yearly unpaid leave (after the three-month paid maternity leave) so that very small children can be brought up by their mothers only a few of them really have enough financial resources to be able to live on only one (the father's) salary. Some families are happy enough to find a reliable woman to come daily and care for their child, but her pay may take up to 50 to 70% of the mother's salary. Finally, some parents may get help from grandmothers but these are usually still working themselves, as the age or retirement for women is 60.

When children leave primary schools at 15, they enter various kinds of secondary schools, either general (lycées) or technical (electrical, chemical, economic, etc). Both boys and girls may study in these schools, but it is customary to have more boys in the technical schools, while girls prevail in lycées. Pupils may begin university studies independently of their secondary school education, they have to undergo entrance examinations. Astronomical courses lasting five years are now available at five Polish universities. The proportion of girls studying astronomy is about one-third, this is exactly true for our Torun University as we have had exactly 33% women in the course for more than 30 years and I suppose it is also statistically true for other Polish universities.

What do the women do when they finish their university education? First of all, some 80% get married, usually during their fifth academic year and then they have to follow

their husbands when these get settled and look for such work as they can find in the vicinity of their new homes. Women usually prefer to teach at secondary schools (they are prepared to teach astronomy and physics) as working hours are shorter than elsewhere while holidays are longer. Some women work at scientific libraries, meteorological institutes and computing centres. Only about 20% of women graduating in astronomy begin a scientific career in astronomy. They are in no way handicapped; they can get salaries equal to those of men, yet in practice, if they have their own families, then they can't spend as much time as they should working on astronomical problems. It is still worse if they have to spend some nights at the observatory and must leave the care of children to the husband, a paid baby-sitter, or perhaps grandmother. And while children are small, it is nearly impossible for a woman to attend scientific conferences, either here or abroad, or to go abroad for a scientific stay. Such a stay usually enables a young astronomer to get more observational material for the preparation of his doctoral thesis. Hence the time for obtaining a doctor's degree is normally much longer for a married woman than for a man. Therefore I think that an astronomical career is much more difficult for a married woman than, for instance, the career of a physicist or a mathematician also working at a university.

If in her astronomical career a woman is given a chair in astronomy in one of the universities, then she may work till 70, which is the age of retirement for professors, both women and men. Generally speaking, there is no legal difference in rights between men and women. Women may be elected to parliament, they may be given the posts of ministers, of directors in various branches of industry, of university presidents, and every-



The pause that refreshes - participants recover from a difficult session

BULLETIN

RADIO OBSERVATIONS OF COMET HALLEY

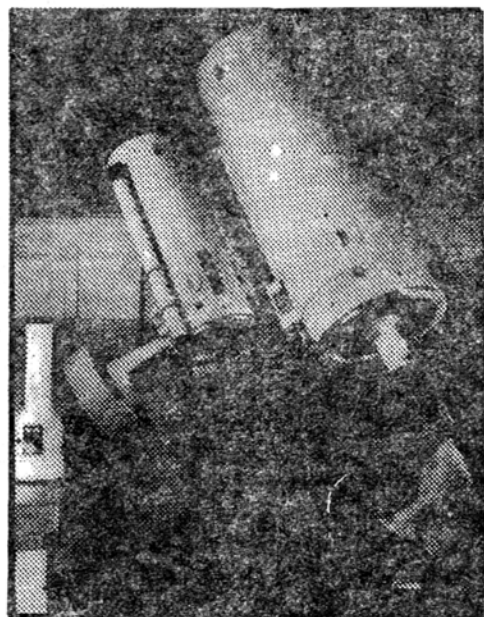
Informal discussion of plans to take place, Monday, August 23, 1030, building A, Pres. of Commissions Room (upstairs). Any interested persons welcome.

Commission 12 and 10 — Discussion Meeting on Solar and Stellar Spots and Activity Cycles

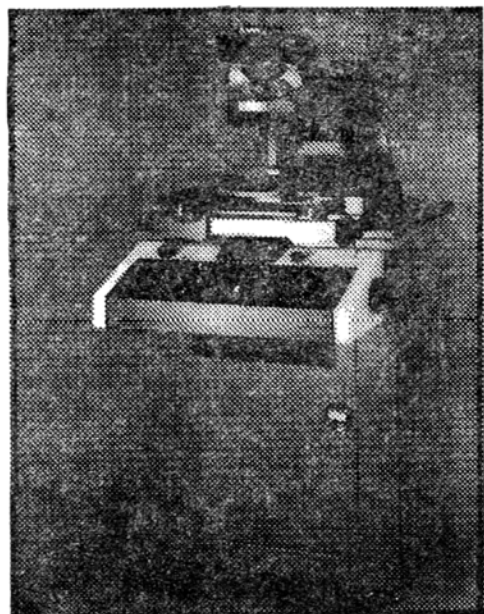
A 3-hour meeting on the above subject will take place starting at 9.00 on Tuesday, August 24 in the concourse Auditorium, room CA. Note that this is a **change of location** from the meeting room printed in the Final Program. The discussion will include invited presentations by M. Rodono («The Starspot Phenomenon»), A. Vaughan («Solar and Stellar Activity Cycles»), and M. Stix («Theories of Spots and Activity Cycles»). In addition there will be contributed oral presentations and poster papers. For details please see the Commission 12 bulletin board.

where they get salaries equal to those of men.

Finally, I ought to mention Emeritus Professor of Astrophysics, Miss Wilhelmina Iwanowska, former Director of our Institute of Astronomy in Torun, Royal Astronomical Society and many other scientific societies, past Vice-president of the International Astronomical Union, who is now retired, but still is taking an active interest in Polish astronomical life.



Telescopes: 30-Inch Cassegrain/Coude Telescopes



PDS Microdensitometer Data Acquisition System.

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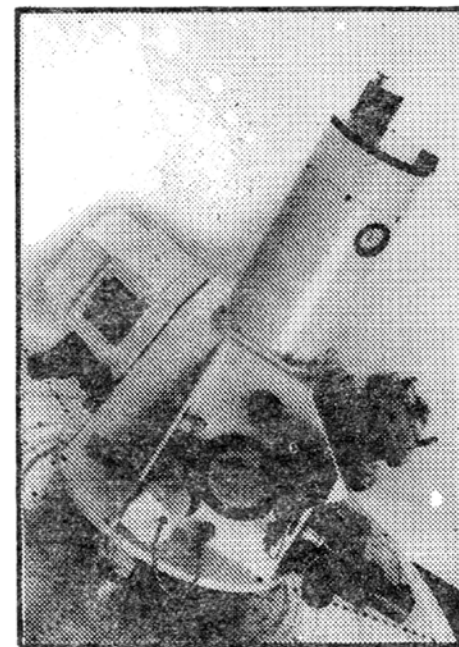
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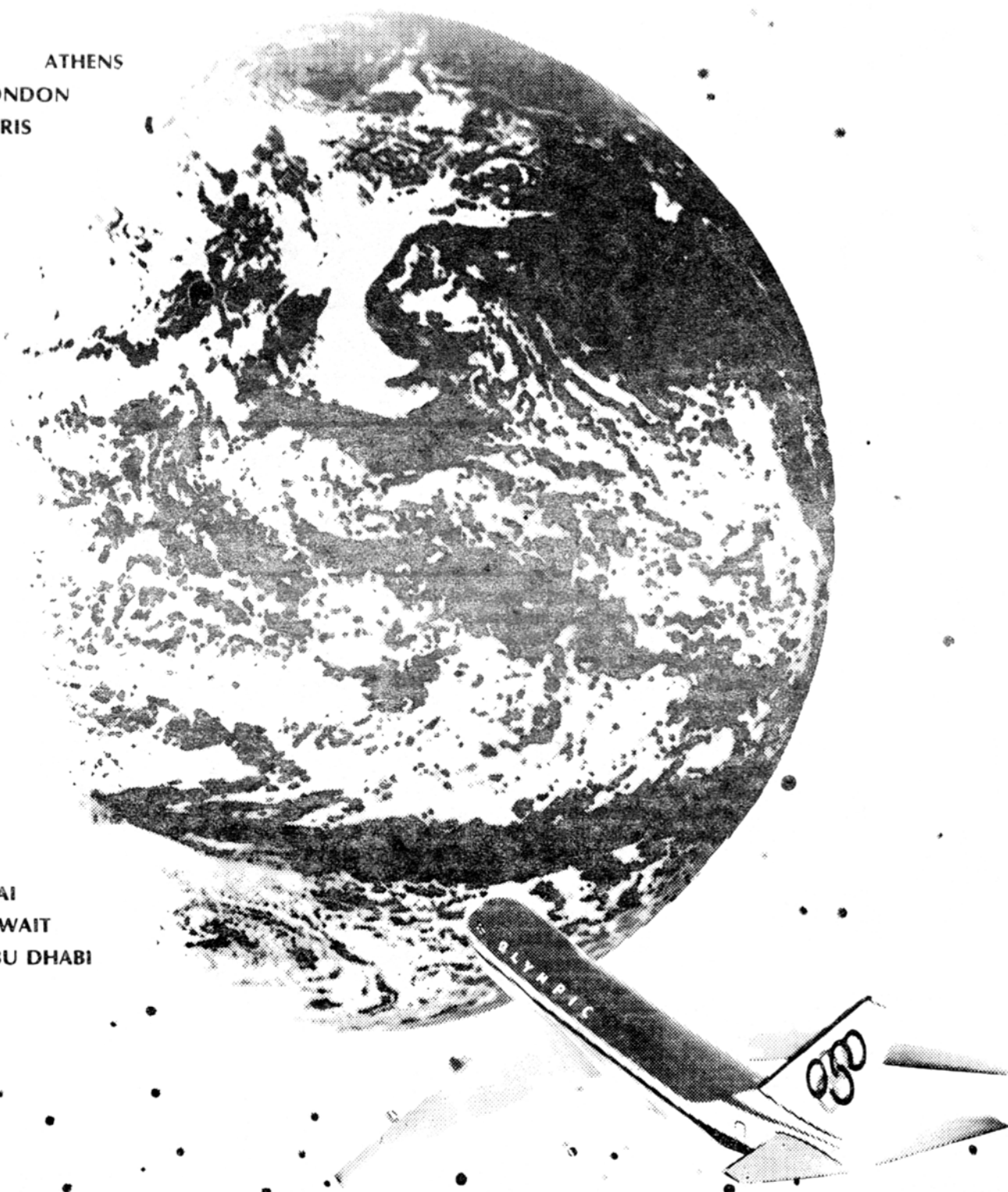
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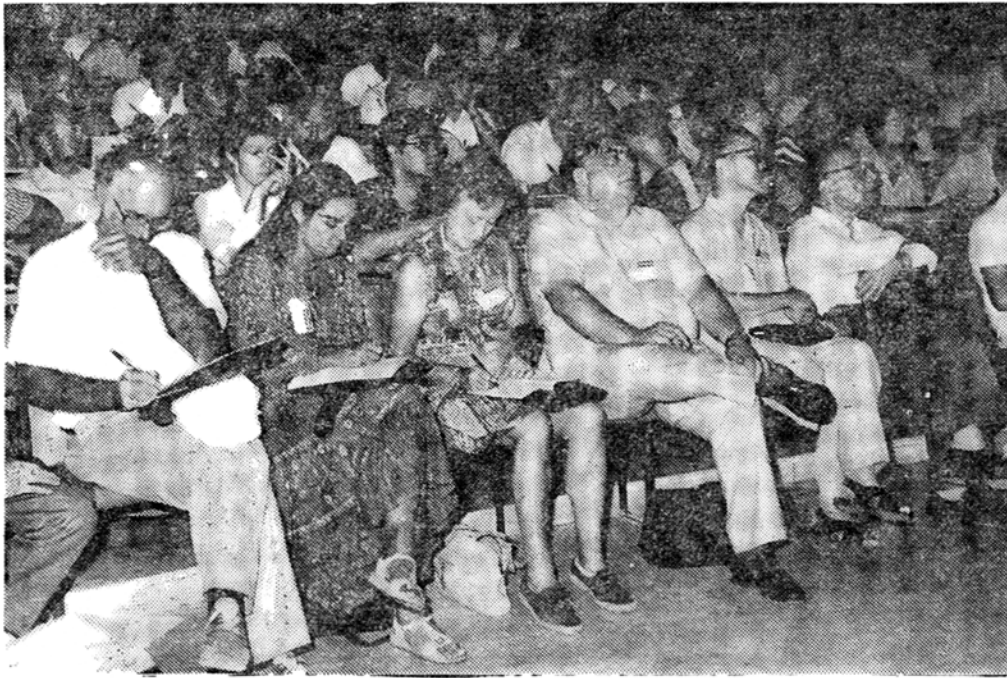
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Prof. Virginia Trimble, Prof. Margaret Burbidge, and Prof. Geoffrey Burbidge, among others in thoughtful mood.



Participants attending Joint Discussion One. A study in concentration!

AO538-66 The most luminous Galactic X-ray source known

P.A. Charles Department of Astrophysics, University of Oxford, Oxford, U.K.

The X-ray object AO538-66 is now known as the Periodic Recurrent Transient. Discovered in 1977 by Ariel V and positioned with the HEAO-1 satellite, the unusual nature of this source became apparent when its location in the LMC indicated an X-ray luminosity at peak of $\sim 10^{39}$ erg s⁻¹. This is ~ 100 times brighter than any other galactic X-ray source and comparable to the integrated X-ray output of a normal galaxy such as the Milky Way and M31. The X-ray outbursts recur every 16.65 days at which time the optical counterpart brightens from $B \sim 15$ to 13. Studies of archival plate material by Skinner have indicated that this has occurred for at least the past 50 years, although there are times of inactivity when no outbursts occur.

AO538-66 was in an inactive state for most of 1980 but came out of it in November 1980 so that our CTIO 4 m and AAT spectroscopy in Dec/Jan 1980/81 indicated growing activity (Balmer, He I emission) superposed on the spectrum of a B2 III star. At maximum the spectrum lines showed multistructure P Cyg-

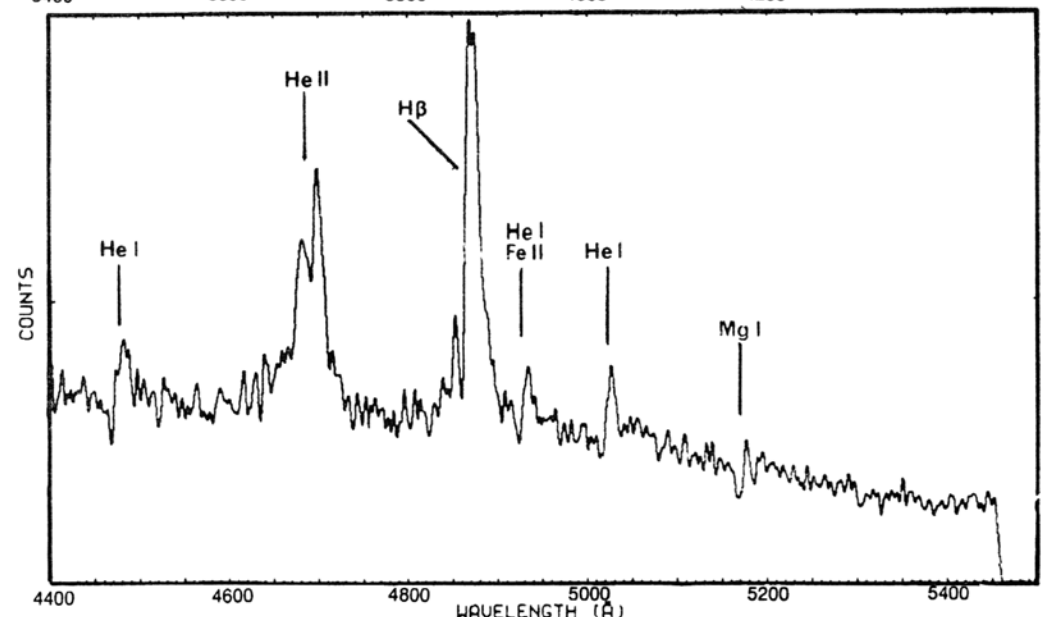
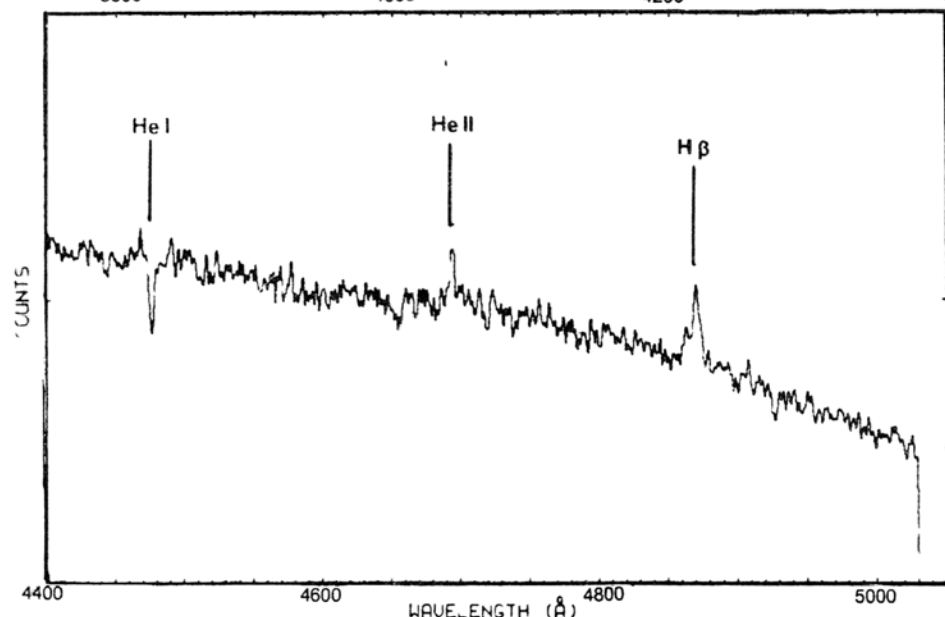
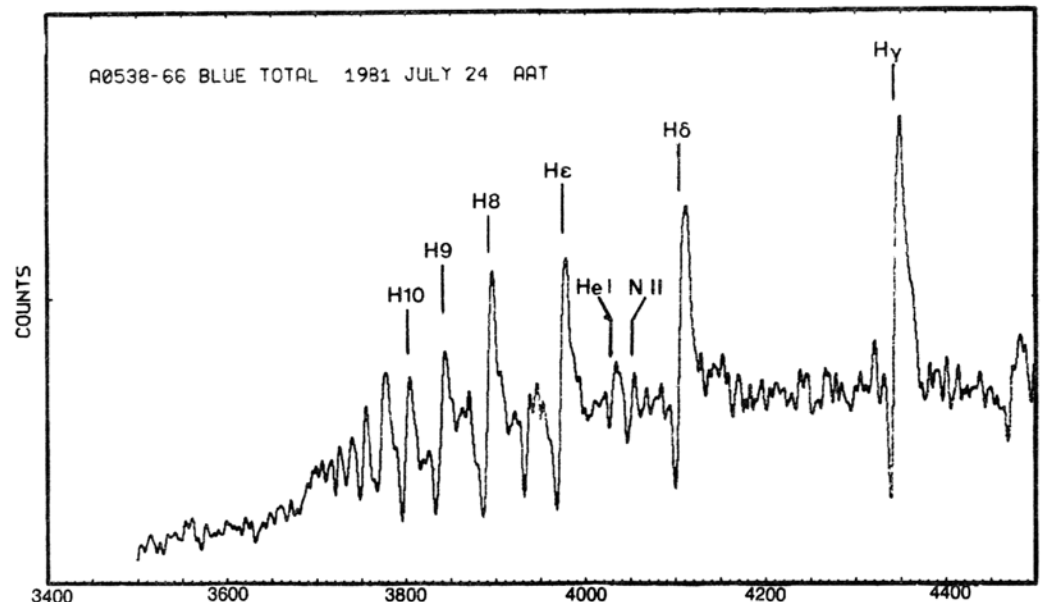
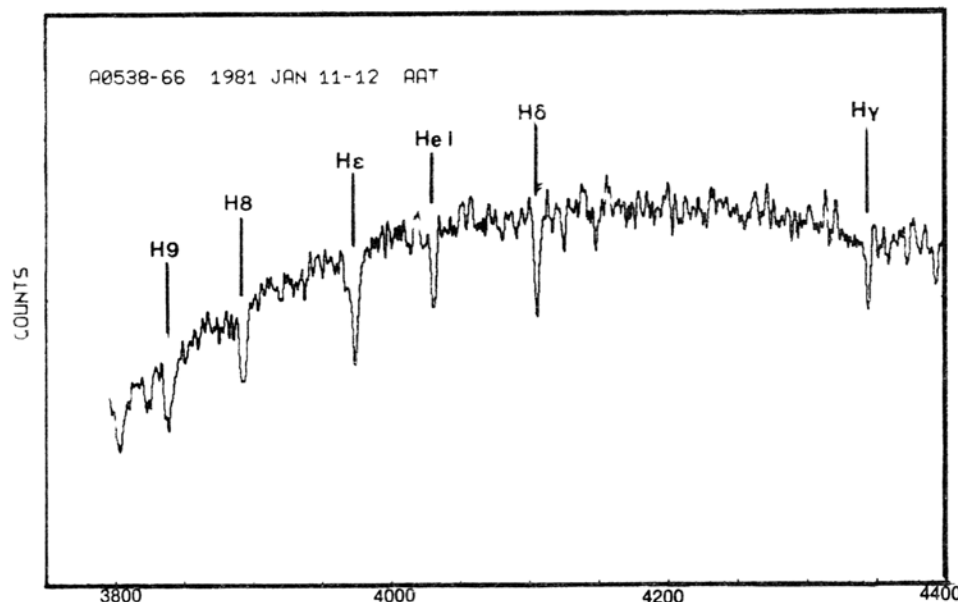
ni profiles and the addition of powerful He II λ 4686 emission (which we interpret as indicating the turn-on of the X-ray source). The quiescent or uncontaminated line velocities are in excellent agreement with the LMC systemic velocity thus confirming its location. No 16.65 day radial velocity modulation is evident, almost certainly as a result of the large and chaotic mass-motions evident in the system. At this time an IUE spectrum was also obtained near minimum light that showed the continuum of a B2 III star ($T_{\text{eff}} = 18500$ K) together with a C IV λ 1550 P Cyg profile that indicated a wind velocity of $v_{\infty} = 1600$ km s⁻¹. Subsequently (in April 1981) IUE spectra were obtained near phase 0 that indicated dramatic changes in the UV spectrum. C IV, He II, N V and Si IV were now very powerful and broad (~ 3000 km s⁻¹, in stark contrast to the UV spectra of other galactic X-ray sources) superposed on a redder continuum of a \sim B9 I star ($T_{\text{eff}} = 12000$ K).

The periodic (and presumed binary) nature of the outbursts and their tremendous

range and peak power clearly require an eccentric orbit. Taking the B star to be of 12 M_{\odot} with an orbiting neutron star of 1 M_{\odot} indicates a maximum $e \sim 0.8$ if the compact object skims the primary's surface. The source of the mass transfer is unlikely to be a stellar wind because of the very large maximum X-ray luminosity range and also the absence of X-rays at periastron during inactive periods. We thus interpret the mass transfer as being due to tidal lobe overflow. Since the primary is rotating at ~ 400 km s⁻¹ (the quiescent spectral lines are resolved) this infers that «co-rotation at periastron» is achieved and the (modified) Roche lobe formulae can be applied to give $e \sim 0.7$ assuming that the primary fills its Roche lobe at periastron. Material is available for transfer when this lobe lies within the B star envelope and a rough estimate of this amount is $\sim 10^{-7}$ M_{\odot} . Hence the observed X-ray luminosity can be obtained with an efficiency of only $\sim 10^{-3}$ (since radiation pressure effects will be substantial). A large amount of this material

will be blown out and will escape the system (as observed) thus forming the large optically emitting region at outburst. The recent discovery of 69 ms X-ray pulsations from AO538-66 by Skinner et al has given considerable support for this model because the observed P/P is consistent with that expected due to eccentric binary motion with $e = 0.7$.

Our 1981/82 observations indicate a possible long-term trend in the size of the outbursts (peaking during summer 1981 and now declining) and thus suggesting that an inactive period may be approaching. Further observations are needed to verify this, as well as joint X-ray/IUE/optical/radio programs to define the model in detail. This extraordinary object is the ideal transient to study because of its predictability as well as being an example of an object that periodically approaches the condition of a common-envelope binary.



XVIIIth GENERAL ASSEMBLY



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Telephone: 991 465

Major international observatory to open next year

Nigel Henbest, Press Consultant, Royal Greenwich Observatory

On a high peak in the Canary Islands, workmen and skilled technicians are putting the finishing touches to the world's newest major observatory — the International Observatorio del Roque de los Muchachos. The first large telescopes will open their eyes to the sky next year. By the end of 1983, they will be operated by remote control from over 2000 kilometres away. And in five years' time, the world's third-largest single-mirror optical telescope will join them. Although this 4.2 metre telescope is rather smaller than the Soviet 6 metre and the American 5 metre at Palomar Observatory, the clear dark skies of La Palma will make it their equal in our joint quest to understand the Universe.

The observatory is perched on the lip of the great extinct volcanic caldera which forms the mass of La Palma, most westerly of the Canary Islands (and confusingly similar in name to the town of Las Palmas, which is on another island). The rugged mountain towers to 2,400 metres, peaking in a distinct formation of small rock pillars — the Muchachos, or «buddies». By choosing the name Observatorio del Roque de los Muchachos, the Spanish are not only following the tradition of naming an observatory after its mountain perch, but also symbolising the observatory's theme of international collaboration. Three years ago, Spain, the United Kingdom, Sweden and Denmark signed the initial agreement, and the observatory has grown speedily since, with Dutch and Irish involvement in the largest group of telescopes and other European countries expressing interest in providing more.

The Spanish are providing the essential services to the observatory, including electrical power and telephone lines. They are blasting and bulldozing a new road from the main town of Santa Cruz to the mountain peak, and are also building there the Residencia for astronomers and other staff to sleep on their few hours away from the telescopes. In return, Spanish astronomers will have 20 per cent of the observing time on the telescopes at the observatory.

The countries participating have a variety of plans to use this superb viewpoint on the heavens. Here I shall concentrate on those which involve the United Kingdom. The Royal Greenwich Observatory will be running these for use by the whole community of British astronomers and their international collaborators.

Together with the Danes, the British are building on La Palma the most advanced ground-based telescope designed specifically for measuring star positions. The Carlsberg Automatic Transit Circle is basically a telescope swinging up and down the north-south line — in the centuries-old tradition of transit instruments. But no astronomer will have to peer through this telescope and wait poised to record the exact moment a star crosses a fine crosswire. The Carlsberg instrument is fully automated. As well as measuring the moment of meridian passage impersonally, it can be programmed with a list of stars and spend all

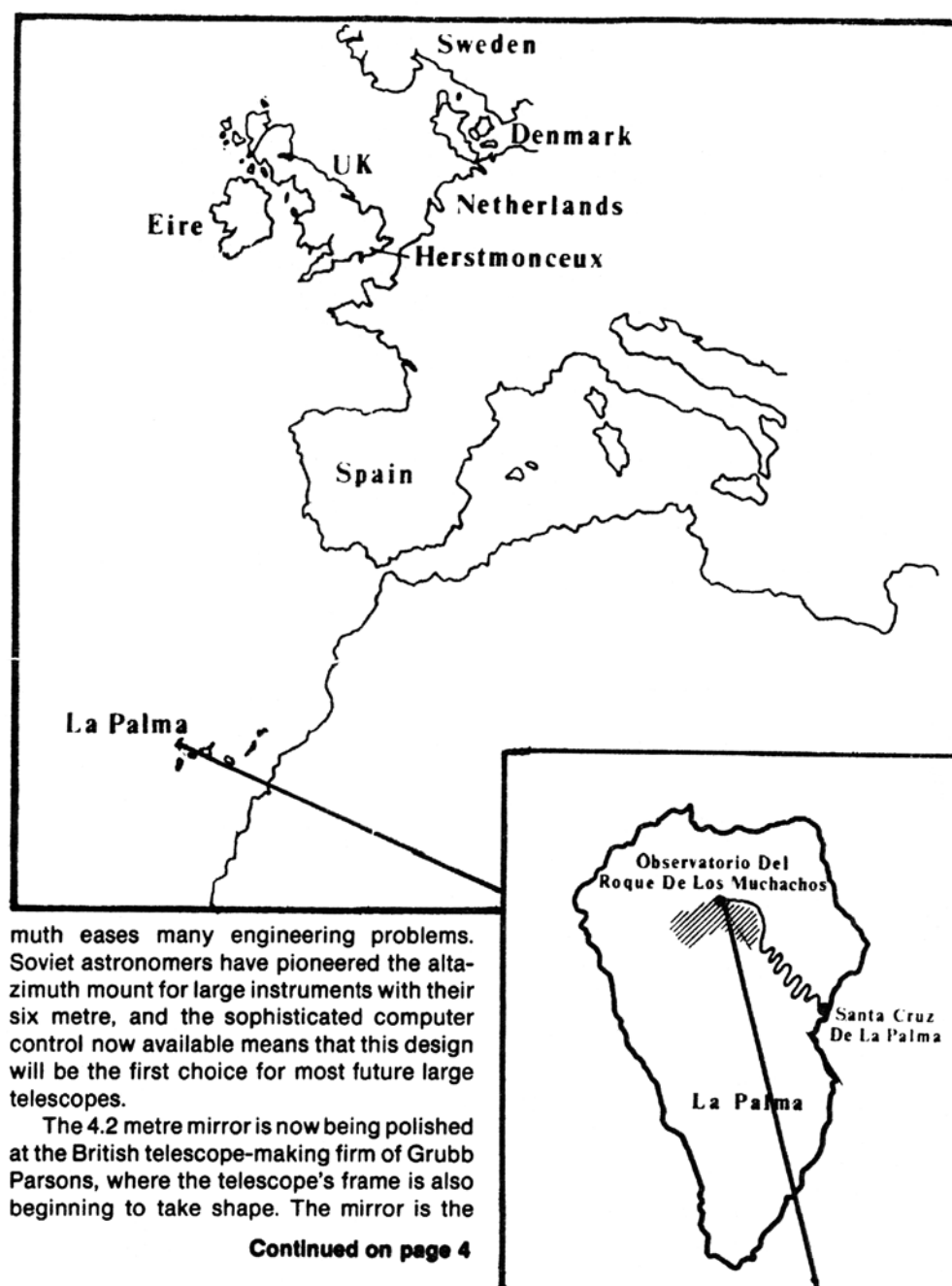
night by itself to nod up and down and find one star after another.

The Observatory's biggest guns will be a trio of British telescopes. The Netherlands is contributing to the cost of these telescopes and is participating in the provision of instruments in return for a proportion of the observing time. (The agreement also covers a 15 metre submillimetre wave telescope — to explore the wavelengths between infrared and radio — which was intended for La Palma but which will now go the higher peak of Mauna Kea in Hawaii).

The smallest of the three is a one metre reflector. It is a dual-purpose telescope. Astronomers can use it for normal spectrographic observations «on-axis». But the telescope is particularly designed to photograph a wide field (1 1/2 degrees) without distortion, and with this aperture it can include a vast number of faint objects. On a single plate it can record several bright stars whose positions have been well-determined with instruments like the Carlsberg circle or the Hipparcos satellite (described in the first issue of Astrocosmos), and using these as a reference framework, astronomers will be able to locate accurately the thousands of fainter stars, quasars and galaxies which appear on the same plate.

Opening along with the one metre next year will be the revamped 2.5 metre Isaac Newton Telescope. The Royal Greenwich Observatory has moved this telescope from under the rather murky skies of its headquarters at Herstmonceux Castle in southern England, and fitted it out with a new and better mirror to make the most of the superb skies of La Palma. Both these telescopes will be operated by remote control from Herstmonceux, using at first ordinary rented telephone lines. A staff of two dozen will live on La Palma, but British astronomers will not have to follow the usual practice of travelling there to use the telescopes. They will be able to sit at a control desk at Herstmonceux, where TV screens will show them what the telescopes are «seeing» and a display of the data, while a voice link keeps them in touch with the La Palma staff. The full data, on magnetic tape, can be flown back a day or two later — as quickly as a visiting astronomer could fly it back himself.

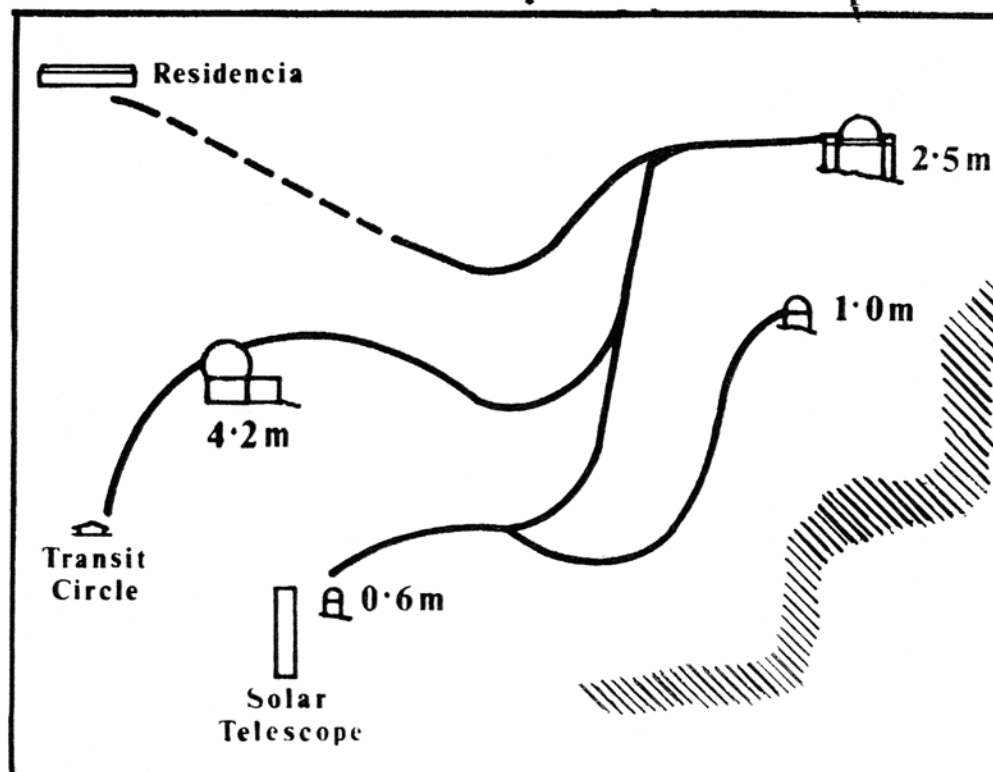
The Observatory's main telescope, however, will be the 4.2 metre William Herschel Telescope. In the spirit of international collaboration, it is named after the Prussian musician and amateur astronomer who discovered the planet Uranus in 1781, while living and working in England. Another link is that Herschel presented the King of Spain with one of his home-made reflecting telescopes in 1803. And the name is appropriate too, because the 4.2 metre will be pivoted on the altazimuth type of mounting favoured by Herschel for his large telescopes. The vertical rotating fork of the altazimuth has long been out of fashion, overtaken by its rival the «tipped up» equatorial mounting, but for really large and heavy telescopes the altazi-



muth eases many engineering problems. Soviet astronomers have pioneered the altazimuth mount for large instruments with their six metre, and the sophisticated computer control now available means that this design will be the first choice for most future large telescopes.

The 4.2 metre mirror is now being polished at the British telescope-making firm of Grubb Parsons, where the telescope's frame is also beginning to take shape. The mirror is the

Continued on page 4



Half a dozen European countries are involved in the telescopes now under construction at the Observatorio del Roque de los Muchachos in the Canary Islands.

Editorial

CONSTELLATIONS

Fortified by Sun, sea, excursions, good companionship and a weekend free from lectures, we return to the second half of the programme. Your editor, ever watchful, has noticed with interest that the strange spell cast upon participants by any conference that lasts more than a few days is already operating.

A sense of belonging to the group influences everyone except the incorrigibly anti-social. Apart from membership of the whole, sub-groups form, as people with kindred interests gravitate together, irrespective of nationality. A person may even find himself a member of more than one group and like a free electron will wander from one group to another. There is an almost palpable atmosphere of incompleteness in a group which like an ion, lacks any of its parts. By the

end of the conference this gestalt effect has taken over to the extent that it is almost traumatic to part from the other members of the group. A friend of mine, a member of a group of four, who had spent almost a whole conference together, saw the other three members off at Athens airport. In a letter to me he described the incredible feeling of loss he experienced and how he felt an irrational impulse to grab the first three people he saw and attach himself to them.

Old stagers to conferences know that after a time recovery from this bonding effect does take place. To some extent. There always remain our memories and, if we are lucky, we meet our friends again some other place, some other time to experience once more that enriching sharing of new experiences.

TODAY'S EVENTS: LES EVENEMENTS DU JOUR

JOINT DISCUSSION III:

*"The Extragalactic Distance Scale
and the Hubble Constant"*

(IAU Commissions 25, 28, 40, 45, 47, 48)

09.30-11.00, 11.30-13.00, 15.30-18.00, Room
AB, 23rd August

SOC	Commission
* P.W. Hodge (USA), Chairman	28
E.A. Dibay (USSR)	28
R. Humphreys (USA)	45
K.I. Kellermann (USA)	40
D. Lynden-Bell (UK)	48
M. Peimbert (Mexico)	34
G.A. Tamman (Switzerland)	47
C. de Vaucouleurs (USA)	28
* Editor	

Programme

Session I — 09.30-11.00

J. Graham: "Distance Indicators in the Magellanic Clouds".
B. Madore: "Cepheid Variables in Nearby Galaxies".

D. Hanes: "The Distance to the Virgo Cloud".

Session II — 11.30-13.00

M. Aaronson: "The Fisher-Tully Relation".
C. Gordon: "Supernovae as Distance Indicators".

Discussion

Session III — 15.30-18.00

B. Carney: "Cluster Ages and the Age of the Universe".

G. Paturel: "Recently-developed Distance Indicators".

G.A. Tamman: "Recent work on the Hubble Constant".

Discussion

JOINT DISCUSSION V:

*"Origin and Evolution of
Interplanetary Objects"*

(IAU Commissions 15, 20, 21, 22)

09.00-10.30, 11.00-12.30, 15.15-17.45, Room
AA, 23rd August

SOC	Commission
* B.A. Lindblad (Sweden) Chairman	22
Z. Ceplecha (Czechoslovakia)	22
B.D. Donn (USA)	15
W.G. Elford (Australia)	22
T. Gehrels (USA)	15
Y. Kozai (Japan)	20
L. Kresak (Czechoslovakia)	15
B.G. Marsden (USA)	20
B.A. McIntosh (Canada)	22
P.M. Millman (Canada)	22
J. Rahe (GFR)	15
* H. Rickman (Sweden)	
A. Simonenko (USSR)	22

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THE STEPHANION OBSERVATORY

by L.N. Mavridis, Department of Geodetic Astronomy, University of Thessaloniki, Greece

The Stephanion Observatory was established in 1966 and soon became one of the main astrophysical observatories in Greece. It lies in Peloponnesos near Mycenae ($\lambda = -22^{\circ}49'44''$, $\phi = +37^{\circ}45'15''$) at an altitude of 800 m. The main instrument of the Observatory is a 30inch Cassegrain reflector with assymetric mount (focal ratio f/3 for the primary hyperbolic mirror and f/13.5 for the Cassegrain focus) constructed by Astro Mechanics and belonging to the Department of Geodetic Astronomy, University of Thessaloniki. This telescope is equipped with the following auxiliary equipment:

1) One Johnson dual channel photoelectric photometer with offset guider unit constructed by Astro Mechanics. The photometer is mounted in the Cassegrain focus of the telescope and includes one RCA 1P 21 and one RCA 7102 photomultipliers, both of which are refrigerated during the measurements with dry ice.

2) One Meinel plane grating spectrograph with flat-field folded Schmidt camera f/2 focal ratio, constructed also by Astro Mechanics.

The 30-inch telescope is used by the members of the staff of the Department of Geodetic Astronomy, University of Thessaloniki for photoelectric observations of variable stars in the U, B, V, R, I colors of the International U, B, V System, as well as for medium-dispersion spectroscopic observations of variable stars. The research program includes:

1) Patrol observations of known and suspected flare stars.
2) Long-and short-term changes of the

quiet-state luminosity of flare stars.

3) Photoelectric photometry of galactic cepheids.

4) Photoelectric observations of fundamental stars.

5) Spectroscopic studies of variable stars.

The same instrument is also used by staff members of other astronomical institutes in Greece, as well as by astronomers from neighboring countries (Bulgaria, Egypt etc) for various research projects.

Other instruments also in operation at the Stephanion Observatory at various times have included:

1) The French CNES operated in 1966 at the Stephanion Observatory one Satellite Tracking Station including both Doppler and Laser facility.

2) Prof. Dr. Heinz Neckel and his collaborators from the Hamburg Observatory carried out during 1967-70 photoelectric observations of late-type stars with the 38 cm reflector of the Hamburg Observatory, which was installed temporarily at the Stephanion Observatory. The same instrument was also used by Prof. Dr. L.N. Mavridis and his collaborators from the Department of Geodetic Astronomy, University of Thessaloniki for photoelectric observations of galactic cepheids.

3) Prof. Dr. J.R.W. Heintze and his collaborators from various astronomical institutes of the Netherlands carried out during 1967-1973 photoelectric observations of variable stars with the 40 cm reflector of the Utrecht Observatory, which was also installed temporarily at the Stephanion Observatory.

This tradition of international co-operation is always alive at the Stephanion Observatory. Guest observers are always welcome to apply for observing time and work at the Observatory.

Evangelatos Spyros Restaurant

A GASTRONOMICAL TREAT!!!

In the center of down town Patras conveniently located on Agiou Nikolaou str. 7, you will find the best restaurant in town.

For the last fifty years now S. Evangelatos has been catering for international connoisseurs of fine food exquisitely prepared and served by the continental chef and his fifteen experienced waiters. Open all day until midnight. We are waiting to serve you.

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Agiou Andreou 6.

In our menu you will find the succulent specialties of the Greek cuisine. The original moussaka and the ever popular Greek souvlaki served with rice Both are gourmet's delight. Your choice of wide variety of our tasty pizzas and sea food is also available. Open to serve you from 17.00 to 02.00.

Our catering service is also operating the Wine Festival of the International Astronomical Union.

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Diffraction Limited has been largely involved in meeting the specific needs of astronomers. Our top priority has been to bring down the normally prohibitive design and fabrication costs for certain "one of a kind" items such as Schmidt Optics. For instance, we are making two 500 mm Schmidt Systems for Kuwait, one of which is a Flat-Field Schmidt Cassegrain (F/3.5) that covers a 7° field! Please don't hesitate to write or call for more information. (Tube assemblies available upon request.)

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ANNOUNCEMENT

Today, Monday August 23, the local group of YWCA (Young Women's Christian Association or XEN) organizes an afternoon of "Local Traditions of the month of August" at the Castello Restaurant (behind the Achaia Beach Hotel).

Ouzo, snaks and fruits will be served and Greek songs (accompanied by piano) will be sung. A lottery with Greek wines will take place. Time: 6:30 - 9.00 p.m.

Those interested, please put your name on the list at the Information Desk.

GASTRONOMY CORNER



arni fricassé

For this dish it is better to use baby lamb so that the meat will be tender.

1 kilo lamb
1 large bunch fresh green onion chopped fine
1/2 heart lettuce (cut as for salad)
Salt and pepper
2 tablespoons butter
Egg-lemon sauce (2-3 egg yolks juice of 2 lemons)*

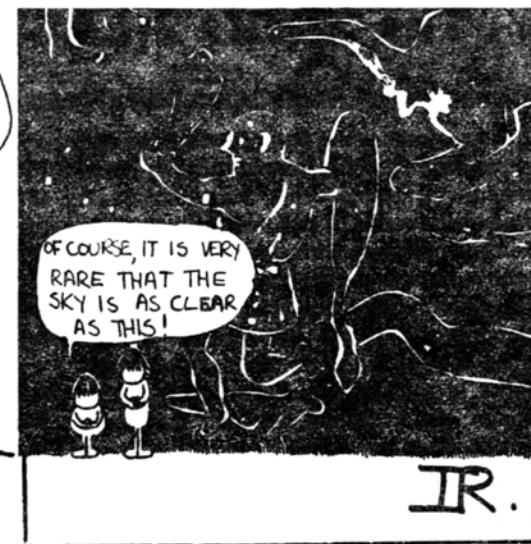
Wash and cut the lamb into serving portions. Melt 2 tablespoons butter in a large saucepan, add meat and sauté for about 15 minutes. Add chopped onion, dill, lettuce, salt and pepper. Add sufficient water to cover and simmer slowly for an hour and a half until the meat is tender.

Add egg-lemon sauce and serve hot.

* Beat egg yolks and while still beating slowly add lemon juice. Slowly add a small amount of liquid from saucepan still beating the mixture. Add the mixture to saucepan.

Wanda Goudas

PATRAS & RION



How to obtain an International Reputation

The following five helpful procedures should go a long way towards enhancing your international reputation.

1. If the first letter of your surname is in the last half of the alphabet, change your name to one beginning with A, or even better with two A's like «Aardvark». In any alphabetical listing of authors of papers your name will then come first.

2. Make sure there are at least two other authors. Reference will then be made to Aardvark et al. (Al is a most prolific writer — almost as productive as Anon — but there is no fear that he will be promoted before you).

3. Maximise your list of publications by:
(i) writing a short account of the research work for NATURE,
(ii) writing a paper on the research work for a learned journal,
(iii) writing an extended abstract for an international conference,
(iv) giving an account of the work at the international conference so that a further version

will appear in the Proceedings of the conference.

(v) allowing a moderately serious and misleading typographical error to slip past the proof stage so that it can be subsequently corrected by

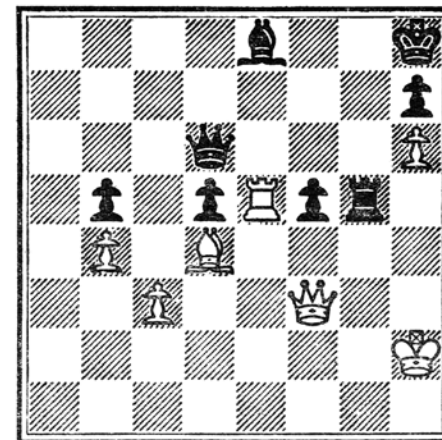
(vi) publishing a short note in a subsequent issue.

NOTE: Deal with (iv), (v) and (vi) personally but don't be selfish: Allow your colleagues to share in the work by taking care of (i), (ii) and (iii).

4. Be seen and heard at as many international conferences as possible.

5. Arrange to be called out from at least one session to take an urgent phone call: make sure that it leaks out that the call is from the President seeking your advice (it is the President of your local Astronomical society but who is to know that).

Chess Position 7



White, to move, wins

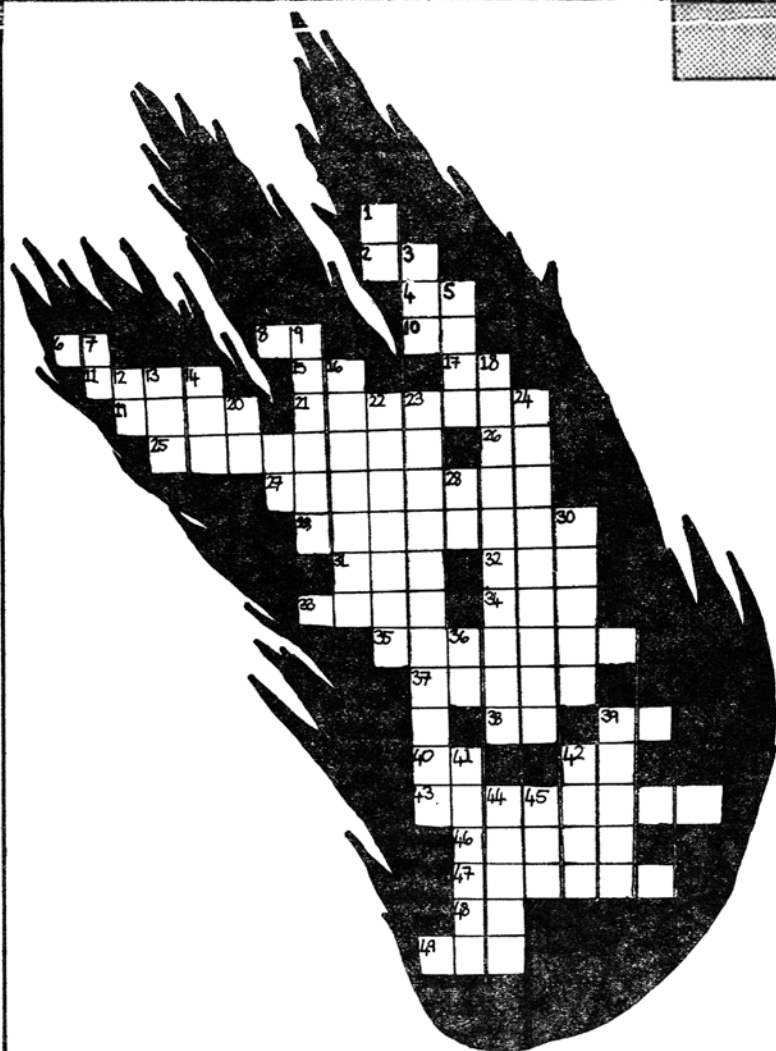
Solution to Chess Position 5:

1. R-QKt6! White loses at least a Rook.

Solution to Chess Position 6:

1. Q-B8ch, Q-Q1 2. R-R8ch, K X R 3. P X P! White threatens both 4.R-R1 mate and 4.P X Q 2 Qch. Black must resign. V.V.M.

ASTROCROSSWORD



ACROSS

2. Too many of them deafen you.
4. Add a little English thank you to this satellite and you haven't got very much.
6. Does an English policeman measure his steps with this?
8. A positive Greek compass reading?
10. A shortened form of transcendental meditation.
11. This clue must be kept a secret.
15. Prolific writer of scientific papers.
17. Volume of celestial predictions.
18. Wander.
21. A down-to-earth person?
25. It's a long time.
26. Add an E for the definite article.
27. After your hard work at the IAU you may need one (two words).
29. As long as it lasts.
31. Quicker than walked.
32. Non-commissioned officer.
33. Some are silly, some are sensible depending on the point of view.
34. Sound of an angry dog?
35. The dog is making these?
37. No western film would be complete without one.
38. Lop the beginning of ECHO, add this to what's left to get a large impact.
39. Early classes.
40. Mind over matter?
42. Indefinite article.
43. Between one and two.

DOWN

1. Subterranean part of the mind.
3. Add enough of them and they can fill any store.
5. A prefix for all.
7. Millilitre.
9. Worked for.
12. Alternatively.
13. Female deer.
14. Gastronomy — not astronomy.
16. Free time from work.
18. Tightening.
20. Not them.
22. Worlds and popular people do this.
23. Hair today and gone tomorrow?
24. State with a hot-line to God.
28. Not by the stars.
30. The pole without penguins.
36. Measured equatorially from the Ram.
39. With an addition it brings tears to the eyes because of its lost electron.
41. To find order in the Solar System obsessed him.
42. A Aquilae.
44. Not dead.
45. Bicyclists and indeed every human should avoid getting into one.

Rodopoulos Michalis

Cavo d'oro

Cafeteria - Spaggeteria
Iroon Polytehniou, Glyfada

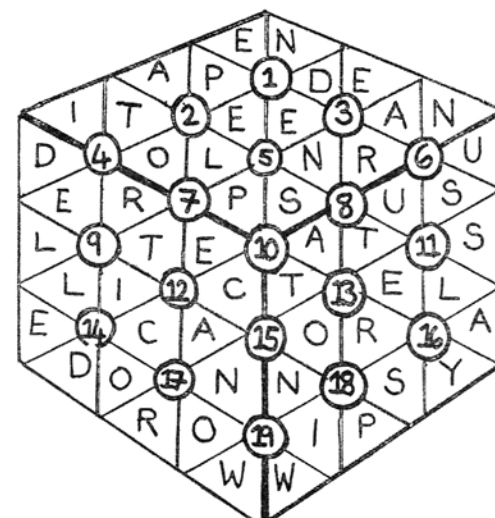
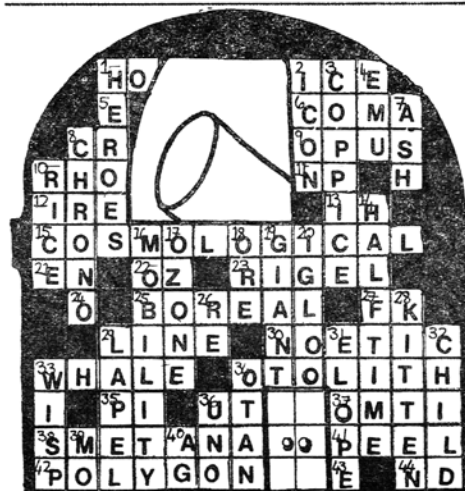
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200, Corinthou str. (1st floor).



The SIRIO 2-LASSO Experiment

S. Leschiutta, Politecnico and Osservatorio Astronomico, Torino, Italy

Time is one of the few commodities with the property to allow transmission or dissemination to remote users, via radiosignals. Large use is made of this possibility and the existence of standard time transmissions or of space surface navigation systems is widespread. Another very important use lies in the comparison between the atomic master clocks kept at the Astronomical Observatories or at the National Metrological Laboratories. An accuracy between 0.1 and 1 microseconds is currently reached in these operations.

But in the last decade an interesting development took place.

The accuracy and stability of the atomic clocks progressed in such a way that the characteristics of the existing radio comparisons methods are no longer adequate. Let us play with some figures

If the frequency difference between the two clocks to be intercompared is 10-14 (a rate of about 1 ns per day), and the resolution of your radio measurement system is of one microsecond, you will wait more than two years before the time difference will show-up.

To study this and related problems is the SIRIO 2-LASSO experiment, a space based time comparison promoted by the European Space Agency (ESA)

SIRIO is the acronym for «Satellite Italiana per Riceria Orientata» (Italian satellite for applied research) and LASSO stands for **L**aser **S**ynchronisation from **S**tationary **O**rbital. Indeed a laser synchronisation via a satellite will be tested for the first time, with the goal of one nanosecond accuracy at intercontinental distances.

The LASSO package, as proposed by B. Gagnebet of CERGA, frasse, is formed by:

- a panel of square cube corner reflectors,
- a very stable clock,
- an optical detector,
- a time-tagging system, and
- the telemetry channels of the satellite.

The operation can be summarized as follows:

— the retroreflector panel reflects back the optical pulses received from each of the laser ground stations,

— the detector, the time-tagging system measure against the space-borne clock, the arrival times of the pulses coming from different earth stations. These data are sent to a single earth station.

The data are finally combined with the **departure times** and the round-trip **propagation times** of all the ground stations, in order to obtain the time difference between the clocks.

This method suffers from a number of limitations and sources of errors, but in principle can prove to be the most accurate time synchronisation system now possible with a gain in accuracy of one-to-two orders of magnitude.

The SIRIO-2 satellite will be launched next September, and after a commissioning period of some months, the LASSO experiment will start its sessions.

Twenty-five observatories and a dozen nations have shown interest in participating. The Nations are Austria, Brazil, the Democratic Republic of Germany, France, Greece, Holland, India, Italy, Spain and United States. Also the Bureau International de l'Heure will participate.

To study the operational procedures, ESA has set-up the Lasso Experimenters and Users Team, a body formed by all the participating observatories, ESA and Telespazio, the agency that will run the technicalities of the experiments.

This team of experimenters have met many times in the last few years, but for their meeting immediately preceding the launch of the satellite and the beginning of the experiment, they chose this UAI 18th Plenary Assembly.

And consequently every one interested in knowing how the nanosecond accuracy can (hopefully) be secured over a span of ten thousand kilometers is warmly invited to attend the meeting, in Room T12, Tuesday 24 August.



Contemporary Greek music casts its spell at the Ancient Odeon of Patras! A study in scepticism, perplexity and endurance.

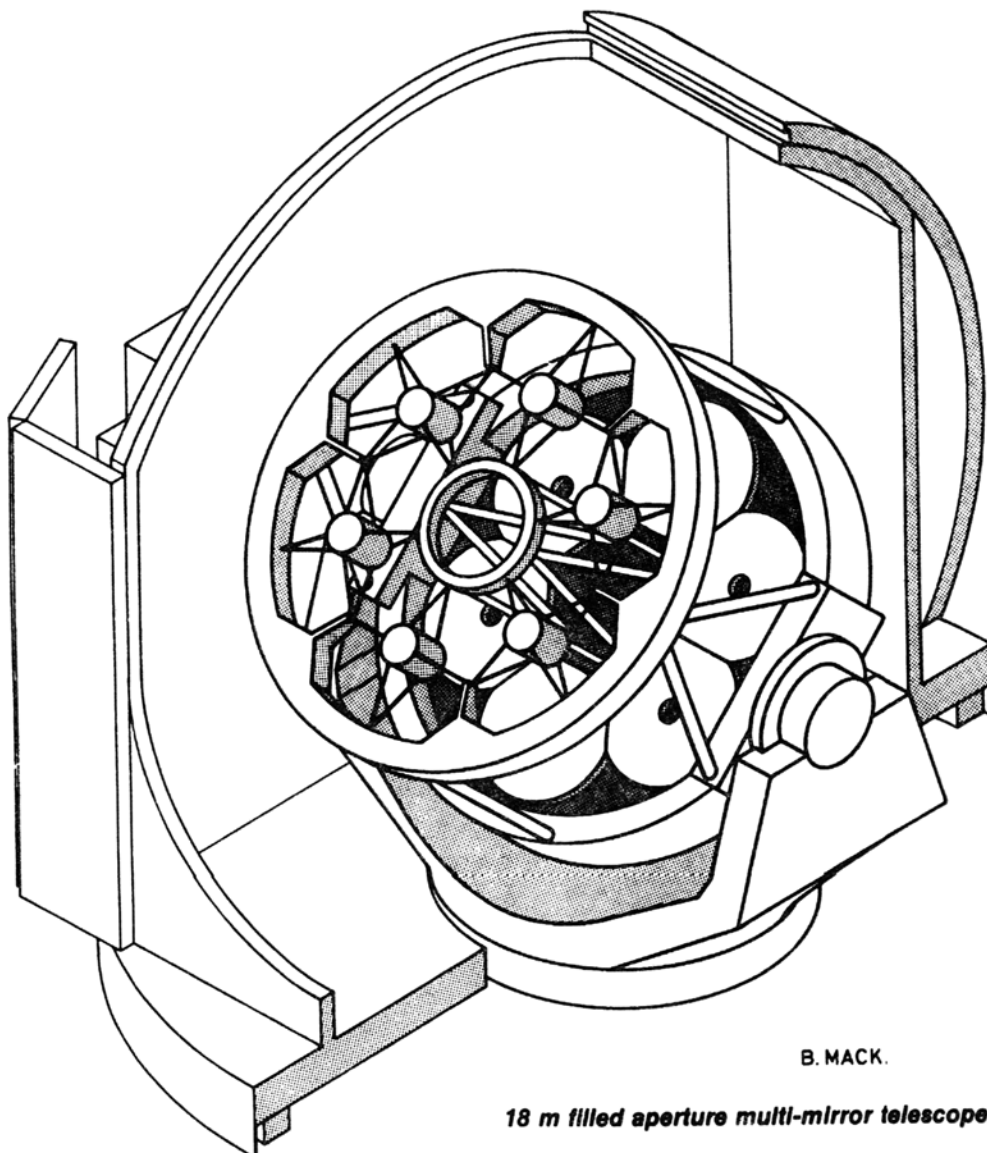
Major international observatory to open next year

Continued from page 1

sister of the Cervit mirrors in the three currently-operating «four metre» telescopes (the Anglo-Australian Telescope, the Kitt Peak Mayall Telescope and the Cerro Tololo 4 metre in Chile), but very slightly larger because the mould at the Owens-Illinois works has been left slightly bigger after each casting has been removed

The William Herschel Telescope should be assembled on La Palma by 1985, and it will also be under remote control from Herstmonceux. It will have several different foci where astronomers can place various light-detectors and spectrographs — the prime focus at the top of the tube, the Cassegrain behind the mirror, two Nasmyth foci at the pivots of the telescope tube, and two «broken Cass» foci on the telescope frame at right angles to the Nasmyth foci. Astronomers can change from one to another merely by altering the configuration of secondary mirrors. In straining for the faintest stars, galaxies and quasars, the telescope's large size is aided by the dark skies of La Palma

What of the future? European astronomers have one of the best observatory sites in the world right on their doorstep in La Palma, and the countries already participating will continue to exploit it as fully as they can — while of course welcoming new colleagues. There is, for example, provision for an optical link between the 2.5 metre and the 4.2 metre to allow them to work together as an interferometer — to show some of the finest details of stars or quasars which would only be apparent to a telescope a hundred times larger than either telescope alone. This technique does not reveal fainter objects, though. Another plan being promoted by the Royal Greenwich Observatory's director, Alec Boksenberg, is a large optical telescope equivalent to a single instrument 18 metres across (a «thousand inch» telescope or more). It could for example combine six 7.5 metre mirrors in a common frame



B. MACK.

18 m filled aperture multi-mirror telescope

The Canary Islands have a long association with astronomy. The peak of Tenerife was the first mountain site to be tested for astronomical observations, when the Astronomer Royal for Scotland took an 18 cm

telescope there in 1856. Now the association is continuing into the 21st century, as astronomers build on the neighbouring island of La Palma the northern hemisphere's leading international observatory

ATLAS OF COMETARY SPECTRA

During the XVIIth General Assembly of the IAU in Montreal in 1979 a Working Group was set up by Commission 15 to prepare an Atlas of Cometary Spectra which will be a sequel to Swings and Haser's «Atlas of Representative Cometary Spectra» published in 1956.

The main goal of the new atlas is to show the progress that has been achieved in the meantime and to present some reproductions of the best of the existing material on cometary spectroscopy.

The emphasis will be laid essentially upon high-dispersion spectra (2 or 3nm/mm to higher resolutions) but some lower dispersion spectrogrammes will be included as well, for instance for the fainter comets. Although the major part of the Atlas will be concerned with optical, photographic spectra, the ultraviolet, infrared and radio regions will also be covered to some extent.

Reproductions of a number of plates that will appear in the Atlas are shown in a display located in the Poster Room, CP (Concourse Area), next to the Registration desk. Comments, critiques or suggestions from the interested persons would be most welcome. Please contact C. Arpigny, B. Donn, F. Dossin, J. Rahe or S. Wycroff.

Financial support from the National Aeronautics and Space Administration and from the Scientific Programme of the North Atlantic Treaty Organisation is gratefully acknowledged.

COMET AUSTIN SEEN

by H. Haupt

The comet AUSTIN was spotted using binoculars on Friday night (21.35 Greek time = 18.35 U.T.) from the beach near Averoff Hotel by H. Haupt (Austria), his family and some more astronomers. It appeared as a fuzzy spot and was nearly as bright as the star Omega Ursae Majoris. No tail could be detected.

XVIIIth GENERAL ASSEMBLY



ASTROCOSMOS



August 24
Number 8



Patras: Greece 1982

Le 24 Août
Numéro 8

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Editor: ARCHIE E. ROY

Telephone: 991 465

Tributes to Professor M.K. Vainu Bappu

Members of the IAU, collaborators and the many friends of the late Professor M.K. Vainu Bappu paid tribute to his memory during a short meeting convened in the Concourse Auditorium at lunchtime yesterday. Professor D.S. Heesch introduced six speakers who delivered speeches of remembrance. Speaking on behalf of the IAU, Professor E.K. Kharadze remembered Bappu's devotion to the Union and his strenuous activities in strengthening activities all over our planet. Professor's Bappu's own personal kindness and benevolence greatly assisted in furthering pleasant collaboration. The IAU, and indeed the whole world, had suffered a great loss, and on behalf of the USSR delegation, Professor Kharadze wished to convey sincere condolences to the Indian delegation.

Professor J.C. Bhattacharyya, on behalf of the Indian National Academy of Sciences, said that Indian astronomy had lost its main guiding force; it was like a nightmare of sailors waking up in dark stormy seas to find their captain missing. He was followed by Academician J. Xanthakis of the Greek National Committee for Astronomy, who spoke of the profound loss they were feeling. On behalf of the Local Organising Committee, Professor C.L. Goudas pointed out that although we were present on this sad occasion to mourn a great scientist and a noble man, Professor Bappu had died at the peak of his glory. And Professor A. Blaauw, past President of the IAU, spoke of Bappu's joy and gratitude when he took on the mantle of President at the close of the IAU General Assembly in Montreal, and how much he had been looking forward to this General Assembly in Patras. At least, he reminded us, we have with us his final thoughts, as contained in the Presidential Address which he was unable to deliver himself.

In a very moving final tribute, Professor H.J. Smith recalled his near-lifelong friendship with Professor Bappu. Speaking of their early 1950s, Professor Smith provided many insights into Bappu's warm, non-cynical and enthusiastic personality; and of his ultimate dream to leave an assuredly brilliant future in the USA to build up astronomy completely from scratch in his native India. Despite an initial lack of ministerial cooperation, which would have totally discouraged the majority of people, Bappu brilliantly succeeded: three thriving institutes, an astronomical society and an astronomical journal are testimony to his drive and enthusiasm. Professor Smith remarked that there were many inspirations which guided Bappu's life, among them an abiding love of nature, and the words of Kipling's poem «If». As a tribute to Bappu, and by way of words of comfort for his mother, Smith concluded with Kipling's lines:

«Since you ran the course against all odds, and won,

You did indeed become a man, my son».

(It is hoped that the full texts of all the speeches will appear in Wednesday's ASTRO-COSMOS).

THE MAIN MUSICAL EVENT AN APPRECIATION

De nombreux membres de la communauté astronomique francophone ont été très sensibles à la délicate intention de Mr. J. Papaioannou de présenter la soirée musicale le Jeudi 19 Août en français, l'autre langue officielle de l'IAU.

Many members of the French speaking astronomical community have been very appreciative of the kind attention of Mr. J. Papaioannou, who had the intent to introduce the «main musical event», of August the 19th, in French, one of the two official languages of the IAU.

ASTRONOMICAL PUZZLE

by

E. Margaret Burbidge
Center for Astrophysics and Space
Sciences University of California, and
San Diego - La Jolla,
California 92093

Philipp Kronberg
University of Toronto
Scarborough College
Toronto (West Hill) M1C 1A4
Canada

Two favorite astronomical «puzzles» — objects whose nature we are trying to elucidate observationally and understand theoretically — are both extragalactic, both radio sources, and both involve at least one quasar. They go by their catalogue names, 3C 303 and AO 0235+164. There is space to describe only one of these here.

3C 303 is a strong radio source, in the original 3C Cambridge catalogue. It is a good example of an object whose study requires international cooperation and both radio and optical observations at several major observatories.

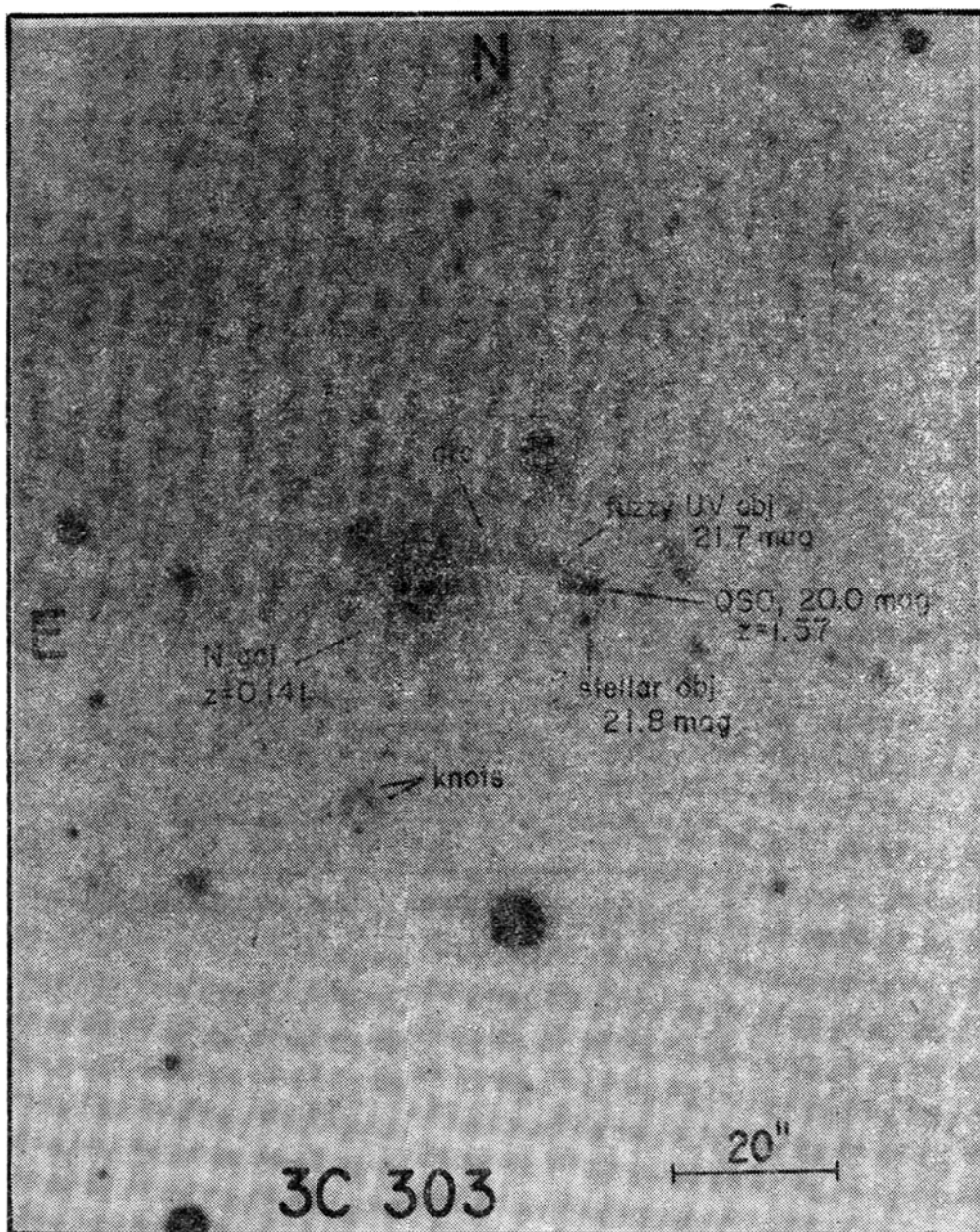
The radio contours are roughly dumbbell shaped in outline and, as revealed recently by the VLA radio telescope, have fascinating and complicated structural details. The optical field contains an N-type radio galaxy, a faint quasar 20 arcsec west of the galaxy, two UV-excess very faint optical objects a few arcsec from the quasar, a luminous arc between the galaxy and one of the UV-excess objects, and a number of faint knots scattered around and in an extended spiral structure extending past the UV objects to the other side of the galaxy; also there are several galaxies fainter than the radio galaxy.

The original optical observations were made by Sandage, who measured the redshift of the N-type galaxy, $z=0.141$, and by the French astronomers, Véron, Lelièvre and Wlérick, who measured the positions, magnitudes, and colors of the group of three UV objects 20 arcsec west, and who pointed out that they might be the true identification of the radio source.

The next observations were by Philipp Kronberg of the University of Toronto and Max Planck Institute, Bonn, and Richard Strom of the Netherlands Foundation for Radio Astronomy, Dwingeloo, who mapped the radio structure at NRAO and Westerbork and by Harding E. Smith and Margaret Burbidge, who obtained the spectrum of the brightest of the three faint UV objects at Lick Observatory with the 3-m telescope. We showed it to be a quasar with redshift $z = 1.57$. The radio structure, apparently one single composite source, had two main lobes, the eastern centered on the radio galaxy and the western on one of the fainter of the three UV objects.

The most recent observations have been carried out by Philipp Kronberg and Louis Noreau (U. Toronto) with the VLA radio telescope, and by Vesa Junkkarinen and Harvey Butcher (Kitt Peak National Observatory) and the UCSD group, using mainly the KPNO 4-m telescope.

The radio observations by Kronberg and Noreau show fantastic detailed structure at 20 cm, 6 cm and 2 cm. At 20 cm, the eastern half divides into a compact source at the N-galaxy nucleus and a fainter extended lobe, and the strong western lobe around the UV objects also has a fainter extension further west. Most fascinating, here is a linear jet of unresolved radio blobs between the radio galaxy and the strong western lobe — resembling a much enhanced and larger - scale version of the



Print of 3C 303 made from a KPNO 4-m plate

blobs in the well-known jet in the nearby radio galaxy M87; not quite coincident, however, with the optically luminous arc. As for the strong central source in the western radio lobe, centered around the northern of the three UV objects, the 6-cm VLA observations show it to break up into many components.

Optically, this northernmost UV object is seen to be slightly extended, with a core asymmetrically placed in the fuzz. The quasar and the other UV objects are star-like. The spectrum of the quasar was relatively easy to obtain with the Lick IDS spectrograph, but the other two objects are about a factor 5 fainter, and we have been working on them with the KPNO 4-m and the Lick 3-m telescopes. Both appear to have at least one spectral emission

feature, at different wavelengths, and not corresponding in either object to any emission lines in the quasar or in the radio galaxy nucleus.

We are still working on the reductions of the most recent optical spectrographic observations, obtained with the Kitt Peak multi-aperture CCD spectrometer, so this account is very much of a progress report. It seemed worthwhile to share our preliminary, multi-authored, internationally obtained, results with our astronomical colleagues, because this object may throw light on the nature of radio galaxies and quasars, the relation between them, and the physical processes at work in them.

Editorial

The other person's job is always easier than your own - until you try it. This fact of life has been brought home to me with fresh conviction during my stint as editor of this journal. I have this past ten days acquired a tremendous admiration for the capabilities of newspaper editors who day by day, week by week, month by month, year by year, cope with their three-ring circus task of producing a newspaper. It is a job that is infinite in its ability to produce a wide variety of problems, all urgent and all requiring attention NOW!

Rather than engendering a feeling of power and the image of a person sitting at the centre of affairs controlling minions who scurry hither and thither at one's calm, reasoned bidding, the impression forced on one is of being a victim cowering in the centre of a circle of people shouting for attention, bombarding their victim with pieces of paper, scribbled, typed, telegraphed while the telephone shrills incessantly as the printer, long-suffering man, calls for the day's plan for the paper so that he can start on it.

I must take the opportunity of apologising

to my friends who, dropping into my office to very kindly greet me, have found me distraught to the point of rudeness. It is nothing personal. It is just the ever-present awareness of Time's winged chariot speeding past, bringing the deadline ever closer. And the thought, always lurking in the background like a dull toothache, that I still have not written the editorial.

Each night after I return from the printing office, I sit in my customary chair under the trees at the front of the Rion Beach Hotel and gradually unwind. As I do so I muse over the qualities one must have to be a newspaper editor and survive. And occasionally, as I sip my drink and listen in the darkness to the soothing sound of waves breaking on the shore I reflect on the factors in one's make-up that conspire to persuade one to take on the job of editor of ASTROCOSMOS. Some I know already. Dedication, a sense of challenge, a sense of obligation and... now, I'm sure there must be something else. Ah yes! I have it. Simplemindedness.

TODAY'S EVENTS: LES EVENEMENTS DU JOUR

JOINT DISCUSSION VII:

«Mass-Loss Phenomena»

(IAU Commissions 29, 35, 36, 37 45)

09.00-10.30, 11.00-12.30, 15.15-17.45, Room AA, 24th August

SOC

A.G. Hearn (Netherlands).

Chairman

J.P. Casinelli (USA)

C.S. Chiosi (Italy)

K.C. Freeman (Australia)

G.A. Gurzadyan (USSR)

M. Hack (Italy)

D.C. Morton (Australia)

D. Reimers (GFR)

T.P. Snow (USA)

J.P. Swings (Belgium)

* Pik-sin The (Netherlands)

A.V. Tutukov (USSR)

* Editor

Programme

Session I

* R.J. Tayler «Evaluation of the work of A.S. Eddington».

L.B. Lucy: «Hot Stars — recent observations and theoretical implications».

L. Hartmann: «Cool Stars — recent observations and theoretical implications».

Session II

R. McCray: «The effect of Mass-Loss from Stars on the Interstellar Medium».

M. Friedjung: «Mass-Loss from Novae and Supernovae».

Session III

J.E. Dyson: «Quasars».

SUMMARY

* Joint Discussion VII marks the centenary of the birth of A.S. Eddington (1882-1944).

In the Averof Grand Hotel:

15.00-18.00: Executive Committee 49th Meeting.

INVITED DISCOURSE

In the Ancient Odeon of Patras:

at 20.30 «Origin and Development of Solar Flares» by E. de Jager.

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL: 20.00-24.00

Bali Hairdressing Salon

«La coupe bali», haute coiffure.

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Sir Arthur Stanley Eddington: centenary

by W.H. McCrea

A.S. Eddington was President of the IAU 1938-1944; this year sees the centenary of his birth on 1882 December 28. As a scientist he was clearly one of the most distinguished ever to hold the office of President. Although he held it longer than anyone else, it was under tragic circumstances and he never presided at a General Assembly. He died on 1944 November 22, and the war of 1939-1945 made it impossible to hold a General Assembly between Eddington's election as President in 1938 at the meeting in Stockholm and the meeting of 1948 in Zurich.

Eddington's work in astronomy was under five main heads: 1) he pioneered modern work on stellar movements; some very recent work on «triaxial» configurations of certain galaxies is along the general lines that he explored.

2) Eddington's name will be for ever attached to the observational check (1919) of Einstein's prediction of the «bending» of light in the gravitational field of the Sun — although he would be the first to wish to share the credit with another great astronomer, F.W. Dyson, Astronomer Royal, 1912-1935. It was Eddington's unique combination of mathematical and physical insight that made Einstein's theory generally accessible in the years after World War 1.

3) To most astronomers, Eddington is best known as the creator of the theory of the internal constitution of the stars. When only a little was known about the physics of the opacity of the material and nothing about the physics of energy-generation, his astonishing intuition led him to a remarkably valid picture of conditions inside a star which enabled him and other physicists to define what they were looking for in sources of opacity and energy-generation. This work then led Eddington to a pioneering assessment of the problems of interstellar matter.

4) It is impossible to say anything about Eddington's science without repeating the word «pioneer» or «pioneering». He was also a leading pioneer of the theory of the expan-

ding universe, particular after the great observational discoveries by Hubble.

5) «Fundamental theory» is the name that E.T. Whittaker gave to Eddington's last book when he edited it for publication after Eddington's death. Eddington believed that the dimensionless constants of physics must have a purely mathematical significance that could be discovered when the operations of an observer or experimentalist are expressed mathematically. Almost certainly, his ideas were the most daring of any modern scientist, but no one else has been able to follow them or evaluate them with any reassurance.

A scientist of such adventurous thinking was bound to have chinks in his armour — if that is not too dreadful a mixture of metaphors! He was almost certainly mistaken in his attitude to relativistic degeneracy, and he was certainly too naive in his acceptance of Hubble's numerical results.

But the shape of a very great deal of what is being discussed this week in Patras is traceable to Eddington's inspired thinking in his comparatively short but wholly dedicated life. One makes bold to claim that there is no other single individual for whom such a claim could be sustained.

In sitting through some of the discussions at the 1982 IAU, when we have been hearing about work in regions of the electromagnetic spectrum that were completely inaccessible in Eddington's time on types of objects about which he had never heard, I tried to imagine what Eddington would have made of it all. He would be intensely interested, but scarcely surprised, since he himself spoke of «so simple a thing as a star», leaving room for lots of things not so simple. But I think too that he could quietly call attention to the fact that we are not using much that could really be called «new physics» since his day.

To end on a lighter note that might appeal to Eddington himself, on a terribly hot afternoon at the Paris meeting of the IAU in 1935, Eddington gave a talk on the problem of energy-generation in the central region of a star and he put limits upon the temperature in such a region. «And if you want a hotter place» he said, looking out of the window, «go and find it». Nearly half a century later, we have found a hotter place — Patras in August.

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GASTRONOMY CORNER



Keftethes

1/2 kilo chopped beef
2 onions
1 egg
1 tablespoon wine vinegar
2 tablespoons olive oil
Salt and pepper
1 slice of bread soaked in water or milk
Chopped parsley and mint well grated.

Put the meat, grated onions and bread into a mixing bowl and knead well with hands.

Add all other ingredients and continue to knead. Allow to set about two hours. Shape into balls, roll in flour, dusting off excess flour, and fry in hot olive oil.

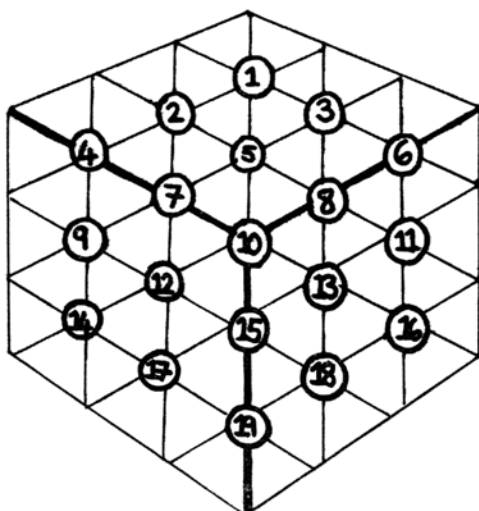
Wanda Goudas

RUBIK CUBE CROSSWORD

Doubtless you remember the simple instructions for solving this type of crossword inspired by Mr. Rubik's famous cube.

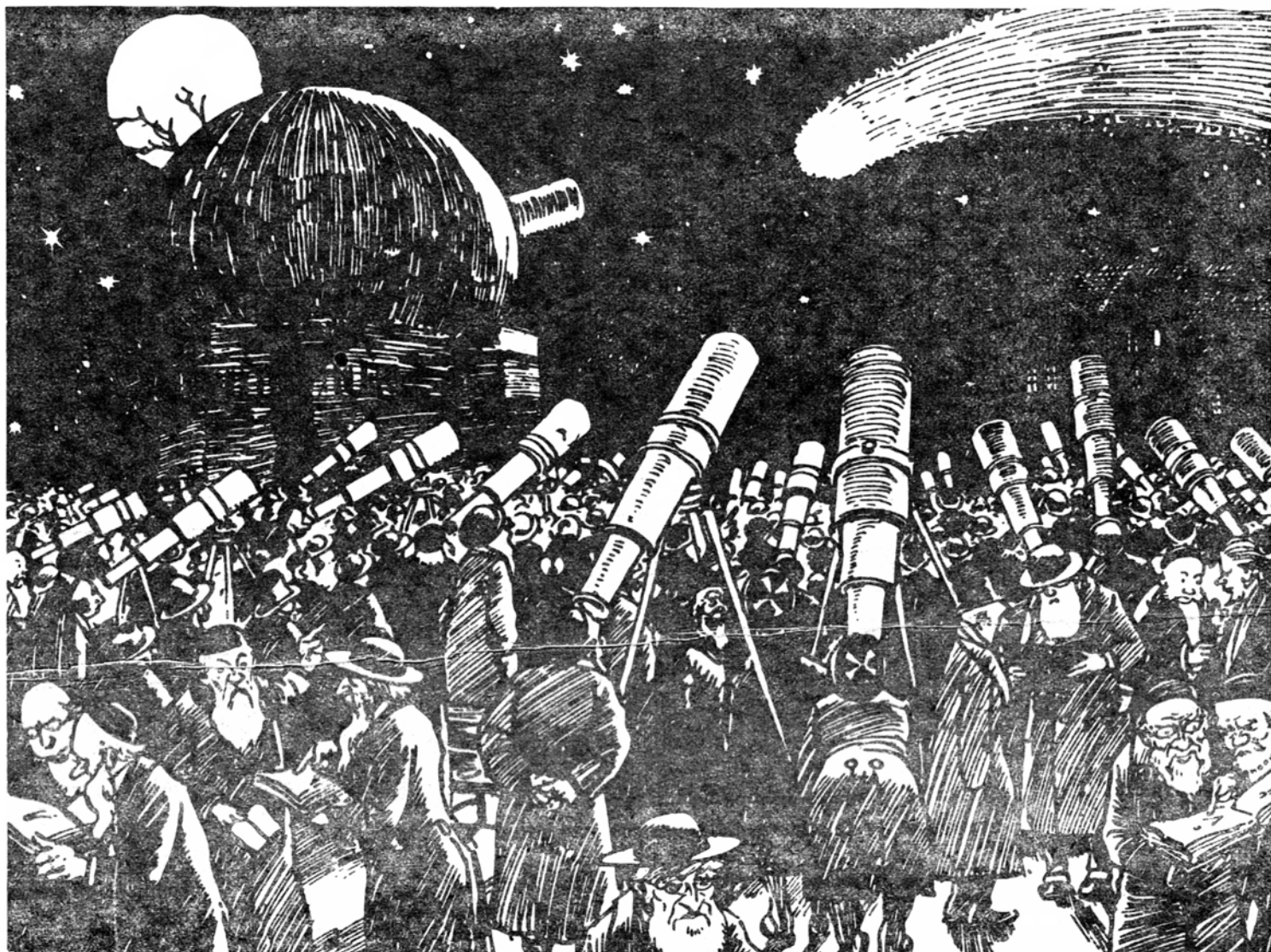
Each clue answer is a six-letter word (or it may be two three-letter words) placed in the six places surrounding the clue number in the Rubik Cube. But although the word's or words' letters retain their correct order, it or they may be spelled out clockwise or anticlockwise and the first letter may begin in any one of the appropriate six spaces. Thus, the answer to clue 16 is PEWITS and to fit it in with the answers to 11, 13 and 18, it is spelled out in an anticlockwise manner, the letter P being placed in the middle left-hand space.

Have fun!



Clues

- As far away from the edge as possible.
- A monarch occupies it.
- The Greek gods drank it.
- A Greek teacher of the art of speaking.
- Sherlock Holmes was good at this.
- Traditionally the object best suited to infuriate the bull (two words).
- English nonconformist chapel.
- The last scrap (two words hyphenated).
- Cross out.
- When found out by Holmes, the villain was...
- Some Scottish shields (plural).
- Fish do it at a baited hook.
- Collection of aircraft (plural).
- A lovely thing, God wot.
- Unstable, liable to change.
- Some lapwings and their cries (plural).
- Mischievous ugly demon.
- Promise with security
- Twin or multiply by two



Tachyon photography enables us to bring you a preview of the IAU 1985 General Assembly eagerly observing the arrival of Halley's Comet (apologies to PUNCH) GEO. MARROW.

NEXT SLIDE PLEASE

The following item appeared in NATURE in 27 April 1978 and stuck in your Editor's mind, perhaps because it is not wildly different from some presentations he has endured at conferences he has attended in the past. He is indebted to Macmillan Journals for permission to reprint it.

ACKNOWLEDGEMENT:

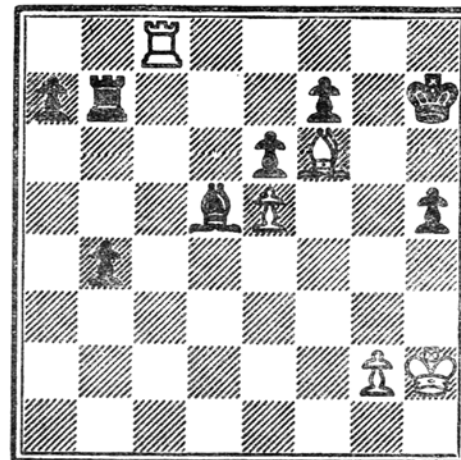
Reprinted by permission from NATURE, 27 April 1978. Copyright (c) 1978 Macmillan Journals Limited.

«I thought that in the eight minutes I've got I'd bring you up to date on what our group has been doing in the last year; in a sense this is a progress report and updates the paper we gave here last year; I won't go over the nomenclature again; could I have the first slide please — oh, I think you must have someone else's box — mine is the grey one with my name on the top, no wait a minute, not my name, whose name was it now? ah yes,

you've found it; there's a red spot on the top right hand side of each slide that is the side that becomes the bottom left when you project it, OK, you've got it now, let's have a look, no, that's the last slide not the first, yes, now you've got the right one but it's on the side, what about the red dot? There are two? Well, anyway turn it through ninety degrees, no, the other way, yes now we're there, perhaps we could have the lights off, well I'm sorry there are probably too many words on this slide, and the printing is a bit thin; can you read it at the back? you can't; well, I'd better read it out; no I won't, it's all in the paper which should be published within a month or so, and anyone who wants I'll give a preprint to afterwards, anyway, for those who can read it, this slide is a block diagram of the purification process we used and before I go any further I should mention that there are a couple of misprints: on the third row, fourth box from the left, well, of course that's the second box from the right, if you can read it, it says alkaline, now that should be acidic; also you can perhaps see the word mebrane, that should of course be membrane; now if I can have a look at the next slide — now which one is this? ah, yes, it's the scatter diagram. I haven't marked the quantities but we are plotting concentration against particle size; if I remember rightly this has been normalised: perhaps I could have the lights for a moment to check in the text, yes, here we are, well it doesn't actually say — we could work it out but it's probably not worth the time, so if I could have the lights off, let's have a look at the plot; well I think you can see a sort of linear relationship — there's a fair bit of scatter, of course, but I think the data are at least suggestive; perhaps if I held up a pointer you could see the relationship more clearly — I expect there's a pointer around somewhere, no I won't need the lights, yes here it is, now you can see the trend and there's just the hint of another trend running subparallel to it through this other cluster of points, you may see that more clearly if I slide the pointer across to the other — no, I wasn't saying next slide, just that I would slide the pointer; anyway now the next slide is up let's keep it on the screen, now this is the sort of evidence on which the data in the last slide were based;

this is a thin section — it could take just a bit of focusing — yes, that's better, it's difficult to get the whole slide in focus at once, now the scale is, well that bar is one micron long, hang on what am I saying? it's ten microns long — oh dear, the chairman is giving me the two minute warning, it's difficult to give you a clear picture of this work in only eight minutes, but let's plough on, what was I saying? ah yes, that bar is ten microns long, now if we turn to the next slide, please, this is the result of a chemical analysis of the dark region that is near the centre of that thin section, is it possible to go back a slide? well not to worry, you can see in the analysis how dominant — sorry what was that? oh yes, the errors are plus or minus a per cent or so — that's the standard deviation, no it can't be, it must be the standard error of the mean — oh dear, the chairman says my time is up, can I beg half a minute — are there any more slides? really? well let's skip the next two, now this one is pretty important, it brings together several of the threads that you've probably been able to discern running through this talk, but rather than go through it in detail perhaps I should have the lights and just put up one or two key numbers on the blackboard — the chairman says there's no chalk, well it's all in the paper I was mentioning anyway perhaps I've been able to give you the gist of what we've been doing, I guess that's all I've got time for».

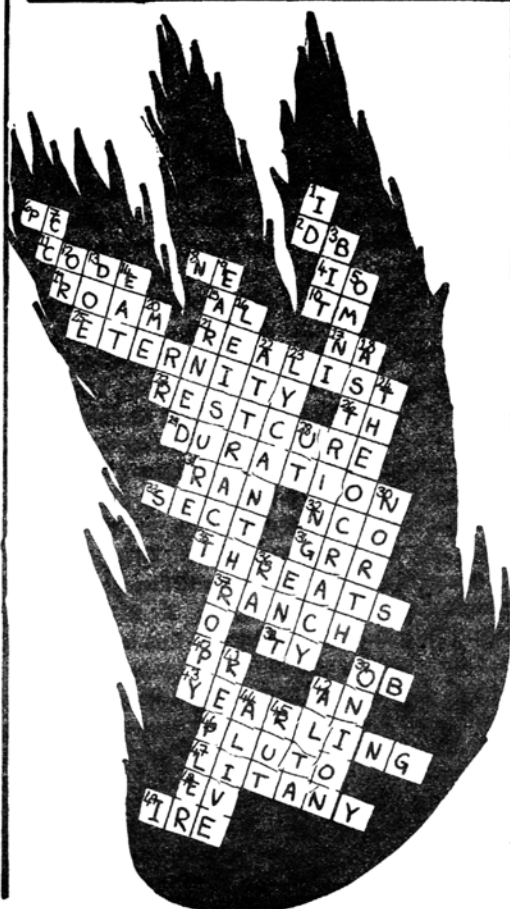
Chess Position 8



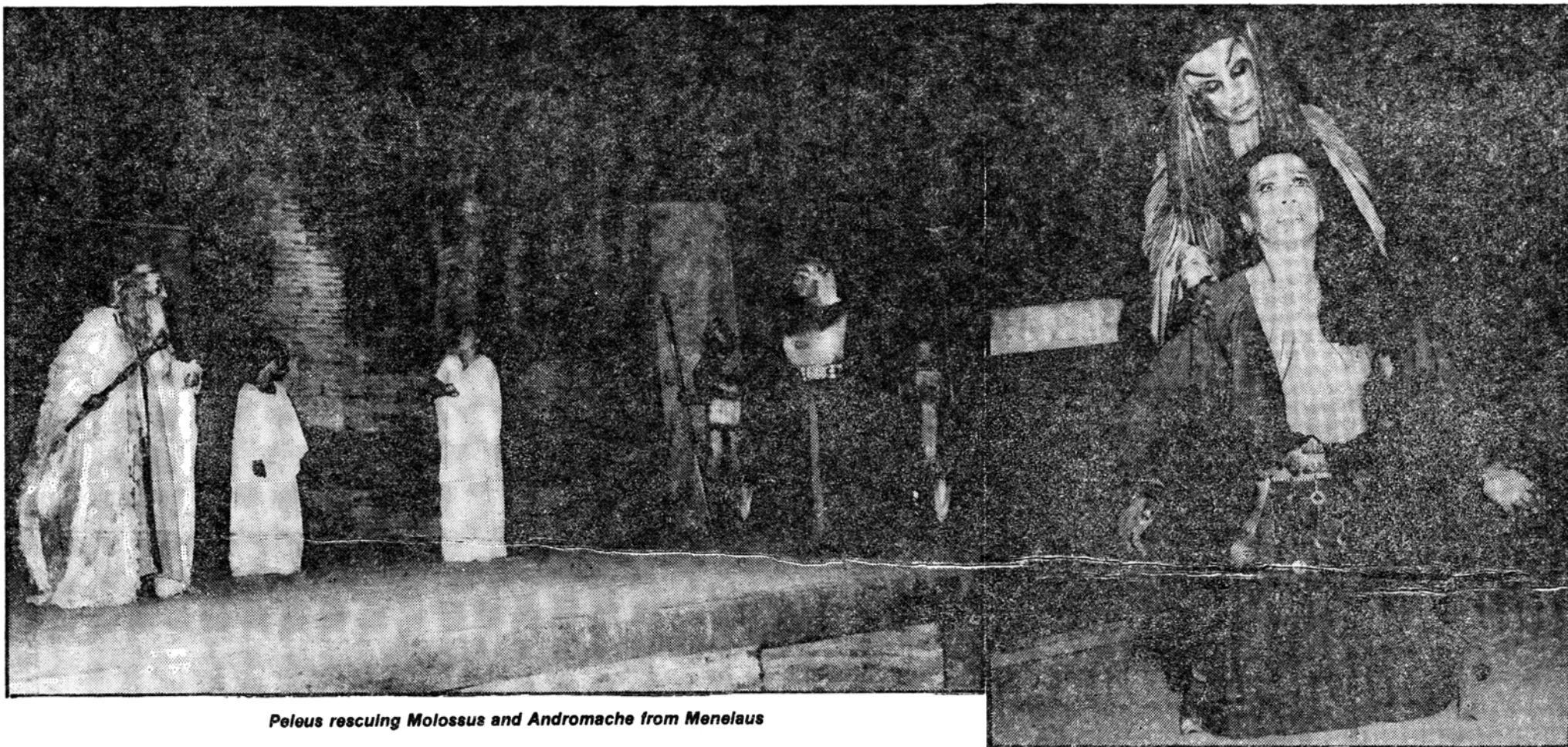
White to play and draw

Solution to Chess Position 7:

1. Q-Kt3!, Q X Pch 2. Q-R3!, Q-Q3 3. K-R1 and black is lost. V.V.M.



FINE PERFORMANCE OF EURIPIDES' TRAGEDY «ANDROMACHE»



Peleus rescuing Molossus and Andromache from Menelaus

A capacity audience packed the Odeon for Sunday's performance of Euripides' tragedy **Andromache**, on a sultry evening under an unusually overcast sky. Even those unfamiliar with the Greek language were enthralled by the continuous action and moments of intense drama, and helped by the comprehensive program notes which guided us surely through the action in English and French.

From Andromache's sudden appearance, chased by armed guides, to the final bow by her son Molossus the action was fast, colourful and emotionally intense.

Andromache (Elsa Verghi) displayed dignified courage as she was hounded by her husband's wife Hermione (Youla Gavala) and Hermione's father Menelaus (Christos Frangos). The doleful execution procession for Andromache and Molossus was dramatically interrupted by the shaggy figure of wise King Peleus (Grigoris Vafias). In this intense central section of the play, a remorseful Hermione next appeared, bent on suicide, ripping open her costume and attempting to impale herself on the soldiers' swords. But an ex-suitor, Orestes (Yorgos Grammatikos), arrived to rescue her: they left for Delphi to

murder Hermione's husband — Andromache's lover (the key character, who never appears on stage!). Peleus wept over his grandson's death, but his goddess wife «appeared» as a shining altar stone to declare that all will be well: the aged Peleus will become immortal, and Andromache will marry Hector's brother Helenus, and her son Molossus will become King — symbolised by the last action where Molossus placed Pe-

leus's crown on his own head.

During the action, the Greek tragedy's chorus of women milled about the stage, dancing, gesticulating and singing their comments — and occasionally delivering messages to the main actors — their multicoloured but subdued dresses forming a background to the vivid costumes of the principals: Andromache (and Molossus) at times in

Note of high dramatic tension as Hermione decides on suicide

white, her rival Hermione in wine-red, Menelaus in royal purple and blue and Orestes in white and scarlet.

Continued applause at the end showed just how much the large audience had appreciated this vivid and compulsive entertainment, listening to words which predated even the ancient Odeon in which we sat spellbound.

The Asteroid 2628 KOPAL 1979 MS₅

Discovered 1979 June 25 by E. Helin and S.J. Bus at Siding Spring, this small piece of sidereal real estate has been named in honor of Zdenek Kopal, astronomer, and Chairman of the Astronomy Department of the Victoria University of Manchester, England, 1951-81. Kopal, a leading world authority on the moon and the terrestrial planets played an active role in the exploration of the moon in a NASA sponsored program. It was therefore only fitting that one of the objects that makes up the planetary system be named in his honor and at a party held in Stamac Hotel, Zdenek and friends met to celebrate the occasion. There are as yet no plans for him to visit 2628 Kopal but knowing Zdenek's capacity for travel the possibility should not be ignored.

BULLETIN Photometric Survey for Variability from Space

An informal discussion of the advantages of space for photometry will take place over beer at the taverna of the Averof at 5:30 this evening (August 24). Those interested but unable to attend may contact Hugh Hudson (1401) or Bob Noyes (0652) for further information.

Space offers an excellent site for a photometric survey dedicated to monitoring variability in stars, extragalactic objects, and transient phenomena (such as the expected optical counterparts of high-energy transients). One scheme for carrying out such a survey would involve a set of CCD cameras in a (relatively) inexpensive spinstabilized spacecraft. For bright stars one main goal would be to obtain a relative photometric precision adequate to measure the global non-radial oscillations of stars even on the main sequence, and thus to probe their internal structures. For fainter objects the photometry will be progressively worse, but one may confidently expect to do much better (orders of magnitude?) than at ground-based observatories.

SECOND INVITED DISCOURSE BY PROFESSOR HERBIG

The Origin and Early History of the Sun and the Planetary System in the Context of Stellar Evolution.

The Origin and Early History of the Sun and the Planetary System in the Context of Stellar Evolution.

At the Ancient Odeon of Patras on Friday evening, the second invited discourse was preceded by the sad announcement of the tragic death of the President of the IAU, Professor M.K.V. Bappu. Delegates stood in silence in his memory.

Introducing the speaker, Professor Feast explained the special pleasure the duty held for him. Outlining Professor Herbig's pioneering work in many fields, Feast pointed out that Herbig had never been a man for bandwagons, and he advised the audience that «if you must jump on a Bandwagon, choose one that G.H. has started rolling».

In his lecture Professor Herbig stated that a plausible scenario for the early history of the sun can be constructed by combining the results of stellar astronomy with lunar and meteoritic chronologies. The meteorites apparently contain material exposed to two nucleosynthetic events, one about 10^8 yr and another a few 10^6 yr before solidification. Following H. Reeves, these are associated with supernovae occurring in star clusters in molecular clouds that formed during passage through successive galactic arm shocks. The Orion Trapezium Cluster may be a modern example; its density is such that encounters between members would have been close enough and frequent enough to have had major effects upon their circumstellar solar nebulae, as would recurrent FU ORI-like eruptions of the stars themselves. The lunar bombardment continued for 7×10^8 yr following formation of our sun. If this represented disk cleanup, disks must persist for that long, and hence circumstellar activity may still be in progress around some young stars in the solar vicinity. The observed time decay of axial rotation and surface activity in solar-type stars can be extended back-wards, and indicates that the ultraviolet radiation of the young sun would have had major photo-

chemical consequences upon the primitive earth.

In conclusion, Professor Herbig sounded a cautionary note:

«Yet it would be unrealistic to claim that this scenario can be in any sense firm or final, on account of the rapid and inexorable advance of knowledge. In explanation of having even attempted such a synthesis, may I simply repeat the words of a famous Athenian of the Fifth Century B.C. who, in comment upon a historical record just as flawed and incomplete and arguable as is the astronomical, said: «We can rest satisfied with having proceeded upon the clearest data, and having arrived at conclusions as exact as can be expected in matters of such antiquity.»

Lost and found

The most distinguished scientist can be so totally absorbed in his deep thoughts that he can forget anything, even his most precious possessions. At least, that's his excuse for his absent-mindedness.

This happened to one unfortunate IAU participant who wishes to remain anonymous. After having looked everywhere, desperately and without any success, he inquired at the Information Desk and his belongings were immediately handed back to him with the most gracious smile. None of his papers was missing nor the contents of his wallet which had been carefully checked in case of some unfair complaint.

Conclusion: Try not to lose your belongings or your smile. But if you do, do not despair, for the chances are that everything will be returned to you with a smile thanks to the efficient network of the «Lost and Found» service set up by the Local Organizing Committee.

The particular scientist who found this out was so impressed by the service that he felt he had to draw the attention of ASTROCOSMOS to it as an expression of his gratitude.

ANNOUNCEMENT: Meeting number 285

Giant H II complexes outside our Galaxy
August 24, room AB, 15.30-18.00

1. Observational results and their primary interpretations in the following domains:

Radio: D.S. HEESCHEN (15 mn)
X-rays: L. van SPEYBROECK (15 mn)
Visible: M. ROSA (20 mn)
UV: P. BENVENUTI (15 mn)
IR: C.M. TELESKO (15 mn)

2) Confrontation with related investigations in our Galaxy and general interpetations: F.P. ISRAEL (20 mn)
Chairman: J. HEIDMANN

Two new catalogues are available at the observatoire de Strasbourg:

11 rue de l'Université
67000 STRASBOURG, FRANCE

• Publication spéciale du C.D.S. No 3: CATALOGUE OF THE CENTRAL STARS OF TRUE AND POSSIBLE PLANETARY NEBULAE. A. Acken, F. Gleizes, H. Chopinet, J. Marcont, F. Ochsenbein, J.M. Roques. Contains observational data, bibliographic references and finding charts, for 460 stars.

• Publication spéciale du C.D.S. No 4: CATALOGUE OF STELLAR GROUPS — PART ONE: THE EARLIER GROUPS. M. Jaschek, D. Egret. Contains positions and bibliographic references for about 6000 peculiar stars belonging to 17 special groups.

XVIIIth GENERAL ASSEMBLY



ASTROKOSMOS



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Number 9



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TRIBUTES TO M.K. VAINU BAPPU

**Professor E.K. Kharadze —
On behalf of the IAU**

Dear Colleagues, friends, ladies and gentlemen,

On behalf of the International Astronomical Union I express the most profound sorrow caused by the most untimely death of the current President of our Union, the distinguished scientist Professor Manali Kallat Vainu Bappu, 55 years of age.

We have all gathered here today at this mournful moment to pay a worthy tribute to his memory.

During Prof. Bappu's triennial presidency of our Union, we have witnessed his devotion to the interests of the Union, his very fruitful activity aimed at its consolidation and strengthening of its scientific effectiveness for the further development of our science - astronomy, all over the planet. The members of our Union will also remember Prof. Bappu's contribution at the earlier time of his office in the Union as Vice-President in 1967-1973.

Prof. Bappu's prominent activity in the Union and in the world - wide astronomical community in general carries the features not only of the skill of an experienced eminent scientist, but also of personal tact, kindness and benevolence to everybody, that has always been so highly appreciated by his colleagues and that has made collaboration with him so pleasant and easy.

We are all sharing Mrs Bappu's inconsolable grief.

Every effort was made in Munich to save Prof. Bappu. The medical care was on the highest possible level. But, unfortunately, it was not Professor Bappu's fate to recover.

With his death, not only me — the Union, suffer a great loss, but so does the entire astronomical world. Moreover, the astronomical Community in India is feeling it badly. They have lost their leading astronomer, who was full of plans and ideas concerning further development of astronomy in India.

Last year Prof. Bappu visited several observatories in the USSR. We have a vivid memory of that visit, and of the enthusiasm with which he spoke on the development of astronomy in India. Many of his plans are left unfinished. But however profound the sorrow may be, however great the loss, our Indian colleagues should be encouraged to go on with their endeavours. That would be the best tribute paid to Prof. Bappu's memory by his compatriots.

Being a member of the USSR delegation to this General Assembly, I permit myself to express on behalf of the USSR astronomers also, most heartfelt brotherly condolence and sympathy to the Indian delegation.

**Dr. J.C. BHATTACHARYYA —
On behalf of the Indian National
Science Academy**

It was with a profound shock that we learnt about the sudden, unexpected passing away of Prof. M.K. Vainu Bappu at Munich on the 19th of this month. A few days ago, we had the vision of a grand reunion of old friends here; we did not even dream of such a calamity of cruel fate snatching away our beloved, illustrious compatriot at this juncture. It is difficult

to believe that Vainu Bappu, our charming friend and leader who was so full of life, will never be among us again.

Bappu completed his fifty-fifth year only a few days ago; we have been looking forward to many more years of his company and guidance. The great upsurge of astronomical activities in India, particularly in the Institute of Astrophysics, which he created, has suddenly lost its main guiding force. It is like a nightmare of a group of sailors in mid-ocean waking up to find their captain missing. He leaves behind not only the team of scientists he has guided and brought up, but also his wife Yemuna and his aged mother to suffer this unbearable loss.

Bappu's contribution to astronomy cannot



This photo of Professor M.K. Vainu Bappu was taken in 1980 in solar Eclipse campus in Yawalagere (India), by Yugoslav astronomers.

We want to express our deepest regrets on the occasion of our dear friend's death.

**J. Arsenijević
1187, YUGOSLAVIA**

be summed up easily. He has discovered new objects, new relations, created and guided new schools of astronomers, inspired active societies and taken part in a wide range of international activities. He had a deep understanding of many problems; whether it was in instrumentation, or stellar process or problems concerning tenuous gas clouds, he was able to suggest ways most likely to lead to tangible answers. A gem of a teacher, as anybody who has listened to his lectures would testify, he could attract and hold audiences spell-bound. A brilliant organizer who could foresee the minutest details of a

projected venture years in advance; in short, Bappu represented a personality of an ideal world, so rare in real life.

We have been fortunate to have this magnificent personality so close to us, and that makes our present loss overwhelming. His circle of friends covered the entire world; many of them are present here, and I am confident that all will agree how his adorable personality charmed everyone who came in contact with him.

One great aspect of Bappu was his love of nature which he worshipped and to which he tendered his creative ideas as offerings; the Institute premises at Bangalore, Kavalur and Kodaikanal bear mute testimony to this enchanting quality. He implored others to develop a sincere love for nature. Speaking on one occasion he remarked: «To a person who enjoys a glorious sunset or marvels at the beauty of a cobweb glistening with the morning dew, nature unfolds her unending stream of magical charms».

Bappu is no more; he now belongs to eternity. His mortal remains have returned to mother nature he loved so much. Only a few days ago, as I was talking to him by telephone from India, he appeared so full of vitality and confidence. The thought uppermost in his mind was of his Assembly. «Do not worry about me», he advised, «go and join the General Assembly which must be a success. Nothing - nothing should mar the proceedings». That was his wish; we all owe him our sincere efforts to see that it is fulfilled.

**Academician J. XANTHAKIS —
On behalf of the Greek National
Committee for Astronomy**

Le Comité National d'Organisation exprime ses sincères condoléances pour la mort de notre président, le professeur Bappu.

Avec vive émotion, je me rappelle qu'il y a huit mois, le professeur Bappu nous a rendu visite avec le Secrétaire Général de l'UAI, Monsieur Wayman, pour discuter des affaires concernant la préparation du 18^{ème} congrès.

A cette époque, il était en pleine santé et a manifesté un grand intérêt et beaucoup de dynamisme pour l'organisation de notre congrès.

L'annonce de sa mort subite, nous a laissés dans une profonde consternation et les drapeaux en berne sont le reflet de notre grande peine.

**Professor C.L. GOUDAS —
On behalf of the Local Organising
Committee of the XVIIIth
General Assembly**

Members of the Assembly, Ladies and Gentlemen,

We are gathered here to mourn for the loss of an excellent scientist and a noble man. To mourn for Vainu Bappu, the President of our Union, whose personality and high qualities are known, to a larger or smaller extent, by all.

The death of a President during the General Assembly he was supposed to preside over is an event without precedence and most likely never to be repeated.

As Chairman of the Local Organizing Committee of the General Assembly that will

be marked and remembered not only for its scientific works but also the loss of Vainu Bappu, I wish, in retrospect, to remind you of the story of Diagoras. Being a veteran of past Olympic games, and while lifted on the shoulders of his two olympic laureate sons inside the stadium of Olympia, Diagoras was cheered by the crowds with the unusual wish «Die now Diagoras». The crowds wished him to die at the moment of the peak of his glory.

Unable as we were, and are, to influence the decisions of fate, we cannot but observe that, since Vainu could not but leave us, the choice of moment of the inevitable was for him a grace — a moment of glory, recognition and appreciation.

Of course, such thoughts can hardly now be mentioned to the immediate family of the deceased. To them we express our deepest condolences.

Long live the memory of Vainu Bappu.

**Professor A. BLAAUW —
As past President of the IAU**

Dear friends and colleagues of Vainu Bappu,

Three years ago, at the closing of the General Assembly at Montreal, when Vainu assumed the presidency, he conveyed to us his feelings of gratitude and joy in anticipation of the task ahead. «As each member», he said, «individual and country, contributes stone by stone to the vast edifice of astronomical knowledge, we rejoice without reservation and in all friendliness at the triumph of the human mind over a facet of Nature. In encouraging opportunities and providing that little extra fillip needed to cross the threshold into the domain of creative productivity, the Union can play an important role».

It is in this spirit that Vainu Bappu, during these past years has served the Union, with his many talents as a scientist and as an organizer. Three years during which he helped guide the affairs of the Union with determination and with the experience and foresight that had already made him so distinguished a renovator of astronomy in his home country. Members of the Executive Committee and of course even more his close collaborators, the Union officers, will long remember his deep concern for all that was in the interest of the IAU.

How immensely would he have enjoyed being among us these two weeks, seeing the accomplishments of tasks undertaken, the realization of plans designed — and above all, how would he have rejoiced in the company of so many dear friends from all over the world, engaged with them in scientific discourse in the subject of astronomy that had fascinated him from his early childhood.

It has not been given to him and to us, for him to be with us during these days. But we know how much he gave his thoughts to this Assembly, long before its official beginnings and with how much care he devoted himself to contributing to its successful proceedings; the several weeks spent in Munich in quiet contemplation of the many affairs to be dealt with and we can only surmise the deep

continued on page 2

Tributes to M.K. Vainu Bappu

continued from page 1

disappointment he must have felt when it became clear that he would be unable to participate himself

But we have had the privilege of sharing his thoughts of those last weeks by the message he conveyed to us at the opening of this Assembly. May I remind you of the words Vainu passed on to us in his presidential address and let me quote a few sentences from it

«While innovation in technique is a factor of much significance in the discoveries that will yet be made, it is certain that an even greater role will undoubtedly be of the human intellect. Time and again we have seen how an individual has appeared on the scene and transformed a picture of gathering confusion into one of logical rigour and aesthetic simplicity. In the final reckoning, it is this aspect of Man that is responsible for the culminating triumph. It is, therefore, a responsibility shared by each one of us in our individual roles, be it of teacher or senior colleague as well as of the astronomical community and the Union as a whole, to nurture such possibility. In its longterm view of contributing to the development of Astronomy the Union must necessarily give considerable attention to the very important role of the individual in Astronomy»

As we take up our tasks for the Union and for research and teaching, let us keep these words of Vainu Bappu in mind

Dr. Harlan G. Smith -
as a close friend

Vainu Bappu was probably my closest friend. For 33 years the strands of our lives have interwoven even to the extent of his being best man at my wedding, and my just missing (because of academic schedules) being something of an equivalent at his wedding in India. I mention this because so few now in the IAU have had the privilege of really knowing him and it is my grievous task to say farewell to him as a friend, on behalf of us all

When the IAU was founded most astronomers knew each other, often rather well. Vainu was proud of the growth of our science, but regretted that he could only know so few of us, especially the young astronomers who are coming up so fast. For those who did not know him, I want to share several memories. There is no way I can truly bring out the richness of Vainu's life and mind and

personality, but these vignettes — like flashes of lightning revealing fragments of landscape — may help you to glimpse the wonderful human being behind the formal degrees, the papers, and the honours he so well deserved.

In January 1949 we entered the Harvard Graduate School of Astronomy — entered with trepidation yet excitement to be studying in halls peopled with memories of the likes of Bond and Pickering, and the very real presence of Shapley, Bok, Payne-Gaposchkin, Menzel and Whipple. In the so-called liberal arts there is now a cult — I believe unfortunate and destructive — of the anti-hero, with its emphasis on sickness and psychosis, on feet of clay. But Vainu belonged to an older and finer school. His spirit was generous, kind, non-cynical — even hero-worshipping in the best sense of the word. He deeply admired if not even venerated his teachers and those, living or dead, who had really accomplished something. He well knew and understood human frailties, but to Vainu the important things were those qualities and works of great men and women which should be admired and emulated as far as possible in his own life.

Then, as now, it was fashionable for graduate students to work very hard, and we did — sometimes tired and discouraged. I recall an occasion walking home with Vainu late on winter night, our conversation turning to whether we might ever get jobs or amount to anything in astronomy. Nearly always cheerful, he brightened up and proceeded to quote from his memory, well-stocked with classics, the entirety of his favorite poem — Kipling's «If». Though I cannot quote them exactly, most of us are familiar with a few of its famous lines, to the effect

*If you can keep your head,
when all about are losing theirs,*

Then you'll be a man, my son.

Then you'll be a man, my son.

*If you can hazard all upon a toss,
and lose, and rise to try again,*

Then you'll be a man, my son.

The spirit of this poem was truly a beacon to his life — encouragement always to try to answer those «ifs» with «I can, and I will».

Yet Vainu was anything but solemn. He laughed, and joined in most of the games and jokes. He found the necessary paraphernalia, and organized at the Observatory what must have been the only cricket team within a few hundred miles, teaching us the mysteries of sticky wickets and googlie-balls. On one occasion he gaily commented on some virtues of yoga, to the amused condescension of some of the other graduate students. So he inveigled me into a scientific test. We both stood on our heads (one form of yoga) for ten

or fifteen minutes before each major exam. And, that year, we two were the only students to pass them all. QED! (but Vainu was too gentle ever to rub it in).

In those innocent days we had never even dreamed of being given money to travel to meetings. Yet Vainu never wanted to miss a session of the American Astronomical Society. So we went to all of them in our part of the country, doing what was necessary to make it possible, such as driving in my \$75 Model A Ford, literally spending nights on the lawns of host observatories in our war-surplus sleeping bags. Hot or cold, hungry, mosquitoes — Vainu never complained, and usually managed to bring the conversation around to astronomy.

He finished his PhD in near-record time. Then, after a couple of brilliantly successful years as a post-doc at Cal Tech, he could easily have obtained a comfortable job in the US. But I never sensed any doubt in his mind. His dream was to build and to do astronomy in India. I think it is hard for us now to realize the courage of this decision — to leave the centre of world astronomy, the 200-inch, and return to an India, which then, just after Independence, lacked any of the structure of modern astronomy, with essentially no institutes, telescopes, colleagues... not even a job. That first period effectively of unemployment, in the midst of such desperate poverty, might indeed have made him wonder whether — having risked his all upon a toss — he might have lost, and could he rise again?

Then came the chance, largely through his own persuasion of a reluctant minister, to build a U.P. State Observatory at Naini Tal. And shortly thereafter came Yemuna, a pillar of love and strength throughout his life. From then on the path was up. You know at least the outline of the rest, but again I think cannot easily imagine the problems to be overcome, the incredible effort involved, in an India trying to build nearly everything at once from scratch, to in effect create three astronomical institutions, a national society, a national journal, optical and machine shops, engineering and computer contacts and facilities adequate to design and build entirely within India a 2.34-meter telescope. Yet during all this time he was constantly looking for, and then looking out for, dozens of students who are now putting India on the astronomical map.

He did these things, and more, and reached the very top. This meeting in Patras would have been the peak of his career. I believe it meant more to him than words can convey, something he had been building toward for 40 years and more. Yet, when the urgency of the operation became clear, he adjusted with remarkable speed and calm philosophical acceptance both to missing this peak, and to the very real risk of the operation.

My wife and I spent a day and a night with

Vainu and Yemuna just before the operation. He was vigorously planning at least three major things for the future, finishing the Kavalu telescope, getting the 1985 IAU plans off to a good start, and, finally, contemplating the course of his life after mandatory retirement around 1985 as director. In general he was planning to travel to many institutes, to renew old friendships and make new ones, and to concentrate on science.

Now these travels will be in our memories, and the work done by others. Meanwhile our hearts are with Yemuna and with Vainu's mother. I want them to know that for us Kipling's poem has come true. Each of the «ifs» has become a «Because», or «Since», for Vainu really did live up to all of them. And I hope his mother might take comfort in adding a final couplet:

*Since you ran the course, against all odds,
and won,
You did indeed become a man, my son.*

TODAY'S EVENTS: LES EVENEMENTS DU JOUR:

At the Averof Grand Hotel:

20.00 Closing Dinner.

At EOT Swimming Resort, Aya Patras:

WINE FESTIVAL: 20.00-24.00.

PLANNING AN OBSERVATIONAL CAMPAIGN?

The International Directory of Amateur Astronomical Societies (IDAAS) is providing constantly updated information on more than 1100 amateur organizations from about 55 countries: addresses, phone numbers, activities, publications, etc.

If the original aims of the IDAAS were to bring closer together amateur astronomers around the world and to facilitate their collaboration, it proved also to be an efficient help to professional astronomers in planning campaigns, etc. Public bodies also use the IDAAS to foster astronomical popularization.

The 1982 (4th) edition of the IDAAS has just been published and is distributed at the cost of production. Persons interested in this 320 page publication should drop their name and address in the box of A. Heck (> 0088 - Spain) or write to

A. Heck
c/o ESA Satellite Tracking Station
Apartado 54065
Madrid - Spain

or to

J. Manfroid
c/o Institut d'Astrophysique
avenue de Cointe 5
B-4200 Cointe - Ougrée
Belgium

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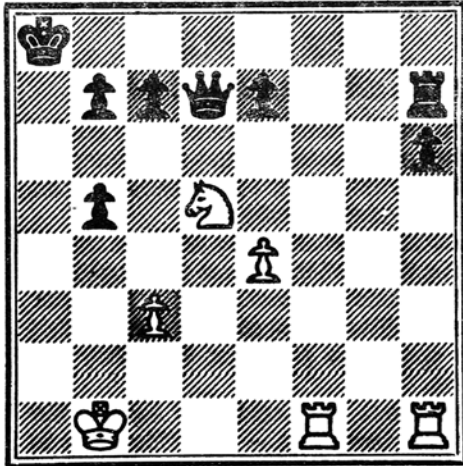
stifatho

1 1/2 kilo beef or hare
1 1/2 kilo small onions
1/2 kilo olive oil
2 ripe tomatoes or 1 dessertspoon tomato paste diluted in 1/2 cup water
2-3 bay leaves
1 cinnamon stick
Salt, pepper, oregano, half a garlic, 1/2 wineglass wine vinegar

Cut the meat into serving portions, put in a pot and brown it lightly in olive oil. Add tomato, cloves of garlic, cinnamon, bay leaves, oregano, vinegar, salt and pepper and stew for one hour. Then put in the onions whole, cover tightly and cook slowly until done.

Wanda Goudas

Chess Position 9

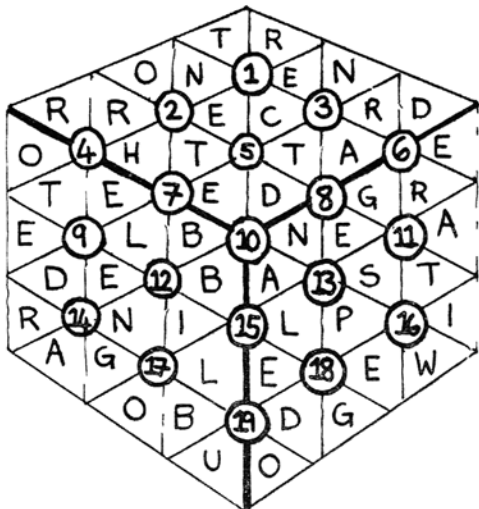


White, to play, wins

Solution to Chess Position 8:

1. P-Kt4, PXP2. K-Kt3, P-Kt63. K-B4, K-Kt3
4. R-Kt8 ch, K-R3 5. R-R8 ch. White has perpetual check.

V.V.M.



Karamouzis Ant. (optician)

Prescription glasses, sun glasses, contact lenses.

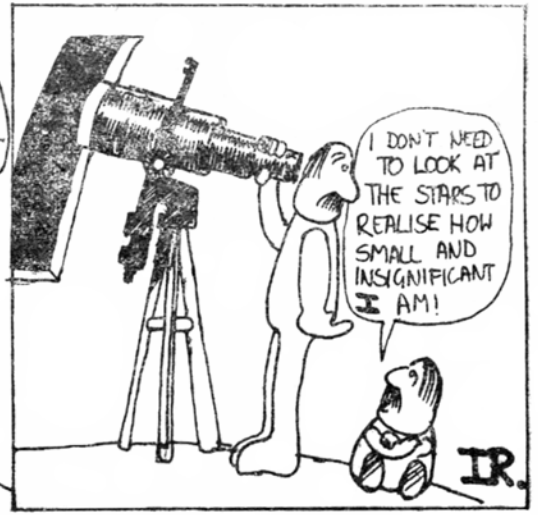
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ASTRONOMY ON STAMPS

Margaret I. Morris

Inquire among astronomers and, as with any other occupational group, you will find a wide range of hobbies and spare time activities. Some people enjoy sport or athletics, others prefer to be soothed and relaxed, while a change from one mental activity to another can often prove refreshing.

There is one hobby ideally suited to tired astronomers (or those suffering the frustrations of bad weather on an observing run) and that is the collecting of astronomy on stamps. Philately is a most accommodating hobby; it can be tailored to suit the time and funds available, or adapted to special interests. It is

bly be how many stamps are available to be collected. If you had asked me that about 30 years ago the answer would have been - not very many. Since then several things have happened to alter the scene.

First of all there was the International Geophysical Year 1957-58 when stamps began to appear with designs including such things as a meteor, aurora with all-sky camera, sunspots, observatories, and my collection doubled overnight! Also in 1957 the first Sputnik ushered in the space age and simultaneously opened the floodgates to a torrent of space stamps many of which have included astronomical features. The third major explosion in astronomical stamps was the celebration in 1973 of the quincentenary of the birth of Copernicus with stamp issues from many countries.

All aspects of astronomy can be found on stamps. Perhaps you may decide to start with some stamps illustrating mythology or worship of the sun and moon. If you are interested in archaeoastronomy, there are useful stamps from the mesoamerican countries, also British postmarks depicting Stonehenge and a French stamp showing Carnac.

The famous men of astronomy are well represented in philately. The most frequently portrayed is Copernicus, but there are also numerous stamps and special postmarks honouring Kepler and Galileo.

A few people have been shown on stamps who, although initially astronomers, are better known for other activities. Two examples would be statesman General Stefanik (on Czechoslovakian stamps) of the Paris Observatory and aviation pioneer Lawrence Hargrave (Australia) of the Sydney Observatory. Physicists like Boltzmann, Kirchhoff and Planck can also be included.

Instruments, early to modern, are well distributed throughout the stamp album. Astrolabes of various types, quadrants and armillary spheres, early Chinese instruments and even astronomical clocks can all be found. The history of the telescope may be traced through stamps.

Many countries have proudly illustrated their national observatories on stamps and, if

the occasion for issue is an anniversary, the early buildings have sometimes been shown contrasted with the newest ones.

Sun, moon and planets have made successful stamp designs and various astronomical phenomena can also be found. A large number of stamps feature constellations, the zodiac being particularly popular.

For the layman, there are many stamps with «easy» astronomical designs — for example, anyone can readily identify the Southern Cross and it is not difficult to recognise a telescope or an observatory. However, for the professional astronomer part of the fascination lies in the ability to seek out the more unusual designs and to appreciate their significance.



1906 Olympic games issue from Greece. Shows Hercules supporting the heavens (represented by «slab» with stars and moon) while Atlas fetches the golden apples of the Hesperides

An example to illustrate this point is the 60c value of a set issued in 1967 by Venezuela to commemorate the 400th anniversary of the city of Caracas. This stamp design consisted of two sections of sky showing the meridian of Caracas 400 years ago and in 1967. The star patterns shown had clearly moved in that interval and so this stamp could be used to demonstrate precession.

This hobby can be deeply satisfying in so many ways. If you happen to develop a taste for the philatelic aspect as opposed to the actual subject, you will find plenty to stimulate you. For instance, the 1923 Polish stamps for the 450th anniversary of the birth of Copernicus were printed from different plates, each with its own characteristics and varieties, on paper of differing thickness and separated by several distinct styles of perforation.

Postal history is another branch of philately which can expand an astronomical collection. I have, for example, a letter written by LeVerrier in 1846 (the year of the discovery of Neptune) to the secretary of the Royal Society thanking them for the award of the Copley Medal. Another treasured item is a special envelope printed for the 1901 Sumatra eclipse expedition and addressed to Professor David Todd.

Here, then, is a hobby offering variety and interest. There is the pleasure of acquisition as each new item is added, there is the fun of seeking out information to enhance the interest and there is also the aesthetic appeal of beautiful and colourful stamps tastefully laid out and annotated.

I have to warn you that you could find such a collection completely absorbing — you might even find yourself wishing that it would cloud over!



Many stamps depicting Galileo use the famous Susermans portrait, but this attractive issue shows the Leoni portrait. Also shown is one of his drawings of the moon as he saw it through his telescopes.

also satisfying from an artistic aspect, as many stamps are small works of art and the hand of individual designers can be detected. Good friendships can develop through ex-



hange of information or material with collectors in other countries.

For anyone seriously thinking of taking up this pursuit, the first question would proba-

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Our catering service is also operating the Wine Festival of the International Astronomical Union.



The badge of St. Kitts-Nevis as used for SG Type 1 of the 1903 issue. This illustration is from an uncleaned die proof.

Well known anachronism. Columbus «discovering» St. Kitts-Nevis with telescope (invented after his death)

EXPOSITION DE REALISATIONS ASTRONOMIQUES SIMPLES

par L. Bottinelli

Des exemples d'instruments simples, réalisés à peu de frais et de documents photographiques et spectroscopiques obtenus par des enseignants français sont exposés par la Commission 46, dans le bâtiment central

Ces réalisations ont été obtenues soit au cours des écoles d'été organisées par une équipe d'astronomes français, soit par les enseignants avec leurs élèves.

SITUATION DE L'ENSEIGNEMENT DE L'ASTRONOMIE DANS LES ECOLES FRANCAISES

La part de l'astronomie dans l'enseignement secondaire français est très modeste. Elle apparaît dans les programmes de physique dans la classe de 4ème (enfants de 13-14 ans) et de 1ère littéraire (16-17 ans) et dans le programme de mathématique des classes terminales littéraires (17-18 ans).

Elle est donc surtout l'occasion de développer l'aspect expérimental de la physique dans le champ d'application particulièrement riche de l'Univers

Les enseignants n'ont généralement pas reçu de formation initiale en astronomie; c'est pourquoi il est essentiel de développer les possibilités de formation continuée. Dans ce but, plusieurs actions sont menées en France, dans diverses universités. Un exemple est l'école d'été organisée chaque année depuis 6 ans par une équipe d'astronomes (L. Bottinelli, F. Delmas, J. Dupré, M. Gerbaldi, L. Gouguenheim, M. Gros et G. Paturel). Cette école regroupe chaque été 70 à 80 participants pendant une dizaine de jours; l'enseignement dispensé est à la fois théorique et pratique

Les instruments et les documents photographiques exposés ont été généralement réalisés au cours de ces écoles d'été. Il s'agit de réalisations modestes: l'accent est mis sur l'aspect pédagogique et le prix de revient modique. L'intérêt essentiel des instruments est qu'ils peuvent être réalisés et utilisés facilement par des enfants, ce qui leur permet d'expérimenter eux-mêmes.

On donne ci-dessous une brève description des maquettes, des instruments d'observation et des documents photographiques exposés.

PROPOSED NEW GREEK RESEARCH CENTER FOR SEISMOLOGY & ASTRONOMY

(Activities of the Hellenic
Astronomical Society)

The Hellenic Astronomical Society was founded 35 years ago by Professor S. Plakides with the aim of popularizing Astronomy in Greece. This is done with various publications of astronomical articles, visits to Observatories, lectures and rewards to secondary school students.

The president of the Society Mrs. M. Laskaratou is taking part in the XVIIIth General Assembly and has reported, in a meeting of Commission 46, on the level of the teaching of Astronomy in Greek Secondary schools.

She announced current plans for the foundation of a Research Center for Seismology and Astronomy on the island of Cefalonia, in Western Greece. When completed it will be the largest establishment of this sort in Southern Europe. The funds for the new Research Center will be provided by the Greek ship-owner and benefactor of the island of Cefalonia Mr. Andrew Vergotis. He will be the second notable donor of large sums of money to Greek Astronomy, after M. Korgialenios who donated, for example, the large telescope at Kiato Observatory. Both these benefactors are from the island of Cefalonia.

SIMOS PHOTOGRAPHY

Photos of the functions and activities of the I.A.U. are on display for sale in the concourse bldg. Next to the news stand.

MAQUETTES

Les maquettes présentées sont destinées à visualiser les mouvements apparents des planètes, du Soleil et des étoiles. Ce sont:

- une sphère armillaire, réalisée en ébenisterie par des enseignants du groupe «Ciel» des Centres d'Entraînement aux Méthodes d'Education Active (CEMEA). Ce groupe a beaucoup étudié les instruments anciens et mis en évidence leur intérêt pédagogique.

- un planétaire héliocentrique en carton
- un planétaire géocentrique en carton (conçu par B. Sandré)
- une carte céleste mobile en carton
- un héliolabe (groupe «Ciel» CEMEA).

INSTRUMENTS

Quelques exemples d'instruments d'observation simples réalisés par des enseignants sont exposés:

- un dispositif permettant de réaliser n'importe quelle sorte de cadran solaire par projection, imaginé et réalisé par D. Toussaint
- un nocturlabe permettant de déterminer l'heure (solaire) la nuit en observant l'étoile polaire et la Grande Ourse (groupe «Ciel» CEMEA).
- une monture équatoriale en bois permettant de réaliser des poses photographiques de plus d'un quart d'heure (conçue par Y. Dargery)
- un spectrographe simple (conçu et réalisé par D. Bardin)
- un dispositif permettant de mesurer la température effective du Soleil, par l'échauffement d'un bloc de laiton (réalisé par J. Dupré et G. Paturel)
- un sextant (J. Dupré).

DOCUMENTS

Quelques documents photographiques, réalisés avec ces instruments simples:

- photos de champs stellaires, de nébuleuses et de spectres stellaires (D. Bardin et A. Villette)
- photos en couleur réalisées par les élèves de D. Toussaint (12 à 14 ans) dans le cadre d'un travail sur la couleur des étoiles
- photographies de champ d'étoiles et de l'éclipse totale de Soleil de Crimée réalisées par le club des «Pleiades» animé par J. Chappelat.
- portraits d'astronomes célèbres dessinés par des enfants de 12 à 14 ans du Collège Valéri de Nice.

FORMATION OF THE PLANETARY SYSTEMS

A book on the formation of planetary systems has just been published by the French Space Agency (A. Brahic editor). It deals mainly with the origin of the solar system, the formation of planetary systems, and the physics and chemistry of planetary interiors, surfaces, and atmospheres. 21 authors contribute to this book (Elmegreen, Reeves, Lattimer, Allegre, Minster, Bibring, Langevin, Burns, Brahic, Greenberg, Cazenave, Owen, Gautier, Blamont, Mignard, Scholl, Masson, Dobrovolskij, Lust, Margulis, Labeyrie). For all information, please write to Cepadues, 111 rue Nicolas Vauquelin, 31100 Toulouse, France or ask to A. Brahic (n. 1648).

Commission 37 — Star clusters and associations Session 371 — Cluster cores

This takes place in room B2 from 11.30 to 13.00, and not in A1 as stated in the Diary and in Astrocosmos No.4. Main speakers are

D. Lynden-Bell: Theory
D.H. Martins: Visual surface photometry.

There will also be a briefer review of UV surface photometry.

Related poster papers are on display throughout the morning from 09.30 in room DB.

D.C. Heggie, Chairman

Editorial

TAKE ME TO YOUR LEADER

Every astronomer has speculated about life elsewhere in the universe. The topic is also an inexhaustible source of science fiction stories and films. Of course the term science fiction covers a wide spectrum of treatments of the subject. In the fifties there appeared a number of excellent films, mature and thoughtful about possible encounters of mankind with extraterrestrial visitors.

There also appeared a large number of films so incredibly bad that it almost became an enjoyable pastime counting the clichés. The titles were pretty dreadful too. I remember one that collated all the major themes of interest — It was: «I married a teenage werewolf from outer space». Beat that if you can.

In these films there was always an old scientist and he always had a pretty daughter with whom the young handsome scientist fell in love. There was always an aunt/uncle/friend/Cassandra whose job it was to intone «Man was not meant to meddle in such realms» or «Of course you realise it means the end of civilisation as we know it», just before he was eaten by the monster/mutated animal/beast from 20000 fathoms/outer space/centre of the Earth which eventually shambled on to the scene like a refugee from a hard rock group. And at the last moment, when mankind was at its collective last gasp, the young scientist, inspired by his acceptance by the old scientist's daughter, would gasp

something like «But is it possible that it cannot survive sea water/popcorn/apple pie?» or what have you.

We are a little more mature now. And possibly rather humbler about man's place in the universe. Either there is life elsewhere or there is not. The three facts of astronomical life are the size of the universe, the sameness of the universe and the age of the universe. If there is no life elsewhere then surely the implication is that we are merely a highly improbable and purely temporary event in its existence. If there is life elsewhere, then the third fact compared with mankind's age implies that we are probably the most primitive natives of the lot. Either way, there is no cause for pride. And either way there is no cause for feeling that we are the hero of the story and not a bit player who can get knocked off without the rest of the cast noticing. Perhaps that is one of the main messages we have for our fellows on our planet.

But you know, I still have a soft spot for those dreadful old films of the fifties and almost with nostalgia find myself watching them late at night when every so often they appear on television. I have not yet seen them with Greek subtitles but I'm sure that will come. Except that after seeing ASTROCOSMOS off to bed at the printers I really do not feel up to watching the late, late show on T.V. Some other time.

FLARE STAR DISCUSSIONS AT STEPHANION OBSERVATORY

Eighteen astronomers from Armenia - USSR, Brazil, Bulgaria, Egypt, GDR, Greece, Hungary, India and Norway participated in an excursion to Stephanion Observatory on Monday to discuss questions related to the flare activity of stars. A guided bus trip with a visit to Corinth put a pleasant start on the day, and after lunch at the Observatory the scientific session could start.

Academician V.A. Ambartsumian presented the introductory lecture on Flare Stars in Stellar Aggregates. Problems related to statistical and physical properties of these stars were elaborated further by L.V. Mirzoyan. In a short contribution P.V. Kulkarni discussed the infrared flare activity in the Rapid Burster (1730-333) and the possible relationship to X-ray activity, and C.A.O. Torres compared rotational results for K-type BY Dra stars in the Pleiades to theoretical expectations of rotational braking in young stars. B.R. Pettersen presented new observations of the continuum and emission line behavior during stellar flares, and L.N. Mavridis discussed the long-term variability of flare activity and the quiet luminosity of two well observed flare stars. All contributions were followed by lively discussions and questions. The successful day was organized by professor L.N. Mavridis, and we all enjoyed the relaxed and friendly atmosphere.

B.R. Pettersen

Letter to the editor of ASTROCOSMOS

Dear Sir,

With reference to the article by Mr. N. Henbest in the issue of ASTROCOSMOS of August 23, the author makes some manifestations about Mr. Herschel's work which I would like to rectify just for the sake of exactness. Truly, Mr. Herschel presented not one but three telescopes (one of 25 feet and two of 7 ft) to the King of Spain. What I must disagree with in the above quoted article is with the preposition «with» as these telescopes were not a present to the Spanish crown, but the result of an order passed in 1796 for the construction of the three instruments and for which some thousands of guineas were really (or royally?) paid.

Thank you for your kind acceptance of this letter.

I remain yours sincerely
M. Lopes Arnoyo
Madrid Astronomical Observatory

EVERYTHING EVER PUBLISHED ON THE CRAB NEBULA

To the Editor of ASTROCOSMOS

You have presented some items on the problem of consistent names for astronomical objects but there is little discussion of an even more serious problem.

Most astronomers would like to be able to obtain a list of all the papers ever published which include information on a particular object (in all its guises) and then select which items cover the particular data they are seeking.

Computers can obviously handle the sorting of these lists — the difficulty is in assembling the information in the first place. Such a scheme would be possible only if an abstracting organisation could easily discover what objects were dealt with in each published paper.

At present all papers have a list of references at the end. Why not also require of objects using accepted names or positional designations plus some standard code letters for each object to indicate the type of information — X-ray intensity, radio spectral index, theoretical model atmosphere, etc. For papers with long tables of objects it would be sufficient to give a cross reference to the appropriate column of the table.

If such a scheme was adopted, eventually the lists from all future astronomical papers could be copied straight into the collating computer. It would then remain for some dedicated individuals to work through the previous literature in order to achieve completeness!

Please suppress my name in case I am persuaded to become one of these dedicated individuals!

L'Astronomie

«L'Astronomie» which is the bulletin of the «Société Astronomique de France» celebrated its first centenary in March 1982. In spite of this old age, its readers are always impatient to have news of recent research. So «L'Astronomie» wants to receive any information on subjects of general interest and of particular interest for the amateurs. Please send any information to:

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Société Astronomique de France
3 rue Beethoven, 75016 Paris, FRANCE

XVIIIth GENERAL ASSEMBLY



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SOME HIGHLIGHTS OF JOINT DISCUSSION IV

THE EXPLORATION OF THE SOLAR SYSTEM

The Lord of the rings himself — the giant planet Saturn — came in for close scrutiny during last Friday morning's session of the Joint Discussion held between Commissions 16 and 44. And the consensus reached by the researchers is that Saturn is far from being a pale shadow of his big brother Jupiter.

Most workers reported on results obtained during the Voyager 1 and 2 flybys. Reta Beebe explained how she and her co-workers had identified three dominant kinds of structures in Saturn's atmosphere — small eddies which pump energy into zonal wind-flows; long-lived spots, averaging 5000 km in diameter which feed off the shear between opposing wind flows; and elongated waves. She also mentioned that Saturn has a unique, bright ultraviolet spot which appears to induce convection in features around it.

Saturn's dynamic weather is matched by its complex and very active magnetosphere, according to Fred Scarf. There are still a lot of problems in explaining the planet's radio-emission — not the least because Saturn was actually inside Jupiter's magnetotail for 4 days of the Voyager 2 flyby. In particular, although Saturn has a radio-emitting sector like Jupiter's, it does not beam radio waves by the same «light house beam» mechanism. Whatever gives rise to the radio waves also controls the mysterious radial spokes in Saturn's B ring which generally lie above the radio - emitting sector.

The spokes are made up of extremely small particles (comparable to the wavelength of light), but as Jeff Cuzzi explained in Review of Saturn's Rings, there is a large range in particle size through-out the system.

The narrow F-ring seen as linked and braided by Voyager 1, looked smooth in Voyager 2 photographs, implying that its irregularities are not continuous or that it may even change its structure with time. And there may be more to the F-ring than meets the eye. Data from the old Pioneer 11 craft showed some evidence that the ring extends to a width of more than 1000 km with a suggestion that the extended region may be made up of «unseen moonlets».

Saturn's extensive collection of major moons has a considerable effect on the ring system by giving rise to gaps. And high-resolution Voyager 2 photographs revealed a dozen examples of spiral density waves in the resonances as well as a couple of cases of corrugated, spiral bending waves, produced by the changing position of Mimas in its inclined orbit.

Saturn has at least twenty moons, reported Dave Morrison, and there's a possibility that there may be two or three more which were glimpsed by the Voyager probes. Four of the «new» satellites are to be officially given names at this General Assembly: Janus and Epimetheus (the two «co-orbital» satellites) Telesto and Calypso (the two satellites in the same orbit as Tethys). And although the moons all have similar composition, consistent with a content of 60% ice, they are a very mixed bunch in terms of their «geology». Of

course, Titan — with its smoggy nitrogen atmosphere and a surface which may be covered with methane pools — is the weirdest of all. «It's a world where government control has been totally abandoned and chemistry has taken its toll», quipped Toby Owen in his account of the origin of this peculiar moon's atmosphere.

Although none of Saturn's other moons have any trace of atmosphere, some of them make up for it in exhibiting obvious signs of internal activity — some of it fairly recent. Contrary to expectations it is not the largest satellites which are the most geologically active but the smaller ones. Enceladus, only 500 km in diameter has such a smooth icy surface that its craters must have been melted by thermal activity beneath, it has certainly been active within the past 10⁹ years — and probably much more recently. And mysterious Iapetus, with its dark leading side and bright trailing side, continues to baffle researchers. So precisely does the distribution of dark material correspond to the satellite's leading hemisphere in its orbit that it looks almost certain to have been «dumped from space». Yet elsewhere on Iapetus, a number of dark-floored craters away from the leading hemisphere seem to indicate that the material has welled up from inside. As Dave Morrison concluded, the Saturn moons are a motley bunch — they make up a real miniature solar system, in terms of both their dynamics and in their individual quirks.

Venus observed

Despite an air-conditioning mechanism designed specifically to drown the speaker's voices, seats which squeaked shrilly at the slightest quiver and a lantern which would not focus, the afternoon audience in room AB on Friday saw Venus being remorselessly unveiled. So much has happened since the last IAU congress though each problem solved seems to raise a host of others.

Less than two decades ago we knew nothing about the surface. Today, thanks to the space probes, we have detailed maps. H. Masursky, the first speaker, gave an overall account of the rolling plains the shield volcanoes and the highland areas of Ishtar and Aphrodite. The images obtained from the Soviet Venera 14, he said, showed some flattish plate-like rocks which could well be basaltic; the Aphrodite highland about the size of Africa was believed to be ancient — and if it included impact craters it must be very ancient indeed. But Venus and the Earth, near twins in size and mass, differed in many ways. Terrestrial type plate tectonics could not apply to Venus. But volcanoes undoubtedly existed, some with summit calderas, and they could be associated with gravity anomalies not unlike those of our own volcanoes.

R. Prinn then dealt with the chemistry and composition of the Venusian atmosphere. Of course carbon dioxide is dominant to the extent of some 96%, chlorine is 1000 times

Bang in the Middle!

Wednesday saw A Building's auditorium packed with astronomers eager to hear about the intricacies of active galactic nuclei, in a Joint Discussion organised by Commissions 28, 40 and 48. It is fair to say that the active galaxies — whose centres show signs of powerful, violent outbursts — scored a narrow victory in preserving their secrets, but not without a battle conducted on all wavelength fronts, and with all the power of theoretical astrophysics which could be brought to bear.

E.Y. Khachikian and Andrew Wilson were among several speakers who stressed the similarity in appearance of all active galactic nuclei, despite the different kinds of galaxy they live in. Khachikian demonstrated this with results from the 6m telescope in the USSR: his sample of Markarian and Seyfert galaxies all had double or triple nuclei, suggestive of jet-like structures beamed out of the central core. Wilson reported his Very Large Array radio studies of the «intermediate» (kiloparsec) scales in Radio galaxies, and in particular the interaction of the ejected beams-whether particle jets or «lumps» of plasma — with the clouds of gas rotating around the centres of the galaxies. For their part, it appears that the rotating clouds can bend the jet, but the jet can get its own back by giving a cloud a kick if it happens to hit one!

«Classical» active galaxies kept coming home to roost throughout the meeting. M 87 and its jet came in for a lot of attention: «It's everything you'd like to have when you study a galaxy!» enthused Massimo Tarengi, reporting on optical studies of the bright «blobs» in its jet. Time only will tell what the blobs are; perhaps they are even mini-galactic nuclei in their own right? Tarengi went on to describe the jet of another «old faithful», the quasar 3C 273, whose tip is distinctly red — probably from loss of energy of the light-emitting electrons.

3C 273 is one of several active whose central regions appear to be expanding at several times the speed of light. But Malcolm Longair, reporting on a «large number of sources» (actually, 4 or 5; but as he pointed out, «We're talking astronomy!») revealed how optical and infrared observations could give a better handle on the nature of the source. As most workers agree, it's all a question of geometry; if you're looking right up the end of the ejected jet, the light emitted virtually «catches up with itself» and gives rise to «superluminal» effects. It can also explain the very short-period variations observed in sources like OJ 287, whose nucleus brightens and fades at near-infrared wavelengths in only 1.28 minutes. L.B. Baath mentioned later — somewhat off the record — that he has mapped the source AO 0235 + 164 with the US and European VLBI networks and found a superluminal expansion velocity equivalent to 45 times the speed of light. A Westerbork astronomer yelled from the back that they had evidence that the superluminal phase was only temporary: in half a dozen sources they'd studied, there was evidence that the beam had «swung round» from its usual position to give the present superluminal effect. And Ken Kellerman invoked «geometry» to explain why the power emitted by galaxies, Radio galaxies and quasars covers such a wide range, when

the phenomenon appears to be the same in each case. A «head-on» source will appear brighter than normal, as well as showing superluminal expansion and rapid flux variations.

These rapid intensity variations may mean that the nuclei of active galaxies are very small — but as Andy Fabian pointed out in his excellent overview of X-ray emission from galactic centres, this isn't necessarily the case if a lot of radiation comes from patterns you'd expect from a central, energetic source — which of course, begs the question as to what the source actually is.

Possibly the well-known Seyfert galaxy NGC 4151 will provide some answers, suggested Malcolm Longair. Reporting on Mike Penston's work with the International Ultraviolet Observatory satellite, Longair described the cyclical way in which the region around the central source responded to changes in the source's intensity. The results indicate the presence of a compact mass of some 10⁸ solar masses—similar to that derived dynamically for the central CORE of M 87. Speaking for most of the theoreticians, Cavaliere put his money on a medium-to-large-sized black hole as the ultimate culprit in active galaxies, whose gravitational energy drives a whirling accretion disc responsible for producing the fireworks. There needs to be **something** pretty potent there, for recent results show that some galactic nuclei are prolific sources of positrons, which spontaneously annihilate with electrons in outlying clouds to give strong X-ray emission. Even our galaxy is not exempted here: one third of its X-ray emission comes from a single line at S11 MeV, and studies of the erratic variability of this line should shed new light on the nature of the object at our galactic centre.

«Franco Pacini asked me to sum up, but I'm really going to talk about redshifts, which he knew I'd do whatever he said», explained Geoff Burbidge in his summary. «Everyone plumps for a black hole at the centre, but how do you test it? Perhaps everyone believes it's true because they reiterate it so much!». And he warned of the risks involved in extrapolating conventional physics close to the event horizon of a black hole. Perhaps, he suggested, many of the energy problems of quasars—in particular—might go if you attribute their immense redshifts to something other than the expansion of the Universe, and thereby bring them closer. But despite some tantalising slides of quasar-quasar and quasar-galaxy associations, no-one seemed very convinced. We need some good, unbiased statistics, said the delegates —almost in one voice— as they rushed for their buses

FAREWELL FROM L.O.C.

At the conclusion of the XVIIIth General Assembly the Local Organizing Committee expresses its thanks to all participants and guests, hoping that their stay in Patras has been fruitful and pleasant. At the same time it wishes to all a happy and safe journey to their home countries and successful continuation of their astronomical work. ΚΑΛΗ ΑΝΤΑΜΩΣΗ (until we meet again)!

Continued on page 2

Editorial

THE JOY AND THE SORROW

We have been together now for ten issues of ASTROCOSMOS and this is the last. Something like 70 000 words with photographs, diagrams, puzzles, cartoons and adverts have appeared in these pages. For our errors of omission and commission we apologise sincerely. We hope we have not perpetrated any error like the one in a certain English newspaper which referred to «Major Goreworthy that well-known battle-scarred veteran» and rushed out an apology the following day saying «This of course should have read 'Major Goreworthy', that well-known battle-scarred veteran».

We are in fact profoundly grateful for the instigating support given us by all who have contributed to ASTROCOSMOS — our reporters Heather, Nigel and Karen, our busy office people Aspasi, Tonia, Olga and Vassilakis, our transporter of staff Kosta available round the clock, our general troubleshooter Peter and our long-suffering but always helpful printers Mr and Mrs Constantinopoulos. Our thanks also go to the Local Organizing Committee and in particular Vassili Markellos for much aid, advice and support. And of course our contributors who in a busy life provided articles at short notice. We thank you most sincerely.

And now the carnival is almost over. Already some of us have left for our own countries and soon the 18th General Assembly of the International Astronomical Union will be ended.

What have we as a community of astronomers as the Astrocsmos — learned? Certainly we have exchanged information about the cosmos and about our latest research methods. Certainly from our deliberations in session and out we have gained a clearer understanding and a wider synoptic view of the science we all pursue, undoubtedly we leave with a renewed enthusiasm for our exploration of that universe which progressively reveals itself to us in all its mystery and beauty. And on the human side we have strengthened the ties of international friendships and understanding as well as forming personal relationships that will influence us and enrich our future lives. For that alone the 18th General Assembly has been a joyful event.

It has been a joyful event overshadowed by the deep sorrow we have felt at the loss of our President, M K Vainu Bappu. The tributes paid to this fine man in a touching ceremony have demonstrated again the truth spoken so long ago by John Donne when he talked of how each one of us is part of the continent of mankind: «No man is an island. Ask not for whom the bell tolls; it tolls for thee».

There is a poem by T S Eliot called *Little Giddings*. In it he describes how the last place to be explored and appreciated in the world is the home from which we set out. Only after all else has been visited and experienced can one evaluate the familiar, taken-for-granted everyday events.

Today man is exploring the worlds of the Solar System and beyond. In the cathedral of the universe his own galaxy is but a speck of dust, his Solar System is as a penny to the continent-sized galaxy, his Earth is the one green and blue, life-bearing planet in a Solar System of slag-worlds and poison-planets. Like the astronauts returning from the Moon, astronomers see their home for the first time. If we have learned anything at all, it is that the Earth is the mother of all life that we know of. The sadness is that as the twentieth century enters its last years Earth, and its biosphere and that clever human race that has so brilliantly demonstrated its scientific and technological prowess in exploring the universe, are threatened as never before by the greed and stupidity and fear and intolerance of that same race.

Sadly we must acknowledge with a sense of humility and fear that in the field of human relations our race has not even begun to ask the right questions, let alone find the right answers to free us from our sorry world state with its problems of famine and disease, of violence and oppression.

Nevertheless, while admitting these facts, we can also take some small measure of hope for the uncertain future from the fact that there has been demonstrated once again at the 18th General Assembly of the IAU that spirit of international cooperation and concern without which there can be no future for our planet and our race. And as astronomers we can endeavour to foster ever more clearly in our fellow humans realisation that they live on a finite, fragile unique home that once destroyed, is gone for ever.

Let a Greek have the last word. In talking of man's estate Pindar wrote more than two millennia ago:

*«What is a man? What is he not?
He is but a shadow in a dream.
But when the gods smile upon him,
There is a brightness upon Earth,
And life is sweet as honey».*

If our race solves its problems then there will be a brightness upon Earth; life will be sweet as honey. If not, then the Voyager records of the sights and sounds of man's planetary activities will journey on through interstellar space as his last brief moment of glory before hubris overtook him.

SOME HIGHLIGHTS OF JOINT DISCUSSION IV

THE EXPLORATION OF THE SOLAR SYSTEM

Continued from page 1

more abundant than in the Earth's air; HCl is of great importance — and there is the H_2SO_4 which goes so far to make Venus an uninviting world. Dr Prinn outlined several possible atmospheric cycles: the exact processes are still under discussion (though tremendous progress has been made), but it does seem likely volcanism may be current.

T. Donohue followed with a fascinating analysis of the Cytherean H_2O problem. It is a dry world with no more than 200 ppm in its lower atmosphere, why was this so? It was hardly likely that virtually no H_2O existed in the original planetesimals, so Venus must have lost its water in some way or other. The vital clue could lie in the relative abundance of deuterium as against hydrogen — greater than

for Earth by a factor of 100. The measurement had been made fortuitously when the Pioneer mass spectrometer became clogged with H_2SO_4 droplets during its descent; but it does indicate that Venus may once have had an ocean, sufficient to cover the surface to a depth of 9 m. The youthful Sun was less luminous than that of today; as the temperature rose the water evaporated — and the escape mechanism is discriminatory which would explain the greater relative abundance of deuterium remaining.

Plate tectonics could have started during the oceanic period. Perhaps Ishtar had been formed then; would we eventually find fluvial channels there? It is by no means out of the question.

L. Brace described the solar wind in relation to Venus; D. Campbell gave an account of the radar work at Arecibo which had revealed circular features some with central elevations. This was followed by further contributions about the nature of the surface. Clearly our knowledge of Venus is not yet complete — but we have found out more than would have seemed even remotely possible a few years ago.

ABOVE THE CLOUDS: BEYOND THE STARS THE UNITED KINGDOM INFRARED TELESCOPE

Bill Zealey, U.K. Infrared Telescope of the Royal Observatory, Edinburgh

The 13,800 foot summit of Mauna Kea, on the Big Island of Hawaii is undeniably one of the best observational sites in the world. Its volcanic peak is the site of the Mauna Kea Observatories. Four major telescopes are now operating.

1. The University of Hawaii 2.2 metre Telescope.
2. The NASA 3 metre Infrared Telescope.
3. The Canada-France-Hawaii 3.6 metre Telescope.
4. The United Kingdom 3.8 metre Infrared Telescope.

The U.K. Infrared Telescope (UKIRT) is arguably the most powerful, ground-based, infrared telescope in the world. It is operated by the Royal Observatory Edinburgh on behalf of the U.K. Science and Engineering Research Council. An operating agreement exists whereby Netherlands astronomers and astronomers from the University of Hawaii have access to telescope time.

UKIRT is a thin mirror telescope. It is light, compact and was comparatively cheap to build. It's thin, upon a sophisticated support system to provide rigidity. So successful has this system been, that the optical performance of the telescope is comparable with more conventional 4 metre telescopes. It can thus, truly be considered the first large, thin mirror telescope.

UKIRT's aim is to make infrared astronomy available to the astronomical community as a whole: not just to infrared instrument specialists. To this end «Common User» instruments have been provided. Sited, as it is, above almost 40% of the Earth's atmosphere, UKIRT is particularly suited for work at wavelengths between 3 and 34 microns and

in the submillimetre and millimetre wavebands. Our immediate priorities have, therefore, been to develop instruments which fully exploit the high altitude site.

Operational instruments now include Indium Antimonide photometers, equipped with circular variable filters for photometry and spectrometry in the 1 to 5 micron region, bolometers working in the 4 to 35 micron region and cooled grating spectrometers for higher resolution spectrometry. Of particular interest is a dual channel photometer which operates simultaneously in the J and K or H and K wavebands.

Future developments revolve around cooled grating spectrometers and the use of multielement array for mapping and spectrometry. Netherlands astronomers will provide a common user millimetre/submillimetre heterodyne receiver for night time and day time operation. To ease the astronomers task at 14,000 feet, as many telescope and instrument control functions as possible have been automated. This has been, logically, extended to the implementation of remote operation of UKIRT. Initially a data transfer and communications link has been provided between the summit and Hilo. However by the end of 1982 a trial system will link Hawaii and Edinburgh. This will eventually provide the remote observer, in the UK with limited control of the telescope and data acquisition.

Perhaps the most exciting, recent, development has been the decision to site the U.K. 15 metre millimetre-wave telescope on Mauna Kea. This telescope, coupled with UKIRT will provide an extremely powerful facility for UK and Netherlands astronomers into the 1990s.

CHINA JOINS THE FAMILY

A notable highlight of the 18th General Assembly of the IAU is the full adherence to the IAU of China as was anticipated at the General Assembly of 1979 at Montreal.

At the founding of the People's Republic in 1949, astronomy in China, like many other branches of science in the country, emerged to its rejuvenation. Today there are five major observatories, i.e. the Purple Mountain Observatory at Nanjing, Shanghai Observatory, Beijing Observatory, Yunnan Observatory at Kunming, and Shaanxi Observatory near Xian; four departments or sections of astronomy at major Chinese Universities — the Nanjing, Beijing Normal Universities and the Chinese University of Science and Technology; one factory devoted solely to astronomical instruments — the Nanjing Astronomical Instrument Factory; three artificial satellite observing stations (at Changchun, Urumqi and Guangzhou); and a planetarium at Beijing, with specialized personnel totalling about 2000, active on various fields of modern

astronomy. Among those fields are solar physics, solar system studies, astrophysics, galaxies and cosmology, radio astronomy, celestial mechanics and astrodynamics, star catalogues and astronomical constants, time and frequency service and astrogeodynamics. In addition, with its long tradition of astronomical observations and study, it is appropriate that the history of Chinese astronomy is an active field of research in China.

The booklet «Astronomy in China Today», published by the Chinese Astronomical Society, describes in detail the work carried out in each of the above fields. It is evident that in the years to come China will contribute ever more effectively and significantly to our subject. At the present moment something like 250 papers per year are being published by Chinese researchers, many of them in the journal *Chinese Astronomy and Astrophysics*. As time passes, this rate of production will undoubtedly rise steeply but, hopefully, not exponentially.

St ANDREWS

St Andrew is the patron saint of Patras, the place where he was martyred. St Andrew and his diagonal cross, or saltire, appear on the placards placed on the building where IAU meetings take place and on the first page of ASTROCOSMOS. St Andrew is also the patron saint of Scotland. How did this happen?

It is reputed that about the 9th century A.D. a Greek monk from Patras known as St. Regulus or Rule landed on the east coast of Scotland at a place called Kilrymonth or Headland of the Pigs. He carried with him a relic of St Andrew, a portion of a finger-bone. A monastery was founded at this place and later a great cathedral was built. St Andrews became the ecclesiastical capital of Scotland and the seat of an Archbishop. The cathedral and monastery buildings were destroyed during the reformation and only ruins remain.

Meanwhile the great universities of Europe were founded, Paris, Bologna, Oxford, Cambridge. During the middle ages Scotland was an independent nation and often at war with England. Scottish students found it difficult to travel to Paris to study and so in 1410 a university was founded at St Andrews. Every year around Eastertime the students hold a pageant and process through the streets of St

Andrews representing important people in the history of Scotland, St Andrews and the University. The procession is led by St Andrew walking barefoot carrying his cross.

James Gregory, inventor of the Gregorian telescope, was professor of Mathematics for a short period in the 17th century and some relics of his observatory remain. Napier, the inventor of logarithms was a student at St Andrews. The modern observatory and astronomy department were only founded some 45 years ago. There are many participants in the Patras General Assembly who were students at St Andrews or have other connections with the University.

TODAY'S EVENTS:

LES EVENEMENTS DU JOUR:

In the Concourse Auditorium:

10.00 Second Session of the General Assembly.

In the Averof Grand Hotel:

15.00-18.00 Executive Committee 50th meeting.

At EOT Swimming Resort, Aya, Patras:

WINE FESTIVAL: 20.00-24.00.

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GASTRONOMY CORNER



Melitzanes papoutsakia

1 1/2 kilo aubergines
3/4 kilo chopped beef
2 onions
2 tablespoons butter
Salt, pepper, cinnamon
160 grams grated chesse (kefalotyri or parmesan)

Cut the aubergines in half lengthwise. Take away the pulp with a spoon to make a hollow in each half, sprinkle with salt. Fill with the minced meat sauted with butter, the chopped onions, pepper and cinnamon. Arrange them in a baking dish, cover each one with béchamel sauce and sprinkle them with cheese. Bake them in moderate oven adding tomato juice.

Melitzanosalata

2 large (round variety) aubergines
2 cloves of garlic, chopped parsley, wine, vinegar, olive oil.

Bake aubergines in oven. When baked, peel them, put into a mortar and pound well with garlic, salt, vinegar and olive oil. Serve with chopped parsley and sliced tomato if desired.

Wanda Goudas

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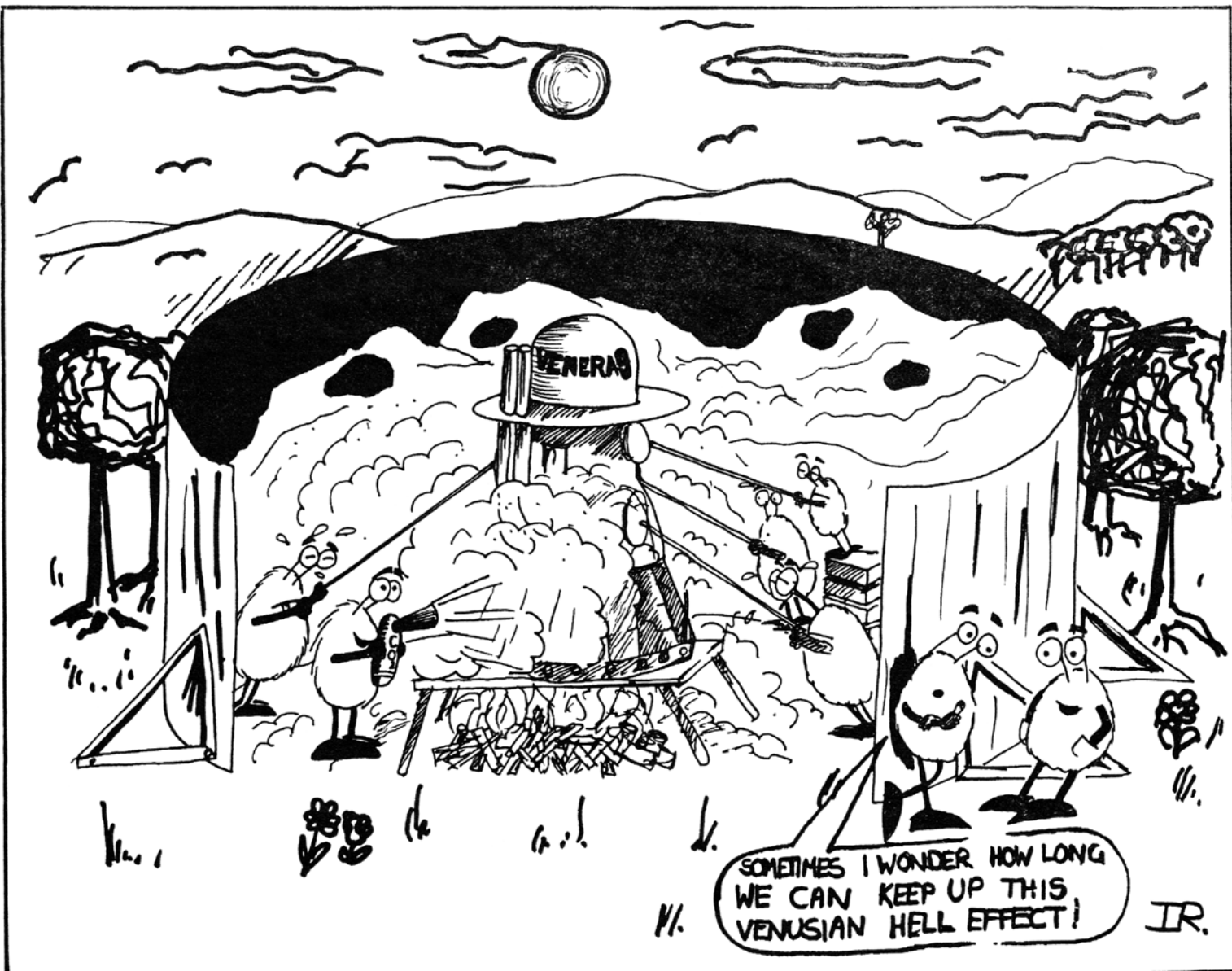
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Delphi: Impressions and reflections

For the busy traveller hastening through modern times, Delphi, including its incomparable museum, represents more than a double sanctuary (Athena's and Apollo's); its godlike scenery offers a spiritual vision of the «centre of the world».

The site nestles at the foot of the Phaedriades, those grey rocks with ochre scars which overlook the wild and green valley of Pleistos. On the other side of the hill, the valley opens up onto the silvery green sacred plain covered with huge venerable olive trees, then onto the smiling coast of the deep blue sea.

To visit Apollo Pythian's Hieron, you follow the Sacred Way, a steep path covered with polished blocks — how many million pilgrims must have walked up there and smoothed it.

It is from above the theatre, in contemplating the ruins of the sanctuary that one grasps the harmony of the whole site: the Treasure of the Athenians, the rocky throne where Pythia gave her Oracles, the wall with its penta- and

polygonal blocks supporting Apollo's temple, the temple itself, which contained the Omphalos — the centre of the world — and finally the theatre built with grey stone from Mount Parnassus. 5.000 people attended the Delphic celebrations of Apollo's victory over the Python snake. Today, we look from the pine and olive grove above the theatre and our glance embraces the scenery inspired by the gods and muses of Mount Parnassus. Cicadas twitter, the scents of Greek plants and herbs float in the air — sage, mint, origan, citronella, resin... —, rocks, dark cypresses and marble columns rise toward the sky like a song of triumph over the powers of darkness..

Below Apollo's sanctuary, the eyes dwell upon the mysterious white marble Tholos of Athena's sanctuary, that gracious light-house marking the lower end of this divine area.

The only earthly parts of Delphi which show the vanity of man are the votive monuments. «The monuments which surround the god on all sides, the offerings and levies which are the products of massacres,

wars and bounty, how can we accept this revolting sight without indignation?», said Plutarch.

The god of the Sun and the goddess of Beauty and Arts have inspired man in Delphi and this spirituality which haunts the place still touches man today.

As to the Castalia Fountain, it casts a magic spell; under the deep green foliage of huge plane trees, runs a happy, cool and clear brook. The fountain flows out of an ochre carved rock next to a very narrow gorge, at the base of the Phaedriades; this silent grove was dedicated to the goddess Gê, the Earth, who gave her Oracles there, centuries before Apollo came.

After having passed a huge recently excavated basin of the Hellenistic period, the tired pilgrim has only a few steps to walk above the road, then he can quench his thirst and rest under the shade in peaceful solitude.

And, who knows, in the rose-tipped hues of early dawn, the sylphs and muses may dance there to the music of Pan's flute...

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XVIII GENERAL ASSEMBLY RESOLUTIONS

The International Astronomical Union recognizing that since the Seventeenth General Assembly Commissions 4, 7, 8, 19 and 31 have adopted the 1980 IAU Theory of Nutation in place of the 1979 IAU Theory of Nutation now endorses the adoption of the 1980 IAU Theory of Nutation

Commissions 4 and 31 noting that the present method of keeping UTC within ± 0.9 of UT1 by means of leap seconds both provides the second of S1 and meets the needs for safe celestial navigation, recommend that the Air and Nautical Almanacs continue to be published with UT1 as the argument

Commissions 4, 19, 31 noting that the International Meridian Conference held in Washington in October 1884 adopted a resolution that from the meridian of the Observatory of Greenwich «longitude shall be counted in two directions up to 180 degrees, east longitude being plus and west longitude minus,» and noting that there is an increasing interaction between astronomy and geodesy in which field and sign convention «east longitude is positive» as in common use, recommends that as soon as practicable all national ephemerides and other astronomical publications adopt the convention that terrestrial longitude be measured positively to the east

Commissions 4, 19 and 31 considering Commission resolution (4) of the Seventeenth General Assembly and that it is planned to introduce the IAU (1976) System of Astronomical Constants, the 1980 IAU Theory of Nutation, and the equinox of the FK5 on 1984 January 1

recommend that (a) the relationship between mean sidereal time and UT1 be modified so that there is no change in either value or rate of UT1, as determined from stellar observations, due to a correction to the zero point of right ascensions of the FK4 and to a correction for the motion of the zero point both to be introduced in FK5, (b) the new expression for Greenwich mean sidereal time of 0h UT1 be $\text{GMST of 0h UT1} = 6^{\text{h}} 41^{\text{m}} 50^{\text{s}} 54841 + 8640184\text{s} 812356 \text{ Tu} + 0\text{s} 093104 \text{ Tu}^2 + 6\text{s} 2 \times 10^{-6} \text{ Tu}^3$ where Tu is the number of Julian centuries of 36525 days of universal time elapsed since 2000 January 1 12h UT1 (JD451545.0)

Commission 8 considering that the determination of the equinox and equator will remain to be an important task of positional astronomy recommends that

a) the Sun and major and minor planets are included in observational programs with transit circles
b) the Sun, and major planets are included in programs with astrolabes and
c) minor planets are included in programs of photographic astrometry, such that from differential and/or absolute observations the positions can be rigorously referred to the fundamental reference system and serve for further improvements of the zero points of this system

Commission 12 recognising the extreme importance of the observation of solar seismology strongly supports international co-operation in establishing a world-wide network of observing stations

Commission 50 considering with deep concern the proposals for a Satellite Power System which would place very large structures into Earth orbit with the potential of destroying the conditions for a major part of astronomical research in many regions of the electromagnetic spectrum, recommends national representatives to bring this concern to the notice of space agencies in their countries, and to ensure that the IAU is kept fully informed of proposed developments in space techniques which would involve dangers to astronomy

Commissions 19 and 31 considering the need to clarify the role of the zonal tides in the processing and publication of the universal time recommend 1 that, when the effect of the short period zonal tides, i.e. periods less than 35 days, is computed for the above purposes, the attached tabulation based on Yoder, Williams, and Parkes study (J. Geophys. Res. 86, 881 (1981)) be used,
2 that the letter R be added to the notation of the relevant quantities to indicate that the correction for the short period zonal terms has been made (for instance UT1R)

Commission 40 recalling the considerations (a) to (d) of IAU Resolution No. 3 of 1979 concerning harmful interference to radio astronomy observations and considering the pioneering use by radio astronomers of the radio spectrum at frequencies above 275 GHz, recommends 1. The provision by national administrations of frequency bands for radio astronomy continuum and polarization measurements at nearly octave intervals throughout the radio spectrum.
2. The provision of bands at the frequencies of the astrophysically most important spectral lines

tabulated in the 1982 report of IAU Commission 40.

3. The protection of these frequency bands from harmful interference from in-band, band-edge and sub-harmonic emissions, especially from space-borne transmitters.

Commission No. 4 considering that it is planned to introduce the IAU (1976) System of Astronomical Constants, the 1980 IAU Theory of Nutation, and the equinox of the FK5 on 1984 January 1 recommends that in the calculation of lunar and solar eclipses, there be a single value for k, the ratio of the radius of the lunar profile to the Earth's radius, and that it correspond to the mean radius of Watts' datum as determined by observation of occultations and to the adopted radius of the Earth; the value is $k = 0.2725076$.

The International Astronomical Union recognizing that continuing long-term synoptic observations of solar activity are vitally necessary, and that some long-term programmes have been lost or are threatened in the present worldwide economic situation, recommends that all countries endeavour to plan well balanced programmes of synoptic solar observations for the sake of future generations.

Commission No. 8 in view of the importance of accurate positions and proper motions of High Luminosity Stars for galactic research reaffirms its previous recommendation that such stars be included in transit circle programmes.

Commissions Nos. 19 and 31 The International Astronomical Union taking note of the success of the MERIT short campaign and recognising that the results to be obtained during the MERIT main campaign will be of short and long-term benefit for the studies of the planet Earth endorses the following two resolutions adopted by the International Association of Geodesy (IAG) at its General Meeting of Tokyo (May 1982).

AIG RESOLUTION 1
The International Association of Geodesy noting that the results to be obtained during the MERIT main campaign will be of long-term benefit to geodesy and its applications strongly endorses the proposals of the COTES and MERIT Working Groups that during the campaign
(a) very long baseline radio interferometric and satellite and lunar laser ranging systems be used for co-located observations of high precision at the recommended sites, and
(b) observations be made intensively for a limited period to detect any short-period variations in the derived earth-rotation parameters and urges that the appropriate resources and facilities be made available for these activities by the countries involved.

AIG RESOLUTION 2
The International Association of Geodesy considers that it is important that the new terrestrial reference frame to be derived from high-precision observations during the MERIT Main Campaign should be extended and related to existing services as accurately and quickly as possible and urges that co-ordinated precise positioning observations be made during the campaign by satellite radio-tracking systems at the Very Long Baseline Interferometric, Lunar and Satellite Laser Ranging sites as well as at a larger number of well distributed sites around the world. recommends (a) that the co-ordinates of the stations of the International Service of Latitude be determined in the Reference System (NWL 10F) adopted for the analysis of observations, by the Doppler method of artificial satellite of TRANSIT or NOVA type.
(b) that special support be given to BIH acting as the co-ordinating center for the MERIT international campaign.

Commission 8 recommends to observe by transit-circle the subset of stars requested by the HIPPARCOS Input Catalogue Consortium. The positions should be available before 1985.5. A moderate accuracy of ± 1.0 arcsec at that epoch is required; however ± 0.3 arcsec (in the FK4 system) is desirable.

Commission 8 noting that the HIPPARCOS stars will be selected for their astrophysical and/or astrometric interest and that such stars would traditionally be included in meridian observing programmes, and noting that very accurate meridian positions of suitable subsets of the HIPPARCOS stars would give checks of the space observations and calibration of the ground-based instruments, it is recommended that such subsets, e.g. faint fundamental stars and International Reference Stars be observed.

The International Astronomical Union recognizing the recent increased interest in cataclysmic variables, and the need for long-term light-curves to make possible the correlation of theoretical and observational research, noting that data collected by AAVSO observers

and other groups throughout the world are available on magnetic tape recommends the publication of this valuable reference material

Commission No 5
The International Astronomical Union reconfirming Resolution No 3 adopted by the XVI General Assembly considers that Astronomy and Astrophysics Abstracts (AAA) fulfil excellently the specialised needs for an abstracting service in Astronomy and Astrophysics, and recommends strongly that AAA continue to be produced by the Astronomisches Rechen Institut, Heidelberg, Fed. Rep. Germany, under the auspices of the IAU.

The International Astronomical Union recognizing the importance of interdisciplinary scientific use of large steerable antennas for astrophysical, astrometric and geodetic research in Very Long Baseline Interferometry (VLBI), endorses the formation of a working group under Commission 40 to collect and disseminate information concerning plans of VLBI experiments in astronomy and geodesy, and to encourage co-operation between observatories internationally.

Commission 49 noting decision 5/82 adopted at the XXIVth COSPAR meeting in May 1982, recommends the introduction of the International Heliospheric Study during January 1988 - December 1990 as an IAU activity conducted under the auspices of COSPAR in conjunction with other appropriate ICSU bodies.

Commission 22 noting the importance of the recent contributions from the Canadian and European Fireball Networks recommends that continued support be provided of these observational programs in order that a more extensive body of reliable data may be gathered for critical analysis. notes the recovery of meteorites from these two major camera networks is likely to remain limited to rare events; progress in the interpretation of fireball data is now leading to significant studies of both the astronomical properties of meteorites and the physics of their atmospheric interaction.

Commission 22 recognising their key position in the Network and their essential role in the location and recovery of meteorites which fall on Austrian Soil, recommends that the University Observatory of Vienna give its fullest support to the continuation of operation of the two Austrian stations of the European Fireball Network.

Appendix IV
Item 13(d) of the AGENDA
1. The Executive Committee, having examined the proposal of the President of Commission 22 to establish a Meteor Data Center of the Commission at the Observatory of Lund in Sweden, propose the allocation of SwFr 1 800 per annum as a financial contribution to the costs of such a center, so established, for the period 1983-85.
2. The Executive Committee, noting the expressed wish of the official representative of the Swedish National Committee of Astronomy at the XVIIth General Assembly of 1979 at Montreal that fellowships for students from developing countries be encouraged, and recognizing the valuable discussions carried out in the interim by the Working Group of Commissions 46 and 38 on the Education of Astronomers from Developing Countries, proposes that a sum of SwFr 35000 be allowed during the period 1983-85 to support the carrying out of a Contract Scheme for Visiting Lecturers with a sponsoring institution in a country newly entering into astronomical work, to be selected before June 1983, as the result of active enquiry within IAU member countries and other selected countries.

Appendix I
Item 4(c) of the AGENDA
Motion of the Executive Committee:
The General Assembly of the Union noting that progress has been achieved in restoring full adherence to the IAU of China, as was anticipated at the XVIIth General Assembly of 1979 at Montreal, and that agreement was obtained by 1 May 1980 on the mode of listing, in the official list of member countries, two adhering bodies for China as a temporary measure, ratifies the arrangements made by the Executive Committee for the adherence of China to the Union during the period elapsed since the XVIIth General Assembly.

Appendix VI
Item 18(b) of the AGENDA
The Executive Committee proposes to the General Assembly that a new Commission of the Union be established in respect of the search for life in the Universe, the name of the Commission to be Commission 51

Appendix VII
Item 18(c) of the AGENDA
The following changes of name have been proposed for existing Commissions of the Union:

Commission 26 (Double Stars) to be renamed «Double and Multiple Stars»
Commission 34 (Interstellar Matter and Planetary Nebulae) to be renamed «Interstellar Matter»

Appendix VIII
Item 5 of the AGENDA
The Special Nominating Committee, convened during 1980 and 1981 by the President of the Union, has selected the following IAU Members to be proposed to the XVIIIth General Assembly at Patras as members of the IAU Executive Committee from 26 August 1982:
As President - Professor R. Hanbury Brown (Australia).
As Vice-Presidents continuing from the former period Dr. M.W. Feast (South Africa), Dr. L. Kresak (Czechoslovakia), Professor R. Wilson (UK).
As Vice-Presidents to be newly proposed: Professor R.P. Kraft (USA), Dr. M. Peimbert (Mexico), Dr. Ya. S. Yatskiv (USSR).
As General Secretary - Dr. R.M. West (Denmark)
As Assistant General Secretary - Dr. J.P. Swings (Belgium).
As Advisers to the Executive Committee - Professor P.A. Wayman (Ireland).

Appendix II
Item 11 of the AGENDA
1. Resolution proposed on behalf of Commission 5.

Commission 5 considering the present unsatisfactory situation of the transfer of astronomical data between astronomical institutions recommends that all astronomical computer facilities recognise and support the Flexible Image Transport System (FITS) for the interchange of binary data on magnetic tape, as described in Astronomy and Astrophysics Supplement, vol. 44, pp 363 and 371.
2. Resolution proposed on behalf of Commission 15:

The International Astronomical Union recognising that it is particularly desirable that pre-selected Comet Halley Days for co-ordinated observation over a limited time be supported recommends that observatory directors and observing program committees give high priority to Comet Halley observation during the interval 1985-1987.
3. Resolution proposed on behalf of Commission 15.

The International Astronomical Union noting that in order to organise and marshal ground-based observations of Comet Halley throughout its 1986 perihelion passage and to co-ordinate them with space missions, an international program, the International Halley Watch, has been established and wishing to avoid duplication of effort at the international level and to encourage participation in this program endorses the International Halley Watch as the international co-ordinating agency for Comet Halley observations.

4. Resolution proposed on behalf of Commission 46
Whereas astronomy is an integral part of the physical sciences, both in education and in research, and whereas some countries now without astronomy may desire to introduce astronomy in their educational or scientific institutions, be it resolved that the International Astronomical Union supports the introduction of astronomy in such countries and encourages activities by its Commissions toward that purpose.

Appendix II
Item 13(c) of the AGENDA
Proposal of the Executive Committee:
Budget for adoption 1983-1985
Unit of Contribution: 1760
RECEIPTS (Swiss Francs) Swiss Francs
1. Contribution from Adhering Bodies (225 units per year) 1.188.000
2. Revenue from IAU Publications 51.000
3. Interest on Accounts 125.000
4. UNESCO and ICSU Contributions 68.000
Total Receipts 1.432.000
Excess of Payments over Receipts 1.433.700

PAYMENTS (Swiss Francs)
1. Administrative Office
1.1. Paris Secretariat (incl. furniture, equipment etc) 500.000
1.2. Secretariat help to GS & AGS 10 000
2. Subscription to ICSU 29 700
3. Commission Expenses 15.000
4. Projects of Commissions
4.1. Exchange of Astronomers (Commission 38) 58.000
4.2. Teaching of Astronomy (Commission 46) 40 000
4.3. IAU Telegram Bureau (Commission 6) 10.000
4.4. Minor Planet Centre (Commission 20) 10.000
4.5. Variable Star Catalogue (Commission 27) 10.000
5. General Assembly 200.000
6. Publications (IAU Information Bulletin) 60.000

Continued on page 6

RESOLUTIONS DE LA XVIIIème ASSEMBLEE GENERALE

L'Union Astronomique Internationale
considérant que depuis la XVIIème Assemblée Générale, les Commissions 4, 7, 8, 19 et 31 ont adopté la Théorie de la Nutation UAI 1980 en remplacement de la Théorie de la Nutation UAI 1979,

souscrit désormais à l'adoption de la Théorie de la Nutation UAI 1980.

Les Commissions 4 et 31

notant que la méthode actuelle consistant à conserver l'écart entre le UTC et le UT1, dans les limites de 0.9s, au moyen de secondes intercalaires, fournit à la fois la seconde de SI et satisfait aux besoins de la sécurité de la navigation par les méthodes astronomiques, recommandent que les annuaires astronomiques et nautiques continuent d'être publiés avec le UT1 comme argument.

Les Commissions 4, 19 et 31

notant que la Conférence du Méridien International tenue à Washington en Octobre 1884 a adopté une résolution selon laquelle à partir du méridien de l'Observatoire de Greenwich «La longitude sera comptée dans deux directions jusqu'à 180°, la longitude Est étant positive et la longitude Ouest étant négative», et notant qu'il existe une interaction croissante entre l'astronomie et la géodésie dans lequel la convention de signe «longitude positive vers l'Est» est d'un usage courant,

recommandent que tous les éphémérides nationales et (les) autres publications astronomiques adoptent dès que possible la convention selon laquelle la longitude terrestre soit mesurée positivement vers l'Est.

Les Commissions 4, 19 et 31

considérant la Résolution 3 de la Commission 4 prise lors de la XVIIème Assemblée Générale et considérant qu'il est prévu d'introduire le Système des Constantes Astronomiques de l'IAU 1976, la Théorie de la Nutation UAI 1980 et l'équinoxe du FK5 au 1er Janvier 1984,

recommandent (a) de modifier la relation existant entre le temps sidéral moyen et le UT1 de façon à ne changer ni la valeur ni le taux de UT1, déterminés à partir d'observations stellaires et introduits, par suite d'une correction à l'origine des ascensions droites du FK4 et du mouvement de cette origine, toutes deux étant apportées au FK5,

(b) que la nouvelle relation du temps sidéral moyen de Greenwich à 0h UT1 soit de GMST à 0h UT1 = 6h41m 50s.54841 + 8640184s.812866 TU + 0s093104 TU² - 6s.2 x 10⁻⁶ TU³ où Tu est le nombre de siècles juliens de 36525 jours de temps universel écoulés depuis le 1er Janvier 2000, 21 h UT1 (JD451545, 0).

La Commission 8

considérant que la détermination de l'équinoxe et de l'équateur resteront une tâche importante pour l'astronomie de position, recommande que a) le Soleil, les grosses et les petites planètes soient incluses dans les programmes d'observation au moyen d'instruments de passage,

b) le Soleil et les grosses planètes soient incluses dans les programmes d'astrolabe et c) les petites planètes soient incluses dans les programmes d'astrométrie photographique, en sorte qu'à partir d'observations différentielles et/ou absolues, les positions puissent être rigoureusement rattachées au système de référence fondamental et servir à améliorer les origines de ce système.

La Commission 12

reconnaissant l'extrême importance de l'observation de sismologie solaire, encourage vivement la coopération internationale par la mise en place d'un réseau mondial de stations d'observation.

La Commission 50

considérant avec profonde inquiétude les propositions relatives à un système d'approvisionnement en énergie par satellite qui mettrait d'importantes installations (sur orbite terrestre) ayant le pouvoir de détériorer une grande partie des conditions de recherche astronomique dans beaucoup de régions du spectre électromagnétique,

recommande aux représentants nationaux d'attirer l'attention des agences spatiales de leur pays sur ce problème, et d'assurer que l'UAI soit constamment informée des projets proposés dans les techniques spatiales pouvant entraîner des dangers pour l'astronomie.

Les Commissions 19 et 31

considérant le besoin de représenter clairement le rôle des marées zonales dans le calcul et la publication du temps universel, recommandent que lorsque l'effet des marées zonales à court terme (période inférieure à 35 jours) est calculé dans les buts précités, on utilise l'expression ci-jointe, tirée des travaux de Yoder, Williams et Parke (J. Geophys. Res. 86, 881, 1981), et que le suffixe R soit ajouté à la notation des quantités concernées pour signifier que la correction des effets à court terme a été effectuée (exemple: UTIR).

La Commission 40

rappelant les considérations (a) à (d) de la Résolution UAI 1979 No 3 relative aux interférences nuisibles aux observations radioastronomiques, et considérant l'exploitation d'avant-garde que font les radioastronomes du spectre radioélect-

rique à des fréquences supérieures à 275 GHz, sélectionnées pour l'intérêt qu'elles présentent du point de vue astrophysique et/ou astrométrique et que ces étoiles devraient être incluses comme d'habitude dans les programmes d'observation méridienne,

et notant que les positions méridiennes très précises des sous-ensembles appropriés d'étoiles HIPPARCOS permettraient d'effectuer des sondages sur les observations effectuées dans l'espace et sur la calibration d'instruments au sol, il est

recommandé d'observer de tels sous-ensembles, c'est-à-dire les étoiles fondamentales faibles et les Etoiles de Référence Internationale.

L'Union Astronomique Internationale

reconnaissant l'intérêt croissant que présentent les variables cataclysmiques et la nécessité de disposer de courbes de lumière à long terme afin de permettre la corrélation entre la recherche théorique et observationnelle,

notant que les données rassemblées par les observateurs AAVSO et d'autres groupes de par le monde sont disponibles sur bandes magnétiques, recommande la publication de ces données de référence de grande valeur.

La Commission 5

L'Union Astronomique Internationale reconfirmant la Résolution No 3 adoptée par la XVIème Assemblée Générale,

considère que les Astronomy and Astrophysics Abstracts (AAA) satisfont pleinement aux besoins des spécialistes désirant publier des notes abrégées dans la revue Astronomy and Astrophysics,

et recommande vivement que l'Astronomisches Rechen-Institut de Heidelberg, Rep. Féd. d'Allemagne, continue de publier les A.A.A. sous les auspices de l'UAI.

L'Union Astronomique Internationale

reconnaissant l'importance que présente l'usage scientifique interdisciplinaire de grandes antennes orientables pour la recherche astrophysique, astrométrique et géodésique dans l'interférométrie à très longue base (VLBI), souscrit à la création d'un groupe de travail dépendant de la Commission 40 en vue de rassembler et disséminer l'information concernant les projets d'expériences VLBI en astronomie et en géodésie, et d'encourager la coopération internationale entre les observatoires.

La Commission 49

notant la décision 5/82 adoptée à la XXIVème réunion du COSPAR tenue en Mai 1982, recommande d'incorporer l'Etude Héliosphérique internationale de Janvier 1988 à Décembre 1990 parmi les activités de l'UAI, sous les auspices du COSPAR, conjointement aux autres organismes appropriés de l'ICSU.

La Commission 22

notant l'importance des récentes réalisations des Réseaux de Bolidés Canadiens et Européens,

recommande de poursuivre sans discontinuer l'aide apportée à ces programmes d'observation afin qu'un plus vaste ensemble de données fiables puisse être rassemblé en vue d'une analyse critique, note que la récupération des météorites au moyen des deux principaux réseaux d'équipements photographiques (de camera's?) restera vraisemblablement limitée à quelques cas rares; les progrès réalisés dans l'interprétation des données relatives aux bolides permet actuellement d'entreprendre des études sérieuses à la fois sur les propriétés astronomiques des météorites et sur la physique de leur interaction dans l'atmosphère.

La Commission 22

reconnaissant leur position clé dans le Réseau et leur rôle fondamental dans la localisation et la récupération des météorites qui tombent sur le sol autrichien, recommande que l'Observatoire de l'Université de Vienne accorde tout son soutien à la poursuite des activités des deux stations autrichiennes appartenant au Réseau Européen de Bolidés.

Appendice IV

Point 13(d) de l'Ordre du Jour

1. Le Comité Exécutif ayant examiné la proposition du Président de la Commission 22 d'établir un Centre de Données sur les Météores à l'Observatoire de Lund en Suède, propose d'allouer une somme de 1800 Francs Suisses par an comme participation financière aux frais de ce centre, pour la période 1983-85.

2. Le Comité Exécutif notant le vœu exprimé par le représentant officiel du Comité National Suédois d'Astronomie à la XVIIIème Assemblée Générale de 1979 à Montréal que soient encouragées les bourses pour les étudiants des pays en voie de développement, et reconnaissant les discussions valables engagées depuis par le Groupe de Travail des Commissions 46 et 38 sur la Formation des Astronomes des pays en voie de développement, propose qu'une somme de 35.000 Francs Suisses soit allouée pendant la période 1983-85 pour permettre d'établir un Modèle de Contrat pour Conférenciers Visiteurs avec un institut de tutelle dans un pays nouvellement acquis à la

recherche astronomique, dont le choix sera arrêté avant Juin 1983, et qui dépendra d'une enquête approfondie dans les pays membres de l'UAI et dans d'autres pays sélectionnés.

Appendice I

Point 4(c) de l'Ordre du Jour

Motion du Comité Exécutif L'Assemblée Générale de l'Union constatant le progrès accompli pour le rétablissement de la pleine adhésion de la Chine à l'UAI, tel qu'il avait été anticipé à la XVIIème Assemblée Générale de 1979 à Montréal, et l'accord obtenu au 1er Mai 1980 pour la dénomination, dans la liste des pays membres, de deux organisations adhérentes pour la Chine à titre provisoire, ratifie les accords passés par le Comité Exécutif pour l'adhésion de la Chine à l'Union pendant la période écoulée depuis la XVIIème Assemblée Générale.

Appendice VI

Point 18(b) de l'Ordre du Jour

Le Comité Exécutif propose à l'Assemblée Générale qu'une nouvelle Commission de l'Union soit créée, relative à la recherche de la vie dans l'Univers, le nom de la Commission et l'objet de sa recherche devant être Commission 51 Recherche de la vie dans l'Univers.

Appendice VII

Point 18(c) de l'Ordre du Jour

Ont été proposés les changements suivants pour les Commissions existantes de l'Union: La Commission 26 (Etoiles Doubles) deviendra «Etoiles Doubles et Multiples». La Commission 34 (Matière Interstellaire et Nébuleuses Planétaires) deviendra «Matière Interstellaire».

Appendice VIII

Point 5 de l'Ordre du Jour

Le Comité Spécial des Nominations, réuni en 1980 et 1981 par le Président de l'Union, a sélectionné les membres de l'UAI suivants pour être proposés à la XVIIIème Assemblée Générale de l'UAI à Patras comme membres du Comité Exécutif de l'UAI à dater du 26 Août 1982: Comme Président: Professeur R. Hanbury-Brown (Australie).

Comme Vice-Présidents continuant de la période précédente: Dr. M.W. Feast (Afrique du Sud), Dr. L. Kresak (Tchécoslovaquie), Professeur R. Wilson (Royaume-Uni).

Comme Vice-Présidents nouvellement proposés: Professeur R.P. Kraft (USA), Dr. M. Peimbert (Mexique), Dr. Ya. S. Yatskiv (URSS) Comme Secrétaire Général: Dr. R.M. West (Danemark).

Comme Secrétaire Général Adjoint: Dr. J.P. Swings (Belgique) Comme Conseillers au Comité Exécutif: Professeur P.A. Wayman (Irlande).

Appendice II

Point 11 de l'Ordre du Jour

1. Résolution proposée au nom de la Commission 5:

La Commission 5

21 considérant la situation actuelle peu satisfaisante de l'échange de données entre instituts d'astronomie

recommande que tous les ordinateurs utilisés en astronomie reconnaissent et adoptent le Système de Transport d'Image Souple pour l'échange de données binaires sur bande magnétique, tel qu'il est décrit dans le Supplément à Astronomy and Astrophysics, vol. 44, pp. 363 et 371.

2. Résolution proposée au nom de la Commission 15:

L'Union Astronomique Internationale

estimant qu'il est particulièrement souhaitable que l'on consacre des Journées Comète de Halley choisies à l'avance à des observations coordonnées pendant une durée limitée recommande que les directeurs d'observatoires et les comités de programme attribuent une forte priorité aux observations de la Comète de Halley dans l'intervalle 1985-1987.

3. Résolution proposée au nom de la Commission 15:

L'Union Astronomique Internationale

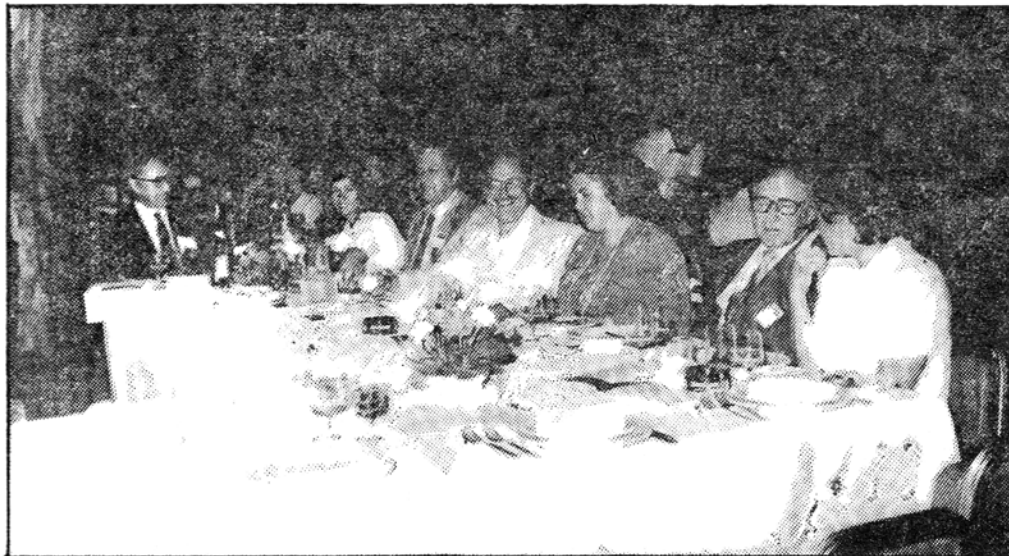
constatant qu'un programme international de surveillance de la Comète de Halley dit «International Halley Watch» a été mis en place afin de préparer et d'orchestrer les observations depuis la Terre de la Comète de Halley tout au long de son passage au périhélie en 1986 et de les coordonner avec les missions spatiales et désirant éviter la duplication des efforts au niveau international et encourager la participation à cette campagne reconnaît l'International Halley Watch comme l'organisation internationale coordonnant les observations de la Comète de Halley.

4. Résolution proposée au nom de la Commission 46:

Ainsi que l'astronomie fait partie intégrante des sciences physiques tant dans l'enseignement que dans la recherche,

et alors que certains pays dépourvus d'astronomie peuvent souhaiter introduire l'astronomie dans leurs institutions scientifiques ou d'enseignement,

il est résolu que l'Union Astronomique Internationale soutienne l'introduction de l'astronomie dans ces pays et encourage les activités dans ce but par le biais de ces Commissions.



Guests enjoy the closing dinner of the XVIIIth General Assembly at the Averof Grand Hotel

THE IDENTITY CRISIS OUTLOOK FOR THE FUTURE

Report from Commission 5 (Documentation of Astronomical Data):

We wish to bring to the attention of all astronomers the following documents which have been compiled and will be published as soon as possible (before next IAU General Assembly) «Astronomers Handbook» prepared by S. Mitton.

«Guide to Presentation of Astronomical Data» CODATA public 46 prepared by G.A. Wilkins.

«IAU Vocabulary» (astronomical key words) prepared by P. Lantos.

«The first Dictionary of the Nomenclature of Celestial Objects» prepared by A. Fernandez, M C Lortet, F Spite

«Compilation of Current Designation Practices in Astronomy» prepared by J. Mead.

Commission 5 has established a Working Group on «Designations» chaired by Haschek

GIORGIO ABETTI

Giorgio Abetti, the father of modern astrophysics in Italy, died on August 24 in Florence

He was going to be 100 years old next October and the Italian Astronomical Society was going to celebrate his anniversary with a special meeting attended by representatives of various national astronomical societies.

A student of G E Hale, he was well known for his contributions to solar research and for his fostering international cooperation. He has been one of the founders of the International Astronomical Union at the Rome Meeting in 1922 and Director of the Arcetri Astrophysical Observatory for almost 30 years

All those who have known him and especially the Italian astronomers mourn the loss of a great scientist and a man with an extraordinarily warm personality.

(F. Pacini)

THE HENRI CHRETIEN AWARD

A generous donor, who wishes to remain anonymous, has given funds to the American Astronomical Society for the purpose of Awards in Honor of Professor Henri Chrétien. A committee of five persons from three countries has worked with the Executive Offices of the American Astronomical Society in selecting Chrétien Award winners. For 1982 they are: Catherine Boisson, France, and Paul Ho, U.S.A.

For future consideration, the rules adopted by the current committee are as follows:

1 Application must be received in the Executive Office of the American Astronomical Society by the first of April.

2 A scientific project description, with emphasis on individual observational or experimental work, is to be included and must not exceed three pages.

3. Identification of applicant not to exceed one page

4. The application must include two letters of nomination from well-established astronomers

5. A very brief statement of support required and a mention of other resources should be included.

Chrétien Awards may number one or more in any given year.

whose major task is to bring into a uniform system the various current designation practices of the other commissions. Such designations are often in conflict with one another. Recommendations will be formulated and circulated among the commissions well in advance of the next General Assembly so that the resolutions may be acted upon at that time.

Difficulties and Recommendations

In compiling the «Dictionary of Nomenclature of Celestial Objects», Fernandez, Lortet and Spite encountered a number of difficulties such as many authors using abbreviations or acronyms without any explanation. Often positional information was lacking for what was deemed by the authors as a «well known» object such as the KL nebula or BN source in the Orion region. It must be stressed that at least the following information be given in order for a minimum of perspicuity and consistency be achieved:

1. Acronyms, abbreviations of sources and catalog names must be defined by their complete bibliographic reference, except for a few widely known catalogues, a list of which should be published by Commission 5.

2. The objects studied should always be identified by two designations, one of which may be coordinates. The equinox always be specified for equatorial coordinates.

3. Before coining a new acronym or abbreviation, check for any possible ambiguity with previous designations by consulting the Dictionary (once it is published). The 3 letter abbreviations for constellation names should also be excluded and used only to refer to constellation names. Note that if a constellation is part of a designation, the entire 3 letter abbreviation should be used and not just the first letter, e.g. ORI MCLD (or ORI MC) but not OMC for a molecular cloud in the constellation of Orion.

It is important that editors of astronomical journals and their referees should enforce these minimum standards concerning nomenclature.



Mrs Wanda Goudas, Chairperson of the social events subcommittee of L.O.C. Many participants have expressed their sincere appreciation for the social events in this General Assembly.

THIRD INVITED DISCOURSE ON CONTEMPORARY COSMOLOGY

Monday night's discourse on «Contemporary Cosmology», given by Professor Ya. B. Zeldovitch in the Ancient Odeon, was a memorable and joyful occasion. In introducing the much-loved and highly-respected theoretician, Professor D.S. Heesch reported that he had had a hard time finding out about all Zel'dovitch's academic honours because Zel'dovitch himself wouldn't tell him. But in the course of his researches, Heesch had discovered that Zel'dovitch's 3 children and their spouses were all physicists; they had so far produced two physics students as grandchildren; and now one of the grandchildren was about to marry, and so we can look forward to a fourth generation of physicists!

In his discourse Professor Zel'dovich remarked that Cosmology got a reputation of being a respectable science only in the last few decades. It now has a solid backbone of well established facts and a long range perspective of developing further most audacious hypotheses. He divided the sources of cosmology's successes into 1) progress of observations-optical, radio and X-ray; 2) Progress in theoretical physics - electromagnetic theory, theory of gravitation, quantum theory including atomic physics, nuclear and particle physics and last but not least 3) moral courage.

One really needs courage, he said, to apply the laws found in our laboratories to the infinite universe.

After the prediction and actual discovery of cosmic background radiation, the theory of a hot Big Bang seems to be established beyond any reasonable doubt. New problems

are arising connected with the actual inhomogeneity of the Universe and its structure.

Quite new branches of mathematics are used to describe the nonlinear part of the story: catastrophe theory, percolation theory, pattern formation, so called synergetics.

Perhaps, the speaker said, we are near to explain the very specific structure of the universe with voids, sheets, strings and clusters of galaxies. One asks why is the Universe as it is? Why is «matter» present and antimatter (antiprotons, positrons etc.) practically absent?

Why were the initial conditions as they were — quasiuniform but with small perturbations?

To answer these questions, one needs to go to time intervals and characteristic energies very far from those studied in laboratories.

It is said that the early Universe is a paradise for physicists in its abundance of all particle species. But is it a paradise lost? The task of finding the footprints of high energies which were present in the past is most exciting.

Remember, Zel'dovich said, that the law of gravity was discovered not by an apple, but comparing the motion of the apple and that of the moon. The velocity of light was found by observations of Jupiter's satellites. If proton decay is found in the next years — we will be proud because cosmology has given the first hints to predict the proton instability. So it is also with several other physical hypotheses.

«The near future must bring most interesting results. I hope we shall hear about them on the XIX, XX etc. Assemblies of the IAU».

«I will give here my sincere thanks to those who proposed me the difficult invited report and to those who attended it».

ANNOUNCEMENT

It has been brought to the attention of ASTROCOSMOS that some of our participants have been concerned and annoyed at certain activities of other participants regarding a human rights question relating to an astronomer not attending the General Assembly.

We wish to express our regret that such activities should occur in the area of the Assembly and to declare that these have been isolated personal activities of the persons involved, for which the Local Organizing Committee has had no control or responsibility.

Meteor Data Centre in Lund

by B.A. Lindblad

The IAU has made a grant to Commission 22 that will enable a meteor data centre to be established at the Lund Observatory in Sweden. The data centre will be under the responsibility of B.A. Lindblad. Purpose of the centre is to make available to interested scientists data on photographic and radio meteor orbits. Both published and unpublished data will be included. In the future copies of the data will also be available from the Ondrejov Observatory (Z. Ceplecha).

Letter to the Editor

As a tribute to Professor Bappu, I suggest that in future the first Invited Discourse at an IAU General Assembly be known as the Bappu Memorial Discourse.

Patrick Moore

XVIII GENERAL ASSEMBLY RESOLUTIONS

Continued from page 4

7. Distribution of IAU Publications to Developing Countries and Executive Committee Members	20.000
8. Executive Committee Meetings	70.000
9. Officers' Meetings	20.000
10. Symposia and Colloquia	225.000
11. Inter-Union Commissions	40.000
12. Projects of the Executive Committee	14.000
13. Representation	30.000
14. Bank Charges	1000
15. Young Astronomers' Schools	36.000
16. Regional Meetings	30.000
17. Expenses of the Special Nominating Committee	5000
Total Payments	1.433.700



Message from your ASTROCOSMOS printers, Mr and Mrs Constantinopoulos: Don't think it hasn't been fun: it hasn't!

FROM THE BIRTH OF THE UNIVERSE TO THE DEATH OF THE SUN

From F. and M. SPITE, R. and G. CAYREL and B. CAMPBELL

Lithium is a very strange metal: its nucleus is made of 7 baryons. It is very fragile and cannot be formed in the normal supernovae, in contrast to the other metals. It is a very shy element, showing only two spectral lines, located in the red part of the visible range. Its observation needs spectra with a very high signal-to-noise ratio.

This is why the recent operation of the coudé focus of the new Canada-France-Hawaii Telescope, with a Reticon receiver, brought exciting informations. Lithium was discovered in halo dwarfs: these are very old (but essentially unevolved) very metal-poor stars, formed at the beginning of the life of the Galaxy. This was mentioned in the Joint Discussion II and discussed in a meeting about the EARLY UNIVERSE. This discovery confirms the hypothesis of the Big Bang and brings some constraints on the corresponding theory; there is a fair agreement with the constraints derived from Deuterium and ³He abundances.

In the Sun, which is about 5×10^9 years old, practically no Lithium is observed, because the deep convective movements of its envelope drive the Lithium into deep layers which are hot enough for leading to an immediate destruction of Lithium by proton fusion.

In the young Hyades stars, recent observations by R. and G. Cayrel show that Li-destruction takes place in solar-type stars in a narrow range of effective temperature: the phenomenon is nearly in a guillotine form. Further study of this phenomenon needs observation of stars with very weak (evanescent) Lithium lines. This is hard work, but it will bring essential information on the internal structure of the stars, and especially of our Sun (surprisingly its structure is not indisputed). These results, and many others, collected at the CFH Telescope coudé focus, justify largely the efforts spent generously by the CFHT staff for bringing its coudé focus and coude spectrograph to a very high level of quality and efficiency.

Hubble, bubble...

The Hubble constant is 85 km/s Mpc. And the Universe is 15 billion years old. These figures appeared to be the consensus at Joint Discussion III on Monday. But they leave a major problem, for the two figures are mutually incompatible. If the Hubble constant is really 85, then the Universe must be younger than 12 billion years. Alternatively, a Universe expanding more slowly from a Big Bang 15 billion years ago must have a Hubble constant less than 70.

Delegates heard two direct methods for determining the Universe's age. David Schramm reviewed the latest results from nucleocosmochronology, stressing the importance of rhenium-187, which has a half-life considerably larger than the age of the Universe. As a result of new experimental results from Oak Ridge and Livermore, the errors in this method have been considerably reduced. Rhenium sets a very strong lower limit of 8 billion years on the Universe's age. The actual age depends slightly on details of galactic evolution, but lies in the range 11 to 17 billion years for standard models, with 15 billion years as a «best guess». The oldest known objects in the Galaxy are the globular clusters, and Bruce Carney argued that their colour-magnitude diagrams show they are somewhere between 15 and 19 billion years old. According to Schramm, the two methods, together with the abundances of elements created in the Big Bang, give a fairly tight range of 13.5 to 16 billion years, with a best value of 15 billion years.

The measurement of the Hubble constant is beset by problems in the distance scale to galaxies. Barry Madore showed an exciting new approach to the use of Cepheid variable stars, the classic method for nearby stars. By observing them in the near-infrared H band (1.6 microns), we can virtually eliminate the effects of metallicity in the stars and absorption along the line of sight. And because the characteristic brightness variation drops to only 0.1 to 0.2 magnitudes, we need just one H band measurement (not a complete light curve) to get a mean magnitude for use in the period-luminosity relation.

For galaxies beyond about 4 Mpc, the distance scales derived by various workers begin to differ markedly. Over the past two decades, this has led to two schools of thought: the Hubble constant is 50 Km/s/Mpc (Allan Sandage and Gustav Tammann) or it is 100 Km/s/Mpc (Gerard de Vaucouleurs). At the meeting, Tammann argued that the Malmquist effect makes de Vaucouleurs' value too large, and used Type I supernovae to derive a Hubble constant of 50 ± 7 Km/s/Mpc.

But the general feeling was for an intermediate value and that the best method at present is some version of the Fisher-Tully relation. This is a tight correlation between the width (in velocity) of the 21 cm emission from a galaxy and its total magnitude. Marc

Aaronsen reported a Fisher-Tully analysis of 300 spiral galaxies all over the sky. This confirms previous indications that the Hubble constant appears different in different directions, and in a manner consistent with our Galaxy «falling» towards the giant Virgo Cluster at 330 km/s. This motion can explain most of the anisotropy of the microwave background radiation, which is slightly «hotter» in the direction of Virgo.

When this effect is removed, the Hubble constant derived from Virgo, ten more distant galaxies and 22 distant Sc spiral galaxies averages out to 85 Km/s/Mpc, a value which met general acceptance at the meeting. But Tammann and Schramm both emphasized that this value is inconsistent with the age of the Universe, if it follows the standard Friedmann expansion. It is possible to reconcile the two if Einstein's «cosmological constant» is not zero, for this introduces an early period when the Universe stopped expanding, giving stars and galaxies more time to evolve. But Ya. B. Zel'dovich pointed out that these particular values of the age and the Hubble constant would mean this period occurred at a time corresponding to a redshift of 3. We would then expect to see a lot of quasars at this redshift — whereas in fact the opposite is true. So the conundrum remains, with firmer but conflicting values for the Universe's age and the Hubble constant.

Perhaps the next General Assembly will see some way out of this rather fundamental deadlock!

Solution to Chess-Position 9

1. Kt—Kt6 ch, P x Kt 2. R—B8 ch, K—R2 3. K—B2, and Black is unable to stave off R—R1 mate.

Chess-Problem

The following problem has been proposed for the readers of ASTROCOSMOS by its composer W.D. HEINTZ, participant of the XVIIIth General Assembly:

White: K a6, Q a1, N b5, e6, B g5, P f7
Black: K c8, R b7, N f5, f8, B b8, P a7, b6, d7
white to play and mate in three moves.

Solution to Chess Problem:

(Main variation): 1. Q—h8, B d6, 2. Q h1, R c7, 3. Q a8 check-mate.
The Queen has travelled to all four corners of the board!

Rodopoulos Michalis

Cavo d'oro

Cafeteria - Spageteria

Iroon Polytechniou, Glyfada

FOURTH INVITED DISCOURSE

For Professor C. de Jager's Discourse — the last of the General Assembly — the Greek sky put on its finest display of sunset colours, and a crescent moon shone high above the Ancient Odeon. Professor Edith A. Muller of the IAU's Executive Committee introduced de Jager, her dear friend and colleague. Summarising his highly esteemed work in solar physics, most of it conducted at Utrecht, Professor Muller remarked on de Jager's great ability as a synthesiser of ideas — and of his considerable experience as an administrator. On a more personal note, Professor Muller mentioned that one of de Jager's abiding passions was marathon running, and she would not have been in the least surprised if he and his wife had attempted to cycle by tandem all the way from Utrecht to Patras!

Professor de Jager also started on a personal note. He had just received a message that he had a new grandson — «And my wife even does not know yet!», he told the delighted audience.

Beginning his discourse on the «Origin and Development of Solar Flares», Professor de Jager reviewed the history of their observation, starting with Carrington's rare discovery of a flare in visible light in 1859. With some spectacular film specially made for this General Assembly by Harold Zirin of the Big Bear Solar Observatory, de Jager demonstrated the development of typical solar flares at a speed 200 times faster than normal. In Ha light the flares — located in the Sun's lower corona above sunspot groups — could be seen snaking and billowing outwards along the direction of the magnetic field lines.

De Jager went on to describe models for the origin of solar flares. The generally accepted picture is that flares occur in the loops of strong magnetic field which reach upwards through the photosphere and into the corona. If magnetic field lines re-connect with one another, an enormous amount of energy can be explosively released as a flare. De Jager likened the situation to an electric

circuit with resistance (provided by the photosphere), inductance (in the loop), and possibly capacitance. Although this was obviously a broad outline, the model could be firmed up with high-resolution observations.

Much of de Jager's recent work had been with the Solar Maximum Mission satellite. He showed a film of the flare of 5 November 1980 in hard X-rays, pointing out that until these satellite observations, it had been uncertain exactly where in the flare the hard X-rays were generated. It had seemed most likely that the hardest X-rays came from the re-connection flash-point itself, directly above the neutral line between the sunspots; but the SMM data showed that the most energetic radiation was produced at the two «feet» of the flare where fast electrons hit the photosphere. And the location of the flash point above the neutral line has been confirmed by radio observations with the Very Large Array, which show a turnover in the direction of the magnetic field here.

In another short movie film made specially for this General Assembly by Dave Rust, de Jager presented both hard and soft X-ray images of flares from the SMM satellite simultaneously. While the hard X-rays last for a very short time and come from a relatively small region, the soft X-rays are produced in a larger area and sometimes larger for many hours after the event. And there is slight evidence that some of the energy of a typical flare is generated in a region as small as 50 Km in diameter.

But our understanding of flares is still in its infancy, cautioned de Jager. Although we may have the broad-brush picture, there are many details to fill in, and it is hoped that high-energy observations over the next two or three decades will provide some of the answers. And the Solar Maximum Mission Satellite will have a rôle to play — for the second time — when its blown fuses are replaced by a Space Shuttle Crew in 1984. This time however, it ought perhaps to be called the «Solar Minimum Mission»!

JOINT DISCUSSION I THE VARIABLE SUN

The Sun is a variable star. Even as recently as the last IAU General Assembly three years ago, there was little evidence for any changes in the Sun's light output, but by now the observations are so definite that a whole Joint Discussion was devoted to the Sun's variable brightness.

In the late 1960s, astronomers measured the Sun's irradiance (the flux arriving at the Earth's average distance) with a variety of instruments flown to high altitudes to minimise the corrections for atmospheric absorption — on balloons, an X-15 rocket-plane and on two space probes. Once they had obtained a definite value in about 1971, they stopped: they had, after all, determined what is known as the «solar constant». But as G. Fröhlich pointed out, more recent results (from 1975 onwards) show that the Sun has brightened slightly, by 0.2 per cent, in the decade from the late 1960s to the late 1970s. These measurements are from balloons, rocket flights, the Nimbus 6 and 7 satellites and the Solar Maximum Mission (SMM) satellite. The radiometers on Nimbus 7 and SMM show that the Sun is currently fading again, at a rate of 0.02 per cent/year (Nimbus 7) or 0.06 per cent/year (SMM).

The SMM radiometer, built by JPL's Dick Willson, has convincingly shown that the Sun's light alters on much shorter periods too. It has «exceptionally good» sensitivity, to quote Hugh Hudson, of about 15 parts per million, and is extremely stable with no detectable drift between the three identical radiometer units after two years in orbit. Willson's radiometer produced extremely high-quality results for the first nine months — until the SMM's fuses blew — and is still returning useful data from the partially-crippled satellite.

The SMM radiometer reveals very small (but real) variations from day to day and week to week, and every so often a really pronounced drop in brightness of about 0.2 per cent, lasting for around a week. And, as Hudson demonstrated, the dips occur whenever the Sun has a large group of sunspots, with the degree of dimming directly correla-

ted with the total projected area of sunspots on the hemisphere facing us.

Solar astronomers have always wondered whether the dark sunspots actually dim the Sun's total light output, or if the radiation escapes somewhere else to keep the Sun's luminosity constant — the question even occurred to Galileo, according to Jack Eddy. Now we know the answer: sunspots do dim the Sun. In fact, astronomers like Hudson and S. Sofia who are investigating the correlation are hampered now not by the quality of irradiance measurements, but by a lack of consistent measurements of sunspot areas. Different solar observatories can give areas for the same group which differ by 50 per cent!

The radiant energy blocked by the spot must be stored somehow, to emerge later when the spot has gone. Peter Fonkal pointed out that although the total energy blocked in each observed «dip» amounts to 10^{36} ergs, this can be readily stored in the gases below the spot «plug» as extra thermal and potential energy.

The Sun's changing brightness should affect the Earth's temperature too: a 1 per cent alteration in the «solar constant» should change the Earth's temperature by 1°C. Jack Eddy described the SMM precision measurement as a «truly historic step» in solar-terrestrial physics, and the most significant advance in weather and climate research in the past 20 years. He has used the correlation between sunspot area and solar brightness to calculate the «solar constant» for every day since 1874, when the Greenwich records of sunspots began. This Atlas is available to climate modellers, and we can now look forward to work at the terrestrial end of the relationship. But Eddy pointed out that the major trend over the past 180 years has been an increase in temperature of almost one degree — and this cannot be due to the eleven-year-cycle of sunspots. But much longer term trends may exist, and certainly astronomers and climatologists will from now on be keeping a much closer watch on the brightness of our very own variable star.

Archaeoastronomy and the IAU

Douglas C. Hoggie University of Edinburgh, U.K.

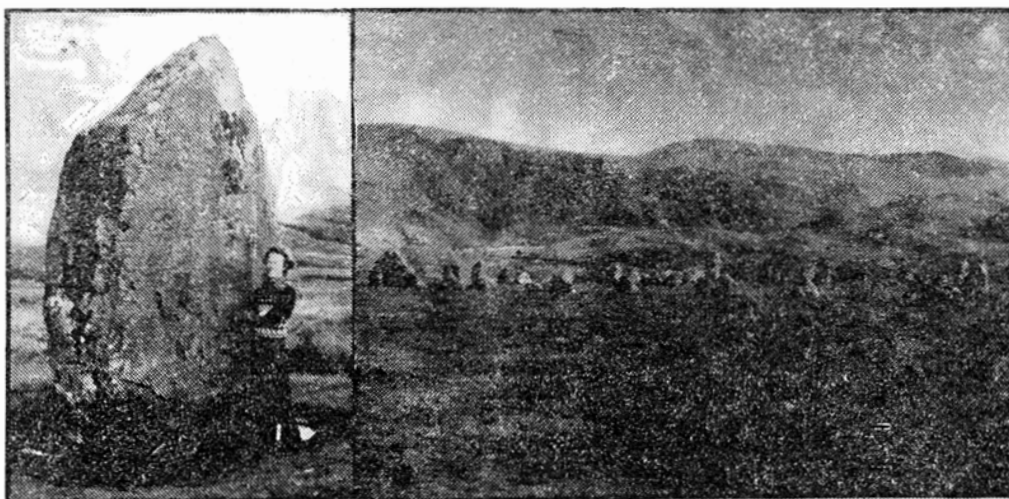
Whatever happened to archaeoastronomy at the IAU? Three years ago at Montreal recent developments in the field were eloquently reviewed by Jack Eddy, and in 1976 at Grenoble there was standing room only at an entire session of Commission 41 devoted to the topic Archaeoastronomy—the study of ancient astronomy, mostly prehistoric, through orientations of structures like Stonehenge—attracts the interest of far more astronomers than the small band of researchers involved. Why, then, no archaeoastronomy at Patras?

The answer is that, far from having been neglected by the IAU in the past three years, the subject has been treated to an entire colloquium. The meeting, co-sponsored by the IAU, was held at Oxford in September last year under the organising genius of the President of Commission 41, Michael Hoskin. The proceedings, edited in two volumes by Tony Aveni and Douglas Hoggie, have now been published by Cambridge University Press just in time for the Patras conference. They provide a fascinating picture of current attitudes in this highly contentious field.

The attitude that will strike the most sympathetic note with astronomers is the statistical one—the insistence that astronomical orientations claimed for ancient structures should occur more often than would happen by chance alone. Arguments of this kind have been in use in this subject for almost 50 years, but they are still often ignored, even in areas such as megalithic astronomy in north-west Europe, where the great bulk of the evidence consists of orientation studies and nothing else. Even where the statistical approach is not ignored, it is rarely easy to ensure that the data on orientations are free of selection effects. Just as in astronomy, the collection of field data in archaeology is expensive and time-consuming, and, unlike astronomers, the people who research into megalithic astronomy generally have to do so in their spare time, and often at their own expense. Therefore it is necessary to be selective about the orientations which are to be measured at each site, and somehow it is all too easy to do so in a way which weights the evidence in favour of the astronomical theories. The normal course in a scientific investigation where the data are suspect is to collect fresh data, but this takes time and so it is not surprising that much debate in megalithic astronomy centres on the reliability of the data and how much may be safely inferred from them.

So much for a strictly scientific attitude to megalithic astronomy. But the subject is one that crosses the borders of several disciplines and each brings a fresh attitude. Archaeologists, for example, while recognising vaguely the importance of statistical arguments, usually do not regard them as paramount. They have their own ways of testing theories, for example by excavation. Certainly if an archaeologist were to uncover an ancient brass telescope at a megalithic site instead of the usual pots and bones, then the statistical arguments would count for very little. But the evidence which the spade has so far turned up is hardly more decisive than the statistical evidence.

The archaeologist who has done more than any other to test the theories of megalithic astronomy is Euan MacKie, of Glasgow University. For example, there is a site on the west coast of Scotland where the astronomical theory had, in effect, predicted where the prehistoric observers must have stood. Digging at this spot, MacKie found a layer of stones, which has been claimed as striking confirmation of the astronomical interpretation. But though the platform of stones is artificial, there is no evidence that it is ancient. Also, evidence was presented at the Oxford conference showing that it would not, after all, have been possible to make satisfactory observations from the platform. So the excavated evidence at this site is certainly no less ambiguous than the statistical evidence as a whole. But there is another site, still under investigation, which may very well prove to be the decisive kind of observing site which MacKie has been searching for.



Astronomer Mike Edmunds visits a disused observatory in south Wales.

The main thing yet to be established is its date; so far no date earlier than late preRoman has been reported.

Megalithic astronomy still has a hard time being accepted by most archaeologists. Progress would be faster if many of those theories which have no statistical support were to be abandoned. Still, there is much

A famous ceremonial observatory in England's Lake District - Castle Rigg stone circle.

evidence that is clearcut, and archaeologists are taking an increasing interest in it. One who has blended archaeology and astronomy with great success is Aubrey Burl. He puts the archaeology first, arguing that we should look for orientations only within groups of sites which are clearly linked on archaeological grounds. Almost all of these are ritual or

ceremonial, and Burl concludes that the orientations were one ingredient in the system of beliefs held by the megalith builders. He also considers that the orientations are pretty rough, and that no care was taken to get them just right. But that's not to say that the sun and moon were not very compelling objects indeed. There is impressive evidence that the builders of a group of tombs in the north of Scotland systematically noted the 19 year cycle of lunar setting positions—a length of time comparable with the average working life of an astronomer in prehistoric times.

What, then, was the role of astronomy in the ceremonial life of the prehistoric inhabitants of north-west Europe? Was it something as vague and incidental as the orientation of Christian churches? Or was it the burial that took second place to the astronomy, like the remains of James Lick in the telescope pier at his famous observatory? Science or symbolism? Perhaps we shall be in a better position to tell by the time the IAU next meets. Meanwhile the IAU can take much pride in its support for archaeoastronomy in the past three years, and the sessions of Commission 41 at Patras can for once be devoted to the history of astronomy, and not its prehistory.

The European Southern Observatory Very Large Telescope (VLT) Project

As we heard during a meeting of Commission 44 the launching of the Space Telescope (ST) will significantly change the pace of astronomical research. ST, however, will not be able to solve all the problems, and a number of important observations will not be made unless new larger instruments are constructed. Let us mention a few examples:

- High resolution spectroscopy at faint objects,
- Diffraction limited imaging in the infrared;
- Interferometric studies of milli-arc-second structures in the optical and infrared.

The solution of many astrophysical problems does require such observation: in order to perform them one will have to construct a telescope system of large collecting area with a capability for interferometry. For the latter, several telescopes are necessary; to collect enough light the total mirror area should be that of a telescope of no less than 16-meter diameter, and to meet the requirements in the infrared, the individual telescope should be in the 8-10 meter range. To satisfy all these specifications ESO's VLT is conceived as an array of four telescopes each of 8-10 m diameter (monolithic mirrors, alt-az mounts, rotating building). Such an array will have maximum flexibility: the four telescopes can operate independently, they can simultaneously observe the same object, in different

modes or with digital superposition of the data for maximum sensitivity, or with coherent optical beam combination for interferometry.



The present ESO Very Large Telescope project consisting of four 8-meter telescopes

It seems presently possible to construct an 8-meter telescope for a price which is not very different of that for a similar 4-meter telescope a decade ago; with the additional savings for the fabrication of four identical telescopes it would appear that the VLT may be constructed for a cost of the order of 10⁹ us dollars.

At ESO work is actively being pursued in some of the fundamental technical aspects: a 3.5 m. New Technology Telescope (NTT) is being built for completion in 1986 to test

several of the concepts before embarking on the VLT (e.g. closed loop active optical control of the primary mirror, optimization of dome design to reduce seeing effects, new material (e.g. metal) for mirrors...). It is thus planned that the final design of the VLT will be frozen one year after the installation of the NTT is completed: first light is foreseen about ten years from now.

In this context I would like to announce that ESO will organize a meeting (proposal submitted for an IAU Colloquium) on VLT's, their instrumentation and scientific programs from April 9 to 12, 1984, in Garching (W. Germany) as a continuation in the series initiated in the 1970's.

J.P. Swings

Coordinator of ESO's VLT Study Group

LETTER TO THE EDITOR:

I have read with interest the open letter "Everything ever published on the Crab Nebula".

For stars such a bibliography exists already, covering the years from 1950 on. There are now more than ninety thousand stars with 350,000 references in it—we call it the "Bibliographical Star Index". It is published by the Strasbourg "Centre de Données Stellaires".

C. Jaschek

The Iraqi National Astronomical Observatory

HAMID M.K. AL-NAIMY, IRAQ

1985

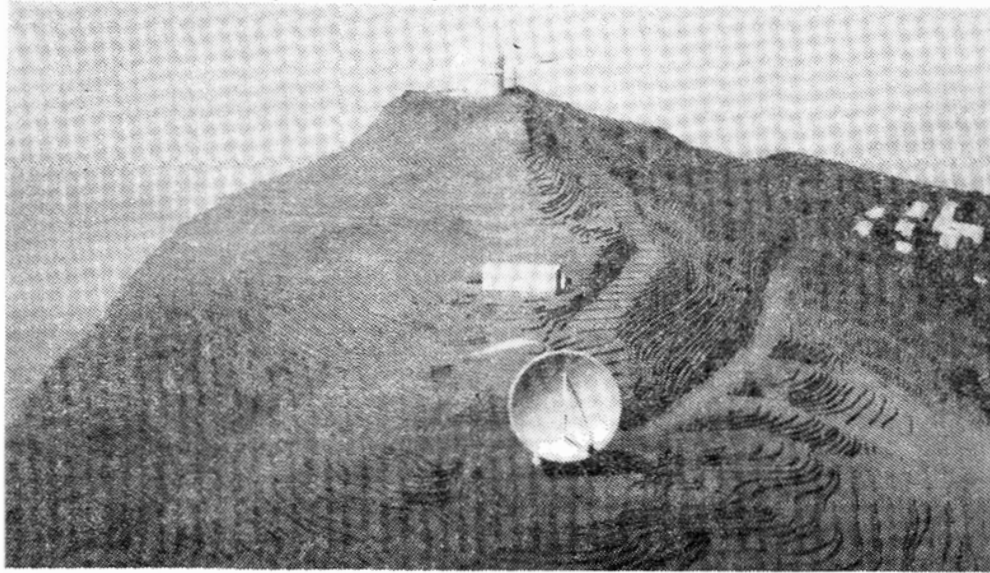
The project was executed under the supervision of the Iraqi Council for Scientific Research, and handled by the Astronomy and

Space Research Center, the headquarters of which is in the city of Baghdad, Jadriya P.O. Box 255.

Hamid M.K. Al-Naimy IRAQ

Iraq's planned project for a major astronomical observatory is on schedule. The observatory will contain a 30m radio telescope for millimeter wave length range, a 1.25 m optical telescope and a 3.5 m optical telescope, the project is supplemented by much auxiliary instrumentation (i.e. astronomical clock, spectrographs, photometers, cameras, TV equipment and computers).

The observatory will be installed on a summit of a mountain called mount Korek in north Iraq of 2100 m altitude. The entire observatory will be erected by a German joint venture KRUPP, MAN and ZEISS. KRUPP will supply the civil work, the domes and partly the radio telescope. MAN will supply the rest of the radio telescope and ZEISS is the supplier of the optical telescopes and their instruments. The contract is under force since July 1981, and the execution is on schedule, (i.e. the primary mirror of the 3-5 m telescope is undergoing polishing, the smaller mirrors are partly ready, and the civil work on the site is going on very well). It is planned that the observatory will be completed by the end of



Model of planned new Iraqi observatory