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INTERNATIONAL ASTRONOMICAL UNION

COMMISSION 46 — TEACHING OF ASTRONOMY

NEWSLETTER

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EDITORIAL

Two of your editor's offerings in the Newsletter appear to have struck chords. The first chord is astronomical being the response by Jordan Marche of the Fleishmann Planetarium to several articles and editorials. I have reproduced part of his letter to me in this issue since it may reflect the experience of others. The second was rather gratifying in that my note on Class Character in No. 11 (part 2) was taken up by Biochemical Education (vol. 11, No. 2 April 1983) and used as an editorial. Clearly the problems of university teaching are inter-disciplinary!

Fortunately I have no need to sermonise in this issue since we have an excellent crop of articles for your delectation. Besides the letter from Jordan Marche, we have Andrei Serban on Amateur Astronomy in Israel, Mazlan Othman on Astronomy in a Developing Country and Maire Bruck on Advanced Projects in Astronomy for Undergraduates using Film Copies of UKST Photographs.

I was most interested in these contributions. The role of the amateur astronomer is often underestimated. Very often it is the amateur astronomer who excites and sustains a youthful interest in astronomy. The efforts of amateur astronomers in this important area are frequently overlooked and in so doing an important resource for astronomical education is under-exploited. Dr. Othman raises some interesting points regarding astronomy in developing countries. I am sure she is right to build from the base offered in the first instance. Hospitality by better favoured nations can provide the need for expensive observing facilities. But she also raises another point, namely that the developing world must use the new technologies if they are to survive.

Finally the article by Maire Bruck brings clearly its focus on an important spin off for education. The expensive new facilities do not only produce plates of the highest quality. Even second class plates are of a quality which is superlative in education. Here is a resource of working material which is only just beginning to be exploited.

I know from my own experience just how useful such material is. Not only does it provide something for idle hands to do on wet evenings but it gives the students a feeling for astronomical work by using high class research material. Appended to this Newsletter is a page describing the Edinburgh material assembled by Maire Brück and her colleagues.

It only remains for me to wish all Newsletter readers a happy, prosperous, and astronomically fruitful and completely non-Orwellian 1984.

D. McNally.

Farewell

It is with a very great sense of loss that Commission 46 reports the deaths of two early members of the Commission - Professor George Abell and Professor Bart Bok. Both men were noted for their scientific contributions to astronomy and for their enthusiasm in promoting and teaching astronomy. Both had very different styles but shared an infectious warmth and enthusiasm for their subject. They will be missed for their soundness of sense and width of vision. We who remain are the poorer for their passing but also richer for having known them.

As Editor of the International Planetarium Society's journal, the Planetarian, I can appreciate/sympathise with your position. Too often our roles as such have led us to become the "voices crying out in the wilderness." Compounding our difficulty (all teachers' difficulty?) is the need to continually re-invent the wheel (or the sky, if you prefer). I guess that necessarily falls from the fact that astronomy inherently isn't a hands-on science (unlike geology or biology, for instance). It is, therefore, one of the most difficult and challenging fields to teach.

As I've read over your essays about the problems of teaching, I can't help but reflect upon my own college instruction in this area, and raise a couple of points.

First of all, the major "revelation" that was gradually exposed to me, by the second or third year of the program, was that I did not have everything that it took to be a research-grade (i.e. Ph.D.) astronomer. Fortunately, because this had never been my specific goal from the start, I escaped the corresponding mental "crisis", having decided beforehand that astronomy education was where I was headed. But there were still clearly two "levels" of students in the same degree program - some like myself, with similar goals, and others who were definitely mentally "above", to whom there was absolutely no question about getting a doctorate in the end. Others, who initially think that they are in the latter group, but who discover later that they are not, are in for greater soul-searching.

Another point which I would like to emphasise has to do with the recruiting of potential students from the ranks of amateur astronomy hobbyists (I was one myself from about age 12 onward). From my experience, I would advise those now in this situation that if they become a working astronomer, they'll likely lose the hobby that fostered their career. While I'm not lamenting this fact (because I've since developed other hobbies to take astronomy's place), it is true that working constantly under the artificial sky of the planetarium has dulled my interest in going out and observing the real sky as I used to. I do still teach programs on Sky Interpretation in a number of county and state parks,

 featuring free telescope viewing and constellation i.d. for the public, but except for unusual astronomical occurrences (eclipes, comets, etc.), this is done largely in a professional manner only. It is something that most students won't realise can happen to them, until later. If it does occur, the individual alone will have to assess the impact of the change. It may be ironic, but I went into the study of astronomy to "get paid to work on my hobby", but now that hobby has nearly disappeared.

Planetarium educators are naturally concerned more with the popularisation of astronomy among the public than with the preparation of future research workers in the field. But as we represent the largest fraction of astronomy educators, and serve the greatest numbers of people, our concerns are still much the same as yours, though often more specialised. I hope that we can share and exchange ideas of interest and usage to both parties.

Jordan Marche II
Editor, Planetarian

ASTRONOMY IN ISRAEL

by Andrei R. Serban, Centre for Astronomical Information, Hamem-Gimmel St.27, Jerusalem 94 422, Israel.

The Israel Astronomical Association was founded in 1951 as the Amateur Astronomers Association of Jerusalem. The nucleus of its founders comprised a small group of persons keenly interested in the oldest-of-the-sciences for already a relatively long time - mainly immigrants from Central Europe, led by Dr. D.V. Zaitschek (Zajicek) - most of whom settled in what then was mandatory Palestine during the (19-) thirties.

As of 1953, a small public observatory began its activities in temporary quarters in the central western part of Jerusalem, with guided observations initially taking place twice a week. The number of members of the newly-founded Association grew rapidly from about 60-80 at the end of 1951 to almost 200 in 1954, simultaneously extending its distribution all over the country. This fact stimulated the first change in the official name of the Association, into: 'Israel Amateur Astronomers Association'. In January of the same year (1954), the first issue of the Association's monthly Hewbrew language bulletin - "HaKokhavim BeKhodsham" (The Stars Month by Month") - was published. Its contents included, in addition to the regular ephemerides and special celestial phenomena, mostly second-hand articles on major issues currently at stake in astronomical research, as well as resumés of newsworthy items of the same kind.

The inauguration in 1956 of the Williams Planetarium on the newly-erected Givat Ram Campus of the Hebrew University of Jerusalem, which soon became the main centre of the Association, provided new impetus to its activities, eventually raising the membership to a maximum of nearly 450 in the mid-1960s. The first national congress was also held in 1956 in the recently-dedicated institution, and continued thereafter at intervals of mostly two years. Special introductory courses were held for students of Humanities, as part of their complementary curriculum in the natural sciences, as well as occasional lectures on different pertinent subjects aimed at the general public. The first major public observatory was dedicated at the end of 1967 at Givatayim, a suburb of

Tel Aviv, which in recent years transformed into a kind of national focus of popular astronomical activity. A second planetarium was inaugurated in May 1968, just outside Northern Tel Aviv. The professional Astronomical Observatory at Mitzpeh Ramon (now listed among the world's major observatories in the ASTRONOMICAL ALMANAC), operated by the University of Tel Aviv and equipped with a 40-inch Ritchey-Chrétian instrument, was dedicated 1971 October 26 in the central Negev desert plateau, 200 km south of Tel Aviv, at an altitude of about 900 metres.* Up to 1971, ten national congresses were held - the greater part in Jerusalem, one in Tel Aviv (1967) and one in Beer Shev(b)a (1971). Due to personal and other inconveniences of some of the Association's most active members, a period of relatively shallow activity followed, which gradually resumed toward the end of 1973, steadily increasing later on. The publication of first a modest newsletter and then a somewhat improved bi-monthly bulletin ("Kol Kokhvey Or") was started anew, at first by members of the Tel Aviv and central area of the country, which, however, soon engulfed the greater part of the Association's previous membership, as well as a considerable number of 'fresh', mostly young people, clustering around the Observatory of Givatayim, near Tel Aviv. These and other similar developments eventually led to the renewal of the Association's (now yearly) congresses, as of 1979 (a proposed one in 1977 did not come into being) at Givatayim (1979 April 15 and 1980 April 3) and on the premises of the Ben-Gurion University of the Negev at Beer Sheva (1981 April 21-22), and University of Tel Aviv: 1982 April 3-4. The willingness and enthusiasm of members, especially the younger ones, is readily apparent; however, in order to put things in the right proportions, one should emphasise that, due to lack of any kind of official support, with the possible exception of the Municipality of Givatayim, which somehow manages the Observatory, the present situation is far from being satisfactory.

Special public lectures were held on the occasion of the 50th anniversary (1980) of the discovery of Pluto and the 200th of Uranus (1981). A successful weekend camp was held south of Jerusalem 1980 August 8-9 and again 1982 August 13-14. The undersigned began a regular astronomical column in every second issue of the popular, well-edited general science journal "Mada" in 1981, and inter alia cares that eclipses and other major phenomena receive a proper, timely and authoritative coverage in the mass media. Other members of the Association also occasionally publish short reviews on astronomical subjects in various forms.

Between 1968-1971 - the first 12 chapters of what was intended to become a first comprehensive Hebrew-language modern astronomy textbook were published as a fold-out in the last issues of "HaKokhavim BeKhodsham", but eventually had to be discontinued, due to various unfortunate circumstances.

The University of Tel Aviv in the late 1960s introduced the possibility of obtaining an M.Sc. degree in astrophysics, as part of the curriculum of the Department of Physics and Astronomy. A few other disparate courses on astronomical and mainly astrophysical topics are also offered at the Ben-Gurion University of the Negev at Beer Sheva, the Hebrew University of Jerusalem and the Weizmann Institute of Science in Rehovot during the mid-1970s.

All in all, one may say, as a paraphrase of a view once expressed by the sixth President of the United States - John Quincy Adams (1767-1848) - that the number of astronomical institutes and the extent of the research carried out by them - faithfully reflects the degree of advancement of a civilised nation. The one we dealt with in this communication is no exception.

*see Sky & Telescope, 43, 2, 72-73 (1972 Feb.)

ASTRONOMY IN A DEVELOPING COUNTRY

by Dr. Mazlan Othman, Department of Physics, Universiti Kebangsaan Malaysia (National University of Malaysia), Bangi, Selangor, Malaysia.

It takes a lot of doing to persuade someone in a developing country that astronomy should be taught at all levels of the education system. Firstly astronomy is regarded as an abstract science and has no bearing whatsoever on the advancement of the country. Secondly there is a mistaken notion that astronomy is only for the specialists and, to understand it, requires a lot of prior knowledge of science at a high level. Astronomy is therefore not favoured in any country where immediate practical applications are preferred and where the foundation for basic science is still weak.

This is the current situation in Malaysia. I therefore decided to tackle the problem in a two-pronged approach. In order to eliminate the second problem I have suggested through working papers and private communication that astronomy need not be introduced in the already over-burdened school curricula as a separate subject but teachers should be encouraged to use astronomical phenomena to illustrate physical laws and principles. All astronomers know the numerous examples that exist but school teachers need to be told and shown what these examples are. The word "astronomy" is still to be used loosely and widely in schools but in universities astronomy is already offered as optional units in two universities.

The second prong of approach has been through the mass media. Through articles in newspapers, astronomical phenomena are explained in the simplest manner and to eliminate the first problem stated above, practical applications of astronomy are emphasised. I believe strongly that space research will continue to contribute greatly, directly or indirectly, to the advancement of technology and unless under-developed countries make some attempt today to understanding the problem and to make use of the technology, they will be left so far behind that it becomes detrimental to these same countries in the end.

A suggestion was made at one of the Physics Department meetings that an Astronomy Department should be set up which will produce astronomy graduates in a few years' time. I was initially excited and was about to make future plans when I suddenly realised that, any way I looked at it, there was no way I could, with a clear conscience, assure my future graduates that there would be astronomy jobs waiting for them. Starting astronomy research requires high capital investment which could be more profitably utilised to upgrade the basic standard of living of the people. But without research a department cannot survive, which brings me to the second reason why I do not subscribe to the idea of having an astronomy department. Looking at the present and future situation of this country, I favour heightened astronomy research within the physics department and whenever telescope time is required it may be obtained as part of research done in collaboration with neighbouring countries, e.g. Indonesia and India.

When my hairdresser asks me about his star in the zodiac (astrology) I can forgive him but when my colleagues admit to not knowing there are other galaxies outside our Galaxy I get a little worked up. But then, some will ask, does it matter whether or not he knows where Andromeda is and that it exists? The 1983 Nobel Prize for Physics that was awarded to Chandrasekhar and Fowler is timely and has gone a long way in making my stand as a staunch promoter of astrophysics and astronomy appear more credible and rational.

 I must admit that it requires much of one's energy and enthusiasm, not to mention passion, to keep the subject of astronomy alive in a state of almost total vacuum, false or otherwise. But it's great fun and I do not really wish that the situation was otherwise.

ADVANCED PROJECTS IN ASTRONOMY FOR UNDERGRADUATES

USING FILM COPIES OF UKST PHOTOGRAPHS

by Maire T. Brück, Department of Astronomy,
University of Edinburgh.

There are some universities where astronomy has been traditionally available at degree level, but these are few compared with those institutions where in recent decades the subject, more properly called Astrophysics, is being encompassed within the study of Physics. Astrophysics is now included in many honours Physics courses and has become a field of research in many universities where there are no conventional facilities for astronomical observation. No longer is it necessary to possess a telescope or to make actual observations by night in order to pursue a course in Astrophysics. However, in order to introduce students to the methods of modern astronomy there is a need for practical instructional material to supplement Physics laboratory work. To help fill this need the Department of Astronomy in the University of Edinburgh in collaboration with the UK Schmidt Telescope Unit have devised, among others, projects which are based on the readily available and excellent film copies of UKST photographs, mostly of IIIaJ (blue) survey fields.

The projects have been in use in Edinburgh over the past four or five years, and also in a number of universities in the UK and elsewhere which have welcomed the possibility of introducing students to astronomy in this relatively easy and inexpensive way. The basic requirements are no more than a light table or light box on which to place the films, a good magnifier, and a graticule and grid for measurement purposes.

The films selected include many different types of astronomical object, ranging from asteroids to clusters of galaxies. Some exercises are simple enough for elementary students and can be done in one afternoon's session. Others take longer, and the advanced projects may occupy anything up to 40 hours of a student's time. The final achievement in these advanced projects is of a high level and gives the student the satisfaction that he has worked with really high grade material and has performed what is effectively a small research project, since there is no set answer and the responsibility for finding the best way to proceed is largely with the student himself.

Many of the projects of necessity involve object counting, such as counting of stars in a globular cluster or of star-clusters in the disk of one of the Magellanic Clouds. The counting exercises, though apparently straightforward, lead the student into serious considerations of statistics and observational errors. The data derived must be fitted to some theoretical model, which involves the use of computers - a field of great importance to the younger generation of astronomers. The final answer - for the mass of the cluster or the effective dimensions of the Magellanic Cloud in the two examples cited - introduces the theoretical astrophysical side of the problem, which is, of course, the ultimate aim of the work. Where a microphotometer or microdensitometer is available projects may be extended into the field of surface photometry, specifically photometry of bright galaxies and the fitting of their profiles or

 isophotes to standard theoretical models.

In carrying out one of these advanced projects the student gains experience in the observational, computational and theoretical aspects of the problem. He is also obliged to study the background to the subject, consult the literature and compare his results with published data. Finally, the project is written up and presented as a mini-thesis, and, in the case of the Edinburgh University course, such a piece of work constitutes the equivalent of one third of the year's practical work.

Naturally these projects can be simplified; one of the advantages of the use of the Schmidt material is that the exercises are flexible and individual instructors may set them at various levels of difficulty depending on the standard of the class and the time available. We feel, however, that it is at the advanced level that they have their greatest value. Elementary problems are easy to come by, and elementary astronomy courses are already well catered for in undergraduate texts.

The Edinburgh Undergraduate Teaching Package consisting of seven films and an instruction booklet prepared by M.T. Brück is available from: UKST Unit, Royal Observatory, Edinburgh EH9 3HJ, price £35. Extra films are also available at £5 each and extra copies of the booklet at £3. A list of the films and exercises may be obtained from M.T. Brück or S.M. Tritton, UKSTU.

ITEMS IN THE PRESS

1. For the French reader, Les Cahiers Clairaut continues at a lively pace with a series of articles on solar neutrinos. This is a very vigorous magazine for the schools.

2. In Planetarian Vol.12 No.3 there is an interesting article by M. Chriss on Science and Nonsense. He too worries about the growth of pseudo-science in the book stores, colleges and universities.

3. In Planetarian Vol.12 No.4 Claire and Everett Carr describe the three laser discs now available from Video Vision Associates of New York. Three further discs will soon be available and the current cost is U.S.$320 per disc.

EDINBURGH ASTRONOMY

TEACHING PACKAGE FOR UNDERGRADUATES

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Schmidt Telescope Unit

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The Edinburgh Astronomy teaching package for Undergraduates is now complete and can be ordered from the UK Schmidt Telescope Unit at a cost of £35 (plus postage).

The package consists of seven specially selected film copies, made from UK 1.2m Schmidt Telescope original plates, together with a set of notes suggesting exercises which can be undertaken using the films. The exercises have been designed by Dr M.T. Brück and used as part of the undergraduate teaching programme at Edinburgh University over the past few years.

The suggested exercises (see over for further details) and chosen films are

1. Asteroids
2. Comet West
3. Globular Star Clusters
4. The Galactic Plane
5. The Vela Supernova Remnant
6. The Large Magellanic Cloud
7. The Virgo Cluster of Galaxies.

Original Plate No.	RA (1950)	Dec	Description	Used in Exercise
J2137	12^h27^m	+13°30'	Virgo cluster	1 and 7
J2140	20^h53^m	+13°01'	Comet West	2
J1935	00^h00^m	-75°00'	Field 28	3
J2155	13^h56^m	-65°00'	Field 97	4
Hα 1355	08^h40^m	-44°47'	Vela Supernova	5
J1953	06^h04^m	-70°00'	Field 57	6
U1152	05^h21^m	-69°06'	LMC	6

An additional film of a field in the ecliptic (J3410 of field 595 at 19^h57^m -20°00') is available for work on asteroids. This film can be ordered, in addition to the package, at an additional cost of £5. Additional copies of the notes are available at a cost of £3 a set.

1. Asteroids. An ecliptic field with a large number of asteroid trails.
Exercises. *Search for asteroids.
*Estimate of asteroid distances.
*Calculation of the approximate size and mass of a bright asteroid.

2. Comet West. A photograph centred on Comet West one month after perihelion in 1976.
Exercises: *Determining direction and length of tail, and dimensions of Coma from the given Sun-Earth-Comet configuration on the date of observation.

3. Globular Star clusters. The field contains the galactic globular cluster 47 Tucanae; it also includes part of the Small Magellanic Cloud and several SMC clusters.
Exercises: +Determination of the tidal radius and mass of 47 Tucanae from star counts.
+Fitting star density profile to theoretical models.
+Comparison of SMC and galactic clusters.

4. The Galactic Plane. A typical Milky Way field with many interesting objects.
Exercises: +Number-magnitude star counts.
+Star counts in obscuring clouds and estimate of their mass.

5. The Vela Supernova Remnant. An Hα photograph of the filaments of the SNR.
Exercises: *Radius of shell of SNR.
*Estimate of age of SNR and density of ISM.

6. The Large Magellanic Cloud. Two photographs, one blue and one ultraviolet showing many interesting objects.
Exercises: *Recognition of blue and red clusters.
+Profile of the LMC disk and effective radius of LMC from cluster distributions.
+Comparison with theoretical exponential disk.

7. The Virgo Cluster of Galaxies. A beautiful photograph of the central region of the Virgo cluster, and containing many well known objects. A finding chart of galaxies is provided.
Exercises: *Classification of galaxies.
*Visual estimate of dimensions of galaxies.
+Surface photometry of a sample galaxy.
+For Departments with access to a microphotometer instructions are included for surface photometry and profile fitting of spiral and elliptical galaxies.

*Elementary exercises suitable for first year students which can be done in one session.

+Advanced exercises suitable as longer projects.

Additional films which will be available for October 1983
(1) A more distant cluster of galaxies.

(2) Objective prism spectra of a halo field.