
CASSIOPEIA



No. 69 - Winter Solstice 1990

ISSN 0715-4747

CONTENTS

From the Editor	2
University of Calgary IRAS Data Analysis Facility	S. Kwok, K. Volk 2
Employment Opportunity / Possibilité d'Emploi	5
CASCA Small Grant Report	M.J. Drinkwater 5
New Phone Numbers at DAO	5
CFHT - Scientific Advisory Council / TCFH - Conseil Scientifique Consultatif	J-R Roy 6
Canadian Astronomy Data Centre	A. Woodsworth 8
The CASCA Small Grants Programme	8
New Slide Set Available	R. Wheate 9
Important Notice Concerning CFHT Proposals	D. Crampton 10
The New DRAO Synthesis Telescope	DRAO Staff 11
Letter to the Editor	J.E. Kennedy 12
President's Correspondence	13
Update Gemini - Formally the NOAO Twin 8-m Optical/IR Project	G. Walker 14
The Petrie Prize Lecture	15
The Plaskett Medal	15
Nomination for IAU Membership / Invited Participant	16
Changes to 1990/91 CASCA Membership Directory	N.R. Broten 17
Canadian Astronomy Publications	18
Peter MacKenzie Millman, 1906-1990	H.S. Hogg 20



FROM THE EDITOR

I am happy to report that our announcement in the last issue that the cost of producing *Cassiopeia* in the new format would be \$300 or so over the previous version in the end proved false. It all came down to a matter of staples. We had thought to save money by not stapling pages together (see the AAS *Newsletter* as an example), and it was not until the very last minute as the print run was about to begin that the printer thought to tell us the lack of staples would cost us dearly. The reason was that their machine for folding the pages together also inserted staples, and if we wanted no staples then the folding must be done by hand and that would cost a bundle far exceeding the savings on staples. So staples it is.

In the end our printing costs still exceeded those of recent issues, but we were able to save significantly on postage. Colin Scarfe had already instigated the bundling of copies going to one institution and we were able to extend that by using the Inter-University Transit System in southern Ontario which provides free mailings between universities and also NRC. The total cost (printing and mailing) for the issue was \$481 as against \$595 for the AE 1989 issue and \$479 for the WS 1989 issue, the most recent for which we had figures immediately available. These figures illustrate how quickly the costs escalate when an issue is even a few pages longer than usual. It may become necessary for the editorial red pencil to be wielded more often in future; meanwhile, I ask contributors to be succinct.

My thanks to those of you who replied on the subject of the new format. There were 21 e-mail replies, two written, and additional verbal ones. All were in favour of the new format, but several decried the lack of any graphics on the cover (“... made me feel I was the recipient of a financial report from Smothers Inc.”; “... not distinguished from quite a few other pieces of mail ... thus increasing the danger it will get tossed accidentally with junk mail.”) So, as you see from the present cover, we have brought back *Cassiopeia* herself, albeit miniaturised, and added the CASCA logo at the bottom. (Incidentally, should contributors wish to add illustrations to their submissions, we are able to handle encapsulated PostScript graphics files and we are able to scan photographs or drawings ourselves, given a few days warning.)

In the last issue the editorial red pencil overlooked in a page 5 listing of objects observed by HST the appearance of NGC 188 as an LMC cluster. It did not escape eagle-eyed Sidney van den Bergh, however: “I note that in keeping with the tradition of migrating south at the time of the autumnal equinox, NGC 188 has migrated from declination $+85^\circ$ to the LMC. Quite a trip for such an old cluster!”

Finally, we are delaying this issue to bring you Gordon Walker's report on the 8-m telescopes project. I am sure you will agree that its importance to our community is worth the delay.

Don Fernie

UNIVERSITY OF CALGARY IRAS DATA ANALYSIS FACILITY

Network Access to the Facility

With the installation of the CA*net, we are now finally integrated electronically with the rest of Canada and the U.S. In addition to the “mail order” service that we offered in the past, users now can directly login to our SUN 4/260 and make use of the software and data that are available. Our internet address is “136.159.1.57”. The username is “visitor” and the password is “ucalgary”. After login, the user will be asked what type of terminal he/she is using. Several popular terminal types, such as VT100, VT220, Heath 19, Tektronics 4010 & 4105, are supported. Those using a graphics terminal will have the capability of having graphics directly displayed on their screen.

At this point, the user will be faced with a main menu (see Fig. 1) with several layers of submenus. Help is available for each of the menu items, with more detailed

explanations on the data and programs. Among the most frequently used programs are those that search the *Point Source Catalogue*, *Faint Source Catalogue*, *Small Scale Structure Catalogue* and the *Serendipitous Survey Catalogue*. Each of these catalogues can be searched by position (with a search radius) either interactively or with an input position file. More general criteria can also be set up to limit a search. These include, e.g., colour of the sources, flux limits, associations with objects in existing catalogues, etc. As an example, one can search for all sources in the *Bright Star Catalogue* with spectral type A that are located north of Dec -30 degrees, with 25 to 12 micron flux ratio greater than 1, and a variability index less than 50%. Two kinds of IRAS colour-colour diagrams can be plotted using the file generated by the search. Sources from the various IRAS catalogues can also be plotted on a star chart (see Fig. 2 at the end of this article).

Perhaps the unique part of our service is the availability of the IRAS Low Resolution Spectra processed at the University of Calgary. Spectra can be extracted by their IRAS *Point Source Catalogue* name, or their common name for sources not in the *Point Source Catalogue*. The spectrum can be displayed on the screen, or extracted in ASCII form.

Also available is a plotting program that combines the IRAS photometry, LRS, and other ground-based photometry data. The IRAS photometry is automatically corrected for colour, and the LRS adjusted for baseline problems, joining between the two bands, calibration errors, etc. The LRS are then convolved with the instru-

mental profile of the 12 μm band and normalized to the 12 μm in-band flux. Smoothing the spectrum and fitting the data by one or two blackbodies interactively is also possible.

All the output of the programs (including plot files) is written to disk files and can be transferred to the user's home computer via FTP. We support a number of graphics output devices, including QMS and PostScript. All the software that you will see was developed locally at Calgary, and is not as professional and friendly as commercial software such as Wordperfect. We will need your feedback to improve. For this purpose, we have a "comments box" where you can leave suggestions.

The following tasks are available to run (choose by number from 1 to 8):

1. Information about the programs and the IRAS data.
2. Extraction of IRAS Low Resolution Spectra into an output file.
3. Various IRAS plotting programs.
4. Search the IRAS Point Source Catalogue for sources by IRAS name.
5. Search the IRAS Point Source Catalogue using general conditions set by the user.
6. Search the other IRAS catalogues (FSC, Serendipitous, SSSC) for sources.
7. File transfer using the FTP utility; execute common commands inside the menu; send messages to the account coordinator.
8. Exit to the command level.

Enter an option number for sub-menus, or "H" for the longer descriptions

Figure 1. The Main Menu

Processing of the Low Resolution Spectra

The IRAS satellite carried a Dutch-built Low Resolution Spectrometer covering the wavelength range of 7-23 μm . During the all-sky survey, approximately 170,000 spectra were recorded, corresponding to $\sim 50,000$ sources. The "best" LRS spectra for 5425 sources were published as the *LRS Atlas* (Olson and Raymond 1986, *Astron. Astrophys. Suppl.*, 65, 607). The entire database was kindly provided to us by the Laboratory for Space Research of the University of Groningen, and the processing of the entire LRS database has become our major activity. We will be systematically extracting and classifying all the LRS spectra to as low a flux limit as possible. Each of the scans is examined individually, and the good spectra

averaged. We estimate that useful spectra for as many as 25000 sources can be extracted. These spectra will be classified based on the features present. A classification scheme has been adopted based on the astrophysical origin of the features. The codes for the classes are: S (stellar), F (featureless), C (carbon-rich), P (PAH), A (silicate absorption), E (silicate emission), H (HII regions), L (line emission), U (unknown), and I (incomplete). This procedure will require actual examination of each individual spectrum but in the end will yield classes of spectra of homogeneous sources. We also plan to reclassify the sources in the publicly-released *Atlas*, correcting some of the misclassifications in that catalogue.

As these spectra are processed, the data files are added

and made available to the "visitor" account. We plan to eventually release a machine-readable catalogue consisting of all the processed spectra. This catalogue will also be accessible through the NASA Astrophysical Data System.

If you have any questions, we can be reached at "kwok@iras.ucalgary.ca" and "volk@iras.ucalgary.ca"

SUN KWOK
KEVIN VOLK

Below is a star chart created by using the software and data of the University of Calgary IRAS Data Analysis Facility.

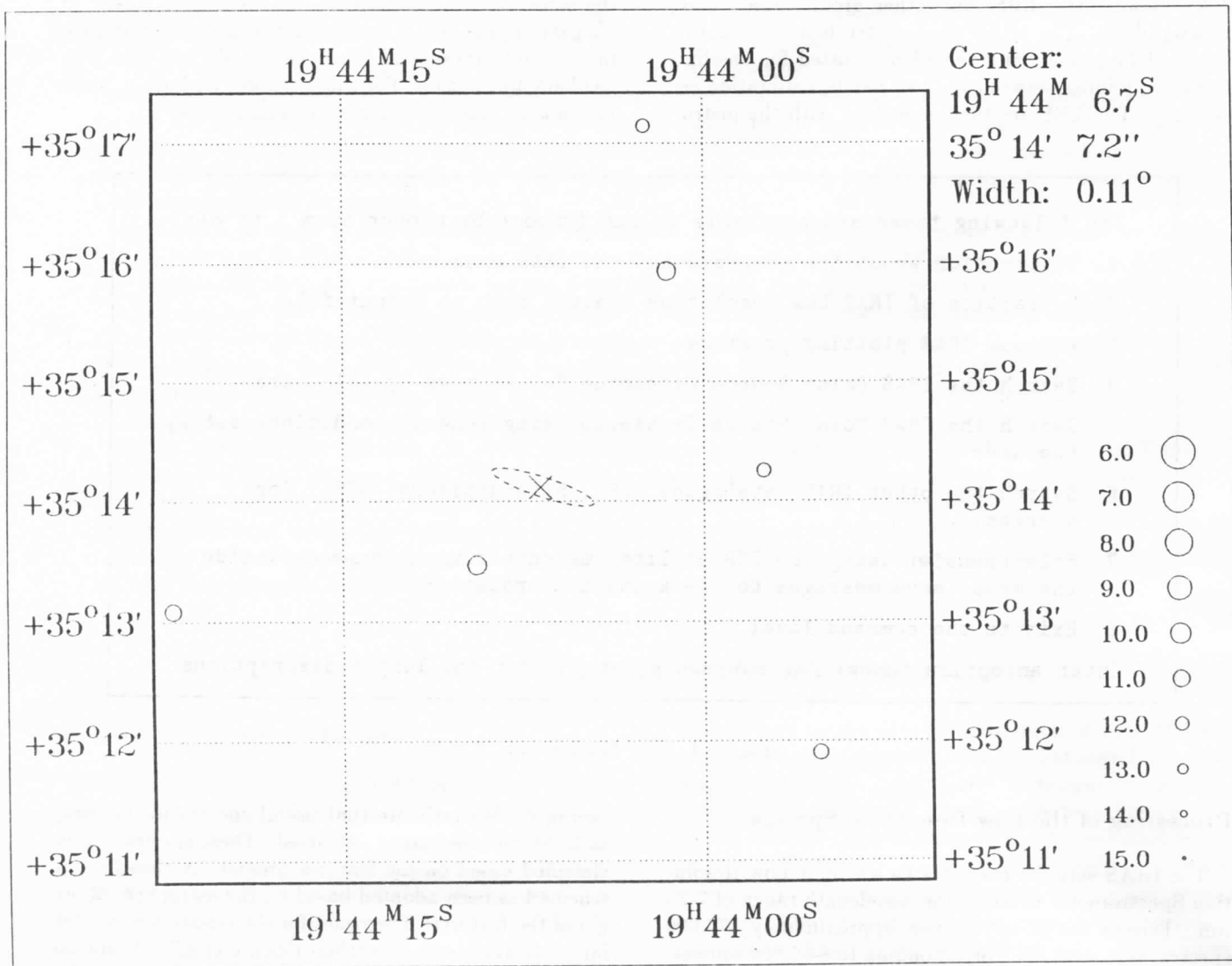


Figure 2.

This finding chart was produced by superimposing *IRAS PSC* sources on a field made up of objects in the *HST Guide Star Catalogue* and the *Bright Star Catalogue*. The positional error ellipse of the *IRAS* source at the centre of the field is also plotted. The sizes of the circles correspond to the visual V magnitude and the size of the "x" corresponds to the *IRAS* $12\mu\text{m}$ flux. The *IRAS* source shown on this chart is 19422+3506 which does not seem to have an optical counterpart.

EMPLOYMENT OPPORTUNITY / POSSIBILITE D'EMPLOI

EMPLOYMENT OPPORTUNITY IN ASTRONOMY OR ASTROPHYSICS AT THE UNIVERSITE DE MONTREAL

The Astronomy/Astrophysics Group in the Département de Physique at the Université de Montréal invites applications for a postdoctoral position in Astronomy or Astrophysics to begin not before May 1991. The appointment will normally be made for two years. Candidates in all areas will be considered. The successful candidate is expected to interact strongly with local research staff.

Applicants should send a curriculum vitae, bibliography, statement of research interests and the names of three references to: Chairman, Astronomy/ Astrophysics Group, Département de Physique, Université de Montréal, P.O. Box 6128, Station A, Montréal (Québec), Canada H3C 3J7. In accordance with immigration regulations, preference will be given to citizens or permanent residents of Canada.

The deadline for receipt of applications is February 1st, 1991.

POSSIBILITE D'EMPLOI EN ASTROPHYSIQUE OU EN ASTRONOMIE A L'UNIVERSITE DE MONTREAL

Le Groupe d'astronomie/astrophysique du Département de Physique de l'Université de Montréal fait un appel de candidatures pour un stagiaire postdoctoral en Astronomie ou en Astrophysique, débutant en mai 1991. Normalement, la nomination est pour deux ans. Toutes les candidatures seront prises en considération, quel que soit le domaine de spécialisation. Le chercheur sélectionné devrait pouvoir collaborer activement avec les membres du groupe de recherche.

Les candidats devront envoyer leur curriculum vitae, le relevé de leurs publications, un document exposant le domaine d'intérêt de leurs recherches, avec indication de trois personnes pouvant donner des références, à l'adresse suivante: M. le Directeur, Groupe d'Astronomie/Astrophysique, Département de Physique, Université de Montréal, C.P. 6128, Succ. A, Montréal (Québec), Canada H3C 3J7. Conformément aux exigences prescrites en matière d'immigration au Canada, cet avis de concours s'adresse en premier lieu aux citoyens canadiens ou aux résidents permanents du Canada.

La date limite de dépôt du dossier: 1er février 1991.

CASCA SMALL GRANT REPORT

The Clustering of High Redshift Quasars

This grant was used to support an observing run on the Australian National University (ANU) 2.3m Advanced Technology Telescope in October 1990. The redshifts of some 80 quasars were to be obtained in order to increase the sensitivity of an earlier measurement of quasar clustering based on an objective-prism quasar survey (Drinkwater 1988 *M.N.R.A.S.* **235**, 1111).

The observations, made in collaboration with Dr. J. Loveday (ANU), went very smoothly. There is no night assistant on the telescope; all building and telescope control is performed by a VAX computer working through a very simple interface. We had accurate positions (from the APM facility, Cambridge) so object acquisition was very efficient: the coordinates were read directly from file

on the VAX and the pointing was sufficiently accurate to put the object straight into the 2 arcsecond slit each time.

Of the 5 nights allocated we had one very good night with 1 arcsecond seeing and 3 mediocre nights (poor seeing and some cloud). A first look at the data obtained suggests that we will get good redshifts for some 45 quasars. The remaining objects are faint and/or do not have particularly strong emission lines. We plan to analyse the data obtained so far to make a measurement of clustering; if the resulting sensitivity is not sufficient, Loveday will apply for time on the AAT next year to observe the remaining quasars.

M.J.DRINKWATER

NEW PHONE NUMBERS AT DAO

Readers who may wish to contact staff members at DAO please note that DAO phone numbers have changed from (604)388-xxxx to (604)363-xxxx.

CFHT - SCIENTIFIC ADVISORY COUNCIL
TCFH - CONSEIL SCIENTIFIQUE CONSULTATIF

Here is a summary of the main points discussed at the Scientific Advisory Council which held its 38th meeting on November 7 and 8, 1990 at the CFHT Headquarters, in Waimea, Hawaii. The SAC members present were Chantal BALKOWSKI, Georges COMTE, David CRAMP-TON, Paul FELENBOK (vice-president), Georges HERBIG, Klaus HODAPP, Daniel NADEAU, Christopher PRITCHETT, Daniel ROUAN, Jean-René ROY (president). The CFHT Corporation was represented by its Executive Directors, Guy MONNET, and John GLASPEY.

1 - Scientific and Technical Activities at CFHT

The Executive Directors, G. MONNET, and J. GLASPEY, presented a review of the activities for the past six months. The weather on Mauna Kea has certainly improved. In particular, during the April 1990-October 1990 period, only 15.3% of time was lost to weather compared to 42.4% for the last semester and 24.2% a year ago. A rather severe earthquake (Richter 4.7) resulted in the closure of the telescope for one night. A major shutdown of the CFH telescope took place from 28 June through 12 July 1990. Realuminizing the 3.6 m mirror, painting the fifth floor area, and reorganizing the summit computer room on the fourth floor were the primary tasks. Unfortunately, an unexpected shutdown, due to mercury spill from the Cass f/8 secondary mirror support system, forced closure of the telescope from 20 September through October 1st.

CFHT has become a popular place for research leaves. Presently, several visiting astronomers are at the CFHT for one-year periods. They are Roland BACON (Observatoire de Lyon), Jean-Luc NIETO (Observatoire du Pic-du-Midi et de Toulouse), René Racine (Université de Montréal) and Ann BOESGAARD (University of Hawaii).

J. GLASPEY, the Associate Director, presented a technical review of the main activities for 1990 II at CFHT. A new 250 kW emergency generator was installed in the summit building. Laboratory space in the dome has been reorganized, including making space for the LAMA, a larger CCD lab, and a new lab for the UBC HF cell experiment. Work on the upcoming Telescope Control System IV is continuing; it will provide an environment that will be easier for the telescope operators to work with, and several new features to help the observers. Pointing accuracy and tracking should be improved significantly.

Tests have been carried out on the optical quality of the Wide Field Corrector used for prime focus imaging. Contrary to earlier beliefs, the optical quality of this cor-

rector is excellent; it introduces at most 0.1 arcsec of degradation in the overall prime focus image size.

A 1024 × 1024, 10 micron pixel, low noise CCD loaned to CFHT by SAIC is now in regular use by observers, and has been very successful. A Ford Aerospace 2048 × 2048, 15 micron pixel, low-noise CCD has been received from Lick Observatory; it has been tested on the sky and looks very promising. Despite the present lack of an adequate 3rd generation controller (the present readout time is 7.5 minutes per image!), the new large CCD is a powerful detector and will be available to the general user community. The CFHT Corporation is planning to acquire new versatile and faster readout controllers, to ensure more reliable exposure timings, and to get new shutters for its CCDs. A new low-noise CCD, called JPL1, is on loan from the Jet Propulsion Laboratory; it is coated for increased ultraviolet sensitivity, and appears optimized for spectroscopic programs.

A computer-aided focussing routine has now been added to speed up data acquisition procedures involving imaging. It has been used with success by many observing teams with both HRCam and FOCAM at the prime focus and with the focal reducers at the f/8 Cass focus. The long awaited Coudé autoguider has been completed.

The multi-object spectrograph, previously called PUMA, but now renamed MARLIN, is being used with the LAMA; this is the laser drilling and cutting machine which allows faster preparation of more precise mask apertures for the focal plane. The MARLIN support structure has been mechanically strengthened and flexures have been reduced by half.

A SUN Sparc+1 station has been installed at the summit. It has its own disk space and Exabyte tape drive. A copy of this powerful data processing facility should soon be installed at Hale Pohaku. The Exabyte tape drive in Waimea has been used by several teams to carry data to their home institutions. However a few such users have had problems reading their Exabyte tapes on drives at their home institutions.

The new Coudé f/4 spectrograph optical design has been completed. Camera and collimator mirrors are being constructed, and delivery is expected in mid-1991. DAO is fabricating most of the major mechanical components. MOS/SIS, built jointly at Meudon and DAO, is progressing very well on schedule. Its delivery at CFHT is expected around October 1991. Commissioning on the telescope should take place in 1992.

On 20 September 1990, mercury drops were detected under the telescope west beam; closer inspection revealed

that these were due to a leak resulting from the rupture of the mercury-filled neoprene tube used in the support of the f/8 secondary mirror. The mercury spill destroyed the aluminium on 70% of the surface of the primary mirror, and was severe enough to force a complete shut-down of the telescope from 20 September through October 1st. Major cleanup procedures and activities took place. The primary mirror was re-aluminized. Preventive operational procedures and other modifications have been made to the f/8 mirror cell to ensure that, should a mercury leak occur, little or none of the mercury would reach the primary mirror. A total of eleven nights were lost at that time, and the October f/8 Cass observing run was rescheduled such that the TIGER observations had to be delayed until November, and the HRCam run was moved ahead. Other lost scientific nights will be "reimbursed" from CFHT discretionary observing time in 1990-1991.

2 - Present Status of the DAO HRCam

OFA-DAO et la Société CFH ont pris les mesures pour assurer la transmission du savoir-faire d'une institution à l'autre au regard des opérations reliées à l'utilisation de HRCam au CFH. Le personnel de la Corporation CFH a acquis une maîtrise suffisante pour faire fonctionner la caméra HRCam sans participation de OFA-DAO. Ceci assure un fonctionnement satisfaisant de l'instrument pour les astronomes visiteurs et un entraînement profitable pour l'arrivée du SIS au télescope en 1992.

Une statistique comparée de la qualité d'image obtenue avec HRCam avec pleine ouverture du miroir primaire et avec FOCAM confirme le gain de l'ordre de 0.1 arcsec que HRCam permet d'espérer en moyenne sur la qualité des images. En effet, les observations avec HRCam à pleine ouverture ont donné FWHM = 0.62 arcsec en septembre 1989 et FWHM = 0.65 arcsec en août 1990. Par contre, FOCAM donnait des images avec FWHM = 0.75 arcsec en août 1989.

3 - Policy for Commissioning Runs for MOS/SIS and Coudé f/4 Spectrograph

The CFHT Corporation and the three national communities have invested large amounts of resources in building the second generation multi-object spectrograph MOS/SIS and the new Coudé f/4 spectrograph. SAC has recommended that several commissioning nights at the telescope be devoted to both instruments, in order to release to the MOS/SIS and Coudé f/4 communities perfectly working instruments with very well-known astronomical performances.

4 - A CFHT Infrared Camera Proposal

An internal infrared camera working group has been formed at CFHT, and a project scientist, D. SIMMONS, has been appointed. The working group is being enlarged to include members from the three CFHT communities. It appears clear that the first CFHT infrared camera should be based on the NICMOS3 256 × 256 pixels² detector which can be used in the wavelength range of 1 to 2.5 micron. This choice is based on: a) the availability of the detector and its proven performance, and b) the deliberate decision to have a simple camera as soon as possible on the telescope. The camera should have optics that provide at least Nyquist sampling of the median seeing at one of the foci through broadband filters; desirable options would include CVF capability and other plate scales including ones that can match the performance of adaptive optics.

5 - Adaptive Optics at CFHT

Au cours de sa réunion de mai 90, le CSC a entendu une présentation du dispositif d'optique adaptative COMEON qui a donné ses premiers résultats sur le télescope 3.60 m de l'ESO (*cf. Astronomy & Astrophysics* 230, L29-132). Cette fois-ci, un dispositif différent a été présenté d'abord sous forme de document, puis oralement, par F. RODDIER de l'Université de Hawaii. Ce dispositif, fort attrayant, a fonctionné en laboratoire lorsque réduit à sa composante "tip-tilt". L'ensemble du dispositif, dont l'étude complète a été simulée, pourra commencer ses premiers essais au laboratoire, puis sur le ciel, dès que le miroir "bimorphe" sera livré. Bien que ce système semble être bien adapté au site du Mauna Kea, les performances en seront connues réellement qu'à la suite d'essais en profondeur. Afin de tirer le meilleur profit du savoir-faire des communautés du CFH, et d'aboutir rapidement à un système d'optique adaptative réaliste du point de vue de la complexité technique, du coût et des moyens humains, un groupe de travail a été constitué par la Société CFH.

6 - Decommissioning of the Photographic Plate Camera

The prime focus photographic plate camera was last used more than 1.5 year ago. There are no demands for it now, and it is unlikely to be requested because of the arrival of the large 2048 × 2048 CCDs. Furthermore the Corporation wishes to recover lab space now occupied by the summit dark rooms. The implementation of drift-scan readout on the large CCDs will make large photographic plates obsolete for most astronomical applications. Therefore, SAC has recommended that the photographic camera be de-commissioned.

JEAN-RENÉ ROY

CANADIAN ASTRONOMY DATA CENTRE

CADC Services Available

The following services are now available to CADC users:

SIMBAD - Up to date bibliography on 650,000 stars and 100,000 non-stellar object - marvellous for doing literature searches, or just for looking up individual objects.

STARCAT - Many popular on-line catalogs allowing selection of objects according to any combination of criteria (e.g. magnitude range and declination range and spectral type) - helpful for generating observing lists

HSTCAT - The HST catalog of proposals and observations. This will be updated regularly.

IUE Uniform Low Dispersion Archive - About 55,000 IUE spectra are available on-line and can be selected by object type, etc. You can extract the spectra of interest and transfer them to yourself as FITS files via ftp.

HST Guide Star Catalog - this is mounted on a pair of CD-ROM's, and contains position and magnitude information on 19 million objects in the seventh to sixteenth magnitude range. It can be used with STSDAS/IRAF to generate finding charts and overlays for Schmidt plates, etc. This file system can be exported to remote sites, i.e. you can set up your work station to see these CD-ROM's as local - albeit slow - drives. Call us for information if you are interested.

Remote access to National Extragalactic Database and to Astronomical Data Center at Goddard - These services are freely available over the Internet (CA*net in Canada). However Canadian astronomers who do not yet have CA*net access can connect to CADC using Datapac and then be connected to NED or ADC.

Documentation - We have prepared Cookbooks for each

of these services. These have been mailed to all users who returned our recent questionnaire; they are also available in compressed postscript form over the network, via anonymous ftp.

How to obtain a CADC account

All astronomers, including grad students, are welcome to request an account. We will send an electronic application form via e-mail, on request to woodsworth@dao.nrc.ca. Please make sure your students, PDF's and long-term visitors are aware of our services. They are, of course, free of charge.

CADC Newsletter

We are planning to put most of our technical information into a separate newsletter, which we will mail to all our registered users. Only the highlights of CADC activities will be described in *Cassiopeia*. The first of these will include a status report on the HST and its instruments, based on information discussed during the recent Workshop for GO's and GTO's held at STScI.

HST User support

As mentioned in a previous newsletter, we will be offering a number of services connected with the HST proposal stages. The deadline for Cycle 2 of HST has now been moved to sometime this summer, so there is quite a bit of time for astronomers who wish to prepare HST proposals to do so. Details of these services, as well as a status report on HST, will be available in the CADC Newsletter.

ANDY WOODSWORTH

THE CASCA SMALL GRANTS PROGRAMME

1. Eligibility Rules

CASCA Small Grants are intended to cover the costs of a specific research project for which other funds are not available. CASCA Small Grants are not intended to support the continuing research of astronomers (or their graduate students, or associated post-doctoral fellows) in the manner of operating grants or institutional support. CASCA Small Grants are intended primarily, but not exclusively, for younger professional astronomers, rather than established scientists.

Applicants should normally have a PhD degree, or should be sufficiently advanced in their studies as to ensure a commitment to professional astronomy. Applicants should be working at least half-time in the field of astronomy and astrophysics. Applicants need not be Canadian

citizens or members of CASCA but the use of the grant should in some way advance Canadian astronomy.

2. How to Apply

Applications should be sent to:

Dr. C. R. Purton
Chairman, Small Grants Committee
c/o DRAO
Box 248
Penticton, B.C. V2A 6K3

The deadline for receipt of applications will normally be March 31. Decisions on grants will be announced six to eight weeks after this deadline. Applications for Small Grants will be considered at other times if there are exceptional circumstances.

There is no prescribed application form. Application for the CASCA Small Grants programme should contain the following information:

Title - brief and descriptive

Abstract - a short, non-technical summary of the research programme that is to be funded, and the purpose(s) for which the CASCA funds will be used.

Justification - not to exceed 2 typed single-spaced pages.

This part of the application should describe both the overall aim and the detailed execution of the project. The general importance of the project to astronomy should be stressed.

Budget - detailed accounting of how CASCA funds will be used. Statement of Financial Need - description of availability of other sources of funding, and the efforts that have been made to procure such funds.

Curriculum Vitae - a summary of education and employment history, recent publications, grants, scholarships, and other information that would be of interest to the selection committee.

Conclusion - a statement to the effect that the grant, if awarded by CASCA, will be used only for the requested purpose, and that an accounting will be furnished to CASCA within 2 months of the use of the funds, or within 6 months of their receipt. This statement should be signed and dated.

Finally, graduate students should submit a letter of support from their supervisor. This letter should include a statement explaining why the supervisor cannot fund the project for which the student is applying for funds from CASCA, and a statement detailing why the student is eligible for a Small Grant.

3. Grant Selection

Evaluation of grant applications and administration of grants will be the domain of a committee of CASCA, the Small Grants Committee. At the close of the application period, committee members will circulate and evaluate applications. When necessary, the committee will seek

external advice on applications. The criteria for judging applications will be scientific merit and financial need. After the committee has reached a decision the applicants and the President of CASCA will be informed, and the Treasurer will be requested to release the funds at a time appropriate for the successful applicants.

The CASCA Board of Directors will provide, in advance of the deadline, a budgetary allotment for dispersal by the Small Grants Committee. In exceptional cases the committee may request additional funds from the Board. Unused funds will be carried over to supplement the budgetary allotment of the following year. The availability of funds for the programme will vary from year to year, and is subject to the discretion of the Board of Directors. There is no implied commitment by CASCA to continue to fund the Small Grants Programme in perpetuity. Unsuccessful applications will not be reconsidered unless they are resubmitted.

4. Administration

Allowable expenses for Small Grants are: travel (to astronomical institutions or conferences), conference fees, minor equipment, page charges, books, computing costs, and other reasonable expenses that are associated with astronomical research. CASCA Small Grants may not, however, be used to pay salaries or university tuition fees. If there is any doubt about the use of Grant funds, the grantee should obtain the approval of the Chairman of the Small Grants Committee before the expenditure takes place.

A full accounting (with all receipts) should be sent to the Small Grants Committee within 2 months of completion of the project for which the funds were intended, or within 6 months of receipt of the funds (whichever comes first). All unused funds are to be returned to CASCA.

At the conclusion of the grant, grantees should submit a brief report of their activities to the Small Grants Committee. This report should normally be suitable for publication in *Cassiopeia*.

NEW SLIDE SET AVAILABLE

Perhaps your members would be interested in this product, that I am distributing on behalf of the Canadian Cartographic Association.

"Mapping the Planets" slide set, by P.J.Stooke and C.P.Keller. This slide set depicting the Moon and planets has been compiled by two cartographers, interested in non-spherical projections. Those covered include the Moon, Mars, Mercury, Venus, Ganymede, IO, Europa, Tethys, Rhea, Miranda and Deimos. They are accompanied by an explanatory booklet, with captions for each

slide, and an overview of the history and current status of efforts to map the Moon and planets. Information on obtaining copies of the maps themselves are included. Price for the 40 slide set is \$50, including postage and handling. Orders and enquiries to: Roger Wheate (CCA), c/o Geography Department, University of Calgary, 2500 University Drive, N.W., Calgary, AL, T2N 1N4. E-mail: wheate@uncamult.bitnet. Tel: 403-220-4892, Fax: 403-282-6561. Visa and mastercard are acceptable as well as cheques.

ROGER WHEATE

IMPORTANT NOTICE CONCERNING CFHT PROPOSALS

Deadlines

One original copy + a photocopy must be received at HIA in Ottawa by Sept 1 for the first semester of the following year and by Mar 1 for the second semester. E-mail and/or Faxed versions will not be allowed. Proposals received on or after these dates will be returned (allow at least one day for internal NRC mail).

Proposal Length

The scientific justification MUST NOT exceed two pages. An additional (i.e., third) optional page may be added for diagrams and/or references. Standard sized type MUST be used, i.e., lower case letters should be at least 2 mm high (12 point type, 6 lines per inch). THE TOTAL LENGTH OF THE PROPOSAL MUST NOT EXCEED 8 PAGES (including instrument requirements and supplies needed).

Important QUESTION re CFHT proposals

After spending a couple of years on CTAC, I'm beginning to wonder whether we shouldn't have some better

way of accommodating long term projects. Some really excellent science proposals are in this category, but after reviewing them several times they begin to lose their initial impact and hence do not do quite as well in their ranking. Many observatories now allocate time to "key" projects - should we? Before all of you rush to submit your request for NN nights, let me remind you that the competition for CFHT time is quite severe (55 applications [203 nights] for our share last semester). Giving long-term status to several projects may build in commitments which succeeding TACs don't want. It can be argued that if a proposal is good enough it will get the time anyway. An intermediate solution would be to accept proposals for, say, up to 15 nights over two years but then only require updates after the initial review (which is likely to be more critical). It might encourage more significant research programs and be a more effective use of the telescope. What do YOU think?

D. CRAMPTON for CTAC
crampton@dao.nrc.ca
Fax: 604 363 0045

THE NEW DRAO SYNTHESIS TELESCOPE

After several years of development, the seven-antenna synthesis telescope at the Dominion Radio Astrophysical Observatory is nearing completion. Compared with its four-antenna predecessor, the new telescope is three times faster and will produce images with substantially improved sensitivity and dynamic range. Regular observing with the new system is expected to commence in April 1991, and observing proposals from interested astronomers are welcomed. The observing itself is automated and the "observer" need not be present. After editing and calibration by DRAO staff, the data in the form of calibrated maps (or *u-v* planes) are presented to the observer for further processing with DRAO software or with AIPS.

The DRAO Synthesis Telescope is a wide-field telescope which operates simultaneously in continuum bands at 408 MHz (λ 74 cm) and at 1420 MHz (λ 21 cm) and in 128 channels on the spectral line of atomic hydrogen at λ 21 cm. At 1420 MHz the maps have 1.0' resolution within a field of diameter \sim 2.5 degrees. At 408 MHz the resolution and field size are 3.5 times these values. The telescope is particularly suited to comprehensive studies of the interstellar medium, extended Galactic nebulae and star-forming regions, and of nearby galaxies. The two continuum frequencies permit detailed spectral index

measurements and allow the separation of thermal and non-thermal components. The HI maps reveal the distribution and dynamics of the atomic component, nicely complementing maps of molecular (*e.g.* CO) emission. The resolution is ideal for useful comparisons with the X-ray and far-infrared data from survey satellites such as IRAS and ROSAT.

The telescope consists of seven 9-m paraboloids on an east-west line 600 m in extent. Three of the antennas move on a precision rail track to stations spaced at intervals of 4.3 m, enabling visibilities for all 140 baselines from 12.9 m to 604.3 m to be acquired with twelve moves. The normal mode of operation is to observe for a full 12 hours at each set of positions to provide a fully sampled *u-v* plane. Broad structure in the continuum and HI emission, corresponding to spacings less than 12.9 m is taken from low resolution continuum surveys or from HI observations with the 26-m paraboloid at DRAO. Experience has shown that inclusion of all broad structure components is particularly valuable for surveys in the Galactic plane and software is available to merge the broad and fine components.

Grating surveys or surveys incomplete in baseline or hour-angle coverage may suffice for some continuum studies. Also, observations at only the shorter spac-

ings can be made to supplement VLA D-array or WSRT (Westerbork) data. As with any east-west synthesis

telescope, observing is effectively limited to declinations above 15 degrees.

System Parameters

	408 MHz	1420 MHz
Polarization	left circular	left + right circular (Stokes I)
Bandwidth	4 MHz	30 MHz
System Temperature	150 K	80 K
Field Size (to 20% response)	8.1°	2.6°
Synthesized beam (EW x NS)	3.5 × 3.5 cosec(δ) arcmin ²	1.0 × 1.0 cosec(δ) arcmin ²
<i>rms</i> noise level, map centre		
brightness temperature	0.67 sin(δ) K	60 sin(δ) mK
flux density	3.3 mJy/beam	0.28 mJy/beam

Parameters, λ21-cm HI spectral line

The cross-correlation digital spectrometer provides 128 channels within a total bandwidth **B** MHz which can be set to values at factor-of-two intervals from 0.125 MHz to 4.0 MHz. For various bandwidths, the following radial velocity parameters apply:

Range in central velocity	-1100 to +3000 km/s
Total channel span	211 B km/s
Channel separation	1.649 B km/s
Channel width	2.64 B km/s

The *rms* noise level at the field centre for maps of each spectral channel in one polarization is:

$$\Delta T = 4.1 B^{-1/2} \sin(\delta) \text{ K}$$

Spectrometer channels available at present are sufficient for all baselines in only one polarization. As an alternative, the spectrometers can be re-distributed to both polarizations at shorter baselines. For this option, maps summed from the two polarizations will have a resolution of 2 arcmin and a noise level reduced from that given above by a factor of 2.8. For observations in this mode the 1420-MHz continuum map will still have 1-arcmin resolution.

Map Production and Analysis

The visibility data are edited and calibrated by the observatory staff, and an initial set of maps with reasonable default parameters are produced. (A standard continuum map measures 512 × 512 pixels with a grid interval of 20'' at 1.4 GHz and 70'' at 408 MHz. Standard HI-line maps are 256 × 256 with an interval of 30''.) At this point the observer is able to inspect his data and make sensible judgements about further reduction.

First-time users are encouraged to visit DRAO once the initial maps are made to investigate the software available, and all observers are welcome to use the computing facilities at DRAO. A new minisupercomputer (UNIX based) will be installed during 1991. A considerable number of software tools for analysis, manipulation and display of images are provided for the observer. A state-of-the-art CLEAN program, optimized for both point sources and extended emission, is routinely used for continuum maps. In addition, the dynamic range of most maps will be significantly improved by the use of a self-calibration algorithm currently under development. Programs for fitting and measuring sources, for integrating extended emission and for subtracting continuum emission from HI-line maps are commonly used. Data can be exported by means of FITS/UVFITS routines. Programs are well-documented and help is provided by a designated "friend-of-the-observer".

Observing Proposals

Observing proposals are accepted at any time and refereed by an external Observing Priorities Committee. The telescope is scheduled at approximately four-month intervals with time allocated on the basis of the committee's ratings.

A more detailed description of the telescope and standard observing application forms are available upon request by mail, phone, fax or e-mail.

Dominion Radio Astrophysical Observatory
 Synthesis Telescope Description
 Box 248, Penticton, B.C., V2A 6K3
 Phone (604) 497-5321
 Fax (604) 497-8800
 E-mail draoST@drao.nrc.ca

DRAO STAFF

LETTER TO THE EDITOR

An article by Anne Innis Dagg appeared in *The Globe and Mail* at the end of February 1989 entitled: "Class Act ... Dreams of a university where women truly are equal." While dreams are a series of images which pass through my mind when I am sleeping, I found the first paragraph of her article on "Dreams" disturbing when I was awake, when I was asleep and when I was dreaming.

Dagg contends our universities are: "most certainly too male-oriented... The students are taught male-biased knowledge, and professors do male-biased research." After years of teaching introductory astronomy, had I been guilty of imparting to students "male-biased knowledge"? Were my highly respected colleagues in astronomy across Canada entirely free of Dagg's accusations?

I selected a book on astronomy from my collection and noticed it had been written by "John" and dedicated to "John", by no means an auspicious start! I took small comfort in realizing the text selected could have been written by "Mary" or "Agnes". Should I admit openly that a book written by a man named "John" could contain, in all likelihood, male-oriented astronomy?

In examining the members of the solar system, I discovered that John stated: "The sun is self-luminous - the source of light and heat to the bodies which revolve round him. Though to the naked eye his surface appears equally luminous throughout..."

For the planet earth, John continued: "From an intimate acquaintance with her physical constitution, we may hope to be able, by analogical reasoning, to learn something of her sister planets..."

John refers to the moon as: "the inseparable companion and comparatively near neighbour of the earth, has, for the last 300 years, attracted the attention of astronomers; nor have her features lost their interest with the present generation."

John next turns his attention to the other planets:

"In consequence of the proximity of the planet Mercury to the sun, he is seldom visible to the naked eye; indeed he can be seen only at the time of his greatest elongation..."

"The planet Venus is much more favourably circumstanced for observation, and hence our acquaintance with her is more extended."

"We have already alluded to his [Mars] gibbous appearance when at his greatest elongation; but the line which divides the darkened crescent from the illuminated portion of his disc, is clear and definite, indicating the absence of asperities of any magnitude on his surface..."

"His [Jupiter's] great size, being 1280 times the volume of the earth, the clearness of his light, render him a most agreeable object for telescopic observation."

"Saturn also exhibits belts like Jupiter; and thus we may suppose him to have an atmospheric envelope, like the other members of the planetary system."

"The diameter of Herschel, or Uranus, is $4\frac{1}{3}$ that of the earth: his periodic time, 30686.82 days."

Neptune? Pluto? There is no mention of either planet in this text - how very inconsiderate of the author! A closer look at the title page reveals I had selected a book by John Drew entitled: *Manual of Astronomy: A Popular Treatise on Theoretical, Descriptive, and Practical Astronomy* published in 1845. The text had been dedicated to Sir John Frederic William Herschel. The date certainly accounts for the omission of Neptune and Pluto. The astronomy contained therein definitely appeared to be "male-biased".

My colleagues across Canada presently teaching astronomy at universities select their texts from such modern authors as the late George Abell or Jay Pasachoff. How do these writers treat members of the solar system?

	<u>Abell</u>	<u>Pasachoff</u>
Sun	It	It
Earth	It	It
Moon	It	It
Mercury	It	It
Venus	It*	It**
Mars	It	It
Jupiter	It	It
Saturn	It	It
Uranus	It	It

* Abell states: "Venus... is sometimes called the earth's sister."

** Pasachoff states: "Venus and the Earth are sister planets."

For the solar system at least, modern astronomy imparted to students appears to be slightly "female-biased". It was reassuring to discover my colleagues teaching 20th century astronomy were exonerated from Dagg's accusations. I must admit openly my guilt in imparting 19th century "male-biased" astronomy to my students. May my dream in retirement forever be disturbed by this finding!

Proceeding alphabetically to the other natural sciences, biologists must surely be in the clear. Most species start out, I believe, with almost equal numbers of males and females. As I recall my texts, sometimes the female devours the male after the useful purpose of fertilization has been served. Would Dagg admit of this female dominance?

Of chemists I am less certain – acids and bases, precipitates and catalysts may be neutral. Perhaps their bias should be given a “litmus” test.

Dreams of equality may be quite worth while, even stimulating for some. My dream of a university will remain as a place where fiscal restraints may be reduced

or removed, where professors of both sexes may find time and adequate support for research and where effective teaching of their discipline, astronomy or other natural sciences, will be primarily their most important challenge. In such an atmosphere research for new “non-biased” knowledge should flourish – leading to another important discovery such as a supernova. Ian Shelton is male but surely his discovery will remain above and beyond Dagg’s criticism.

J.E.KENNEDY
323 Lake Crescent,
Saskatoon, Sask.,
S7H 3A1

PRESIDENT’S CORRESPONDENCE

30 October 1990

November 7, 1990

The Right Honourable M. Brian Mulroney
Prime Minister
80 Wellington Street, Suite 120
House of Commons
Ottawa, Ontario
K1A 0A6

Dear Mr. Prime Minister,

Recently a number of reports have surfaced which suggest that operating support for the KAON factory, if it is approved, might (in part) be drawn from the Natural Sciences and Engineering Research Council operating funds. We believe that this would be unwise.

The per capita support level of research by Canadian astronomers is presently only about one quarter of that available to our American colleagues. Any additional reduction in our research funding would make it virtually impossible for Canadian astronomers to remain competitive in the world-wide effort to study and understand the Universe.

Yours sincerely,

Sidney van den Bergh, F.R.S.
President
Canadian Astronomical Society

Mr. Sidney van den Bergh,
President,
Canadian Astronomical Society,
5071 West Saanich Road,
Victoria, British Columbia.
V8X 4M6

Dear Mr. van den Bergh,

On behalf of the Prime Minister, I wish to acknowledge receipt of your letter of October 30 regarding the proposed TRIUMF-KAON research facility in British Columbia.

I would like to thank you for writing the Prime Minister and advise you that a copy of your letter has been forwarded to the Honourable William Winegard, Minister for Science, for his information.

Yours sincerely,

Denis Jollette
Special Advisor
Office of the Prime Minister

UPDATE GEMINI - FORMALLY THE NOAO TWIN 8-M OPTICAL/IR PROJECT

When the US House Budget was finally passed in 1990 October, (US) \$4M was included to begin phase B engineering studies and to order glass for the NOAO twin 8-m telescope project. Continued funding to a limit of (US) \$88M now seems assured in the USA to either complete one 8-m telescope on Mauna Kea or to share equally with foreign partners in the cost of two telescopes, with the other being in Chile.

On 1990 December 19 the UK SERC took a firm decision to join with the NSF and Canada in the NOAO twin 8-m option rather than to build a single 8-m telescope with the Spanish on La Palma. Fiscal restraints however, prevent the UK from making any financial contribution for two years. For Canada, I am preparing a detailed proposal begun by Chris Pritchett in collaboration with other astronomers, engineers, industry and administrators which will be submitted in 1991 January to the Federal Government in the expectation that a Cabinet level decision will be taken on our official entry into the project by the Spring. A copy of the proposal will be sent to every member of CASCA.

I took over from Chris Pritchett in 1990 July as Project Scientist, Walter Grundmann (DAO) is the Canadian Project Engineer, and Don Morton has worked tirelessly in support in administrative matters, international negotiations and as a liaison with industry. Under an NRC contract, Jaymie Matthews has provided half-time teaching relief for me and helped enormously in the preparation of the proposal and of a publicity brochure which may also be distributed in January. Jaymie left UBC in December to take up a position as an *attaché de recherche* at the University of Montreal.

Apart from those who contributed to the proposal (and who will be acknowledged therein), the members of the Canadian 8-m Steering Committee are: David Crampton, Eduardo Hardy, Simon Lilly, Tony Moffat, Don Morton, Chris Pritchett, Derrick Salmon, Gordon Walker, Doug Welch. We shall have our next meeting at UBC on 4/5 January 1991. René Racine and I are the two Canadian members on the international Scientific Advisory Committee. The latter met in Oxford at the end of November to begin drawing up the scientific requirements for the telescopes which will form the background to the phase B studies.

NOAO has already advertised for a Project Manager and an appointment is likely to be made in January. The Project Office will be established in Tucson to house a 'Tiger Team' with a complement of some twenty engineers at any one time to study all crucial aspects of the telescope and enclosure construction as well as the mir-

ror technology. Canada, through HIA, has already let, or is in the process of letting, a number of study contracts in anticipation of this work. Further, Rick Murowinski and Allen Moore of DAO have begun liaison visits to Tucson which in the case of Allen will become stays of several months while he becomes involved with tests of the WIYN 3.5-m borosilicate mirror. At any one time Canada expects to provide some five engineers for the Tucson Project Office who will either be members of HIA or under contract to NRC. I am also preparing a submission to NSERC for a Cooperative Special Project Grant to partially support the engineering and scientific efforts.

There have been considerable engineering and scientific studies in the UK and a series of meetings took place during the summer between the three potential partners. In August the Project Scientists met at DAO while the Negotiating Committee met in Washington. The Steering Committee met in Washington in October and there was a final session of the Negotiating Committee in Montreal in early November followed by the first Scientific Advisory meeting in Oxford. The latter will probably meet again in conjunction with a Steering Committee meeting in Tucson at the end of January. One clear outcome of these meetings is the degree to which the industrial capabilities of each of the three partners nicely complements their expected share in the project.

The original four volume proposal from NOAO is available to most CASCA members either through their nearest Steering Committee member or in their departmental reading room. In order to raise visibility we felt that a proper name would help and, in Canada, we have accepted 'Gemini', whether it will be assumed by the other partners remains to be seen. In Gemini, the partners will build two identical optical/infrared telescopes of 8-m diameter: one on Mauna Kea by 1998, the other on Cerro Pachon by 2000 with a USA:Canada:UK 2:1:1 share in capital/operation costs and observing time. Currently the plan is for the Joint Astronomy Center to operate the Mauna Kea telescope and NOAO that on Cerro Pachon each with a staff supplemented by some thirty people. The overall Headquarters would be in Canada.

Apart from offering full-sky coverage, the telescopes and enclosures will be engineered to maintain the best potential seeing at both sites equivalent to almost diffraction limited performance at 3 microns (0.1 arcsec fwhm) with a goal of no more than 4% for telescope emissivity. These are stringent specs! Our partners seem persuaded by the CFHT experience to adopt a height of about 20-m above the ground for the primary and an active mirror support will be essential. Thermal control of the primary

to a fraction of a degree has yet to be solved but water tunnel tests carried out at the University of Washington on a variety of enclosure models may help to establish the best enclosure design. The low emissivity required for the infrared poses engineering problems for the stowage and deployment of the optical baffle and tertiary mirrors.

Paramount is the choice of the mirror blank; NOAO naturally favours the stiffer, lighter, honeycombed borosilicate blanks which Roger Angel expects to produce. The tests on the WIYN mirror may help to answer some questions and the ability to cast and clean up the 6.5-m MMT blank later this year will be crucial. To remain on schedule with a borosilicate mirror, orders for glass would have to be placed later this year, possibly before some questions can be answered. Schott will be able to supply miniscus blanks of low-expansion material but we would be behind others including some of the ESO VLT blanks in the queue. An intriguing alternative is Aluminum. 8-m miniscus blanks will be produced in Europe and when Kanigen coated they can be polished like glass. Not only the choice of blank but the test and polishing procedures are basic questions for the Tiger Team.

It is clear that $f/1.8$ is as fast as one can make the primary without serious optical difficulties. The $f/7$, 40 arcmin diameter field is considered necessary for useful

multi-object spectroscopy and while an atmospheric dispersion compensator will be necessary, the image specification will be relaxed to 0.25 arcsec for this field. At the SAC meeting serious consideration was given to the possibility of only two secondaries, $f/7$ and an overcoated silver $f/15$ for both the infrared and high resolution optical observations. This could greatly improve the versatility of the telescopes and allow one to respond rapidly to changing conditions. To achieve full wavelength coverage from 0.3 to 30 microns, the possibility of feeding spectrographs at the Nasmyth focus with UV fibres from the $f/7$ focus will be explored.

This is the last opportunity for scientific input to the telescope and instrumentation specifications. Several small working groups have been set up: high resolution spectroscopy, direct imaging, multi-object and wide-field spectroscopy, adaptive optics, infrared imaging and spectroscopy, telescope optics. If you have a feeling for critical performance specifications which should be met by the Gemini telescopes, please let me know, preferably by bitnet to GAHW@UBCMTSG.

If you feel strongly about the project you should talk it up among academic and other influential colleagues once you receive your copy of the proposal.

GORDON WALKER (1991 January 1)

THE PETRIE PRIZE LECTURE

The Petrie Lecture is an invited discourse by an outstanding astrophysicist which is held at Annual Meetings of the Canadian Astronomical Society in alternate (currently odd-numbered) years. The Lecture is in memory of the significant contributions to astrophysical research by the late Robert M. Petrie.

To assist the Board of Directors in their choice for the 1991 Lecture, suggestions from the community are being solicited. Please address these through the Awards

Committee* before February 15, 1991.

* Dr. C.C. Dyer, Chairman
CASCA Awards Committee
c/o Scarborough College, University of Toronto
1265 Military Trail
Scarborough, Ontario M1C 1A4

THE PLASKETT MEDAL

The Royal Astronomical Society of Canada and the Canadian Astronomical Society have established an award entitled The Plaskett Medal, in recognition of the pivotal role played by John Stanley Plaskett in the establishment of astrophysical research in Canada. The award, consisting of a gold medal, is to be made annually to the graduate from a Canadian university who is judged to have submitted the most outstanding Doctoral Thesis in astronomy or astrophysics in the preceding two calendar years.

A candidate should be nominated by the head of his/her astronomy/physics department from among the

graduates of that university. The department head should submit a letter of recommendation and four copies of the nominee's thesis to the Awards Committee*, prior to February 15, 1991.

Note that the phrase "in the two preceding calendar years" in the eligibility rules makes it possible to re-nominate a candidate for whom an unsuccessful nomination was made in the preceding year. Because none of the documentation of previous nominations is retained for the use of the current selection committee, all re-nominations should be submitted with full documentation.

MEDAILLE PLASKETT

La Société Royale d'Astronomie du Canada et la Société Canadienne d'Astronomie ont créé un prix, nommé médaille Plaskett, en reconnaissance du rôle important qu'a joué John Stanley Plaskett dans l'établissement de la recherche en astrophysique au Canada. Le prix, qui consiste en une médaille d'or, est offert chaque année à un(e) diplômé(e) d'une université canadienne qui, d'après l'opinion du jury, a soumis la meilleur thèse de doctorat en astronomie ou astrophysique durant les deux dernières années.

Un(e) seul(e) candidat(e) par département peut être proposé(e) par le directeur du département. Le directeur doit transmettre une lettre de recommandation et quatre copies de la thèse du/de la candidat(e) choisi(e) au comité des prix* et ce, avant le 15 février 1991 pour que le/la candidat(e) soit considéré(e) pour le prix de 1991.

S.V.P. notez que l'expression "les deux dernières années" spécifiée dans les règlements d'éligibilité, permet de proposer pour une deuxième fois un(e) candidat(e) qui n'a pas été retenu(e) l'année précédente. Cependant il faut soumettre de nouveau les documents nécessaires à l'évaluation car les membres du jury changent d'une année à l'autre.

* Dr. C.C. Dyer, Chairman
CASCA Awards Committee
c/o Scarborough College, University of Toronto
1265 Military Trail
Scarborough, Ontario M1C 1A4

NOMINATION FOR IAU MEMBERSHIP/INVITED PARTICIPANT

Final Announcement, Deadline is Imminent

Through this notice, nominations are solicited of Canadian astronomers for membership in the IAU, or for invited participant status at the forthcoming IAU General Assembly in Buenos Aires, Argentina. If you (or anyone of whom you are aware) are interested in IAU membership or invited participant status, and are qualified, please arrange to have the nomination form provided in the last issue of *Cassiopeia* filled out and returned to me. The normal qualifications for membership are: (1) Canadian citizenship or Landed Immigrant status, (2) current employment in Canada, (3) a Ph.D. received prior to July 23, 1988, or demonstrable equivalent research experience, and (4) active involvement in astronomy. An application for membership should be submitted by a current Canadian IAU member. Persons nominated by the Associate Committee on Astronomy, currently serving as the IAU National Committee, will be automatically invited to attend the 21st General Assembly.

Names are also solicited of persons to be invited to attend the 1991 General Assembly because they can make a valuable contribution to it (*e.g.*, invited papers or reports or discussions on particular subjects at commission meetings, colloquia, or symposia). Invited Participants are normally representatives of other international

or national organizations, "young" astronomers (potential members of the IAU), or distinguished scientists who are active in other fields having direct impact on astronomy. An IAU member should nominate a prospective invitee, describe the expected contribution, and provide any supporting documents (*e.g.*, a letter of invitation from a Commission President).

The IAU also wishes to know of any members who wish to resign from the Union for any reason (*e.g.*, age, change of sphere of activity, *etc.*) If, by any chance, you fall into this category, please notify me. Resignation is entirely voluntary, though, in view of the costs involved in sustaining a membership, it is encouraged in those instances where IAU membership is no longer desired.

Finally, IAU members who wish to join a specific commission should write to the Chairman of that commission to apply for membership.

All nominations must be received no later than Tuesday, January 15, 1991 in order to meet the deadlines set by the General Secretary of the IAU.

Dr. A.F.J. Moffat
Département de Physique
C.P. 6128, Succ. A
Montréal, PQ H3C 3J7

CHANGES TO 1990/91 CASCA MEMBERSHIP DIRECTORY

Address Changes:

BOIVIN, ALBERIC

834 EYMARD
QUEBEC, PQ
G1S 4A1

COTE, STEPHANIE

MOUNT STROMLO OBS
PRIVATE BAG
P. O. WESTON CREEK POST OFFICE
AUSTRALIA

HUA, XIN-MIN

SPACE ASTROPHYSICS LAB/ISTS
2700 STEELE AVE. W.
CONCORD, ONTARIO
L4K 3C8
(416-665-5445)
e-mail "minhua@nereid.sal.ists.ca"

KINGSBURGH ROBIN I., (S)

DEPT. OF PHYSICS AND ASTRONOMY
UNIVERSITY COLLEGE LONDON
GOWER STREET
LONDON, WC1E 6BT
UNITED KINGDOM (071-387-7050x349)
e-mail "SRLK@UK.AC.UCL.STARS"

LILLY, SIMON J.

DEPARTMENT OF ASTRONOMY
UNIVERSITY OF TORONTO
60 ST. GEORGE STREET
TORONTO, ON
M5S 1A7
(416-978-5186)

MARTEL, HUGO

UNIVERSITE DE MONTREAL
C.P. 6128, SUCC. A
MONTREAL, PQ, H3C 3J7

NOREAU, LOUIS

1312 RUE ROLLAND
VERDUN, PQ
H4H 2G6

QUASHNOCK, JEAN M.

DEPARTMENT OF ASTROPHYSICS
UNIVERSITY OF CHICAGO
5640 S. ELLIS AVE.
CHICAGO, IL 60615
U.S.A., (312-702-0598)
e-mail "jmq@oddjob.uchicago.edu"

ST.-LOUIS, NICOLE (S)

DEPARTEMENT DE PHYSIQUE
UNIVERSITE DE MONTREAL
C.P. 6128, SUCC. A.
MONTREAL, PQ
H3C 3J7

Telephone, e-mail changes:

ARCORAGI, JEAN-PIERRE

(514-343-6111 X1088)
e-mail "arcoragi@cc.umontreal.ca"

BEAUDET, GILLES

(514-343-6674)

BASTIEN, PIERRE

e-mail "bastien@cc.umontreal.ca"

CARIGNAN, CLAUDE

(514-343-6128)
e-mail "carignan@cc.umontreal.ca"

DE ROBERTIS, MICHAEL M.

(416-736-2100 x 77761)

DEMERS, SERGE

(514-343-2364)
e-mail "demers@cc.umontreal.ca"

FICH, MICHEL

e-mail "fich@astro.uwaterloo.ca"

FONTAINE, GILLES

e-mail "fontaine@cc.umontreal.ca"

HARRIS, GRETCHEN L.H.

e-mail "gharris@astro.waterloo.edu"

LAMONTAGNE, ROBERT

(514-343-6111 x 3195)
e-mail "lamontag@cc.umontreal.ca"

MICHAUD, GEORGES

e-mail "michaudg@cc.umontreal.ca"

MOFFAT, A.F.J.

e-mail "moffat@cc.umontreal.ca"

MUCHMORE, DAVID

(514-343-6111 x 3197)
e-mail "muchmore@cc.umontreal.ca"

NADEAU, D.

e-mail "dnadeau@cc.umontreal.ca"

PINEAULT, SERGE

(418-656-3901)
Bitnet "1150002@lavalux1"

RACINE, R.

e-mail "racine@cc.umontreal.ca"

RUSK, RAYMOND E.

(604-363-5048), FAX (604-363-2856)
Bitnet "RUSK@NRCD" Cdnnet "Rusk@dao.nrc.ca"

TREMAINE, SCOTT D.

(416-978-6477), FAX (416-978-3921)
e-mail "tremaine@cita.utoronto.ca"

WESEMAEL, F.

e-mail "wesemael@cc.umontreal.ca"

The following student members at the University of Montreal have their phone numbers changed to (514-343-6111x3219): Asselin, L., Beauchamp, A., Bedard, J., Bonnell, I., Brassard, P., Chayer, P., Grandchamps, A., Grondin, L., LeBlanc, F., Martimbeau, N., Rivard, M., Robert, C., Turbide, L., Turcotte, S., Van de Rydt, F.

The FAX number for the Department of Physics, University of Montreal is 514-343-2071.

See Page 5 of *Cassiopeia* for changes in the telephone numbers at DAO.

N.R.BROTEN

CANADIAN ASTRONOMY PUBLICATIONS

September 8 to December 4, 1990

If you have a preprint or other Canadian publication, we would like to include it in this list. Please send a copy (or a photocopy of the title page) to:

Canadian Astronomy Publications List
Astronomy Library
University of Toronto
Room 1306
60 St. George Street
Toronto, Ontario
M5S 1A7

PREPRINTS OF RESEARCH PAPERS

The following is a list of preprints written by Canadian astronomers and received at the Astronomy library within the dates given above. The preprints are arranged in alphabetical order according to the surname of the first listed author. Originating institution and date of receipt at the library are given.

- Annual report of the Dominion Astrophysical Observatory for the period 1 April 1989 - 31 March 1990.* Dominion Astrophysical Observatory, 18-Sep-1990
- Anderson, M.D., Landecker, T.L., Routledge, D., Vaneldik, J.F., *The far sidelobes and noise temperature of a small paraboloidal antenna used for radio astronomy.* Dominion Radio Astrophysical Observatory, 30-Nov-1990.
- Belley, J., Roy, J.-R., *The abundance gradients across the spiral galaxies NGC 628 and NGC 6946.* Université Laval, 10-Oct-1990.
- Bond, J.R., et al, *Cosmic structure constraints from a one degree microwave background anisotropy experiment.* Canadian Institute for Theoretical Astrophysics, 5-Oct-1990.
- Bryan, G.L., Kwok, S., *Energy distribution of symbiotic novae.* University of Calgary, 3-Dec-1990.
- Canto, J., Raga, A.C., *Mixing layers in stellar outflows.* Canadian Institute for Theoretical Astrophysics, 24-Oct-1990.
- Clement, C.M., Kinman, T.D., Suntzeff, N.B., *Two double-mode RR Lyrae stars in the field.* David Dunlap Observatory, University of Toronto, 6-Nov-1990.
- Clement, C.M., Walker, I.R., *A search for double-mode RR Lyrae stars in the globular clusters M80, M9, and NGC 2298.* David Dunlap Observatory, University of Toronto, 6-Nov-1990.
- Davidge, T.J., Le Fevre, O., Clark, C.C., *Multicolor CCD imaging of supergiants in the disk of NGC 253.* Canada-France-Hawaii Telescope, 4-Oct-1990.
- Dewdney, P.E., Roger, R.S., Purton, C.R., McCutcheon, W.H., *IRAS 23545+6508, a dissociating star: prototype for a new observational class?* Dominion Radio Astrophysical Observatory, 12-Oct-1990.
- Drinkwater, M., Hardy, E., *Extreme blue compact dwarf galaxies in the Virgo cluster.* Université Laval, Obs. Mont Megantic, 1-Oct-1990.
- Dubinski, J., Carlberg, R.G., *The structure of cold dark matter halos.* David Dunlap Observatory, University of Toronto, 23-Nov-1990.
- Ellingson, E., Yee, H.K.C., Green, R.F., *Quasars and AGN in rich environments II. The evolution of radio-loud quasars.* Dominion Astrophysical Observatory, 19-Nov-1990.
- Evans, Nancy, *Classical cepheid luminosities from binary companions.* Institute for Space and Terrestrial Sciences, York University, York University, 12-Sep-1990.
- Feldman, H.A., Kamenshchik, A.Y., *Decoherence properties of scalar field perturbations.* Canadian Institute for Theoretical Astrophysics, 5-Oct-1990.
- Fich, M., Tremaine, S., *The mass of the galaxy.* Canadian Institute for Theoretical Astrophysics, 30-Oct-1990.
- Friel, E.D., Janes, K.A., *Metallicities and kinematics of old open clusters.* Dominion Astrophysical Observatory, 23-Oct-1990.
- Gomez de Castro, Ana I., Pudritz, Ralph E., *Global properties of star formation in Taurus.* McMaster University, 10-Sep-1990.
- Gray, D.F., *Rotation of evolved stars.* University of Western Ontario, 22-Nov-1990.

- Hesser, J.E., Briley, M.M., Bell, R.A., *C and N abundances from spectroscopy of 47 Tuc main-sequence stars*. Dominion Astrophysical Observatory, 23-Oct-1990.
- Hrivnak, B.J., Kwok, S., *On the possible bipolar nature of 21 μ m IRAS sources*. University of Calgary, 3-Dec-1990.
- Hrivnak, B.J., Kwok, S., *The carbon rich proto-planetary nebula IRAS 22272+5435*. University of Calgary, 3-Dec-1990.
- Hube, D.P., Aikman, G.C.L., *3 Vulpeculae: a non-radial pulsator in a one-year binary system*. Dominion Astrophysical Observatory, 19-Nov-1990.
- Hutchings, J.B., Cowley, A.P., *Binary X-ray sources in the LMC*. Dominion Astrophysical Observatory, 18-Sep-1990.
- Hutchings, J.B., Neff, S.G., *Evolution of luminous IRAS sources: CCD imaging*. Dominion Astrophysical Observatory, 19-Nov-1990.
- Hutchings, J.B., Neff, S.G., *0.4 arcsec images of 3C 273*. Dominion Astrophysical Observatory, 19-Nov-1990.
- Hutchings, J.B., Durand, D., Pazder, J., *Quasars in radio source catalogues*. Dominion Astrophysical Observatory, 19-Nov-1990.
- Kaiser, N., Peacock, J.A., *Power spectrum analysis of one dimensional redshift surveys*. Canadian Institute for Theoretical Astrophysics, 5-Oct-1990.
- Kuijken, K., *The Milky Way: lop-sided or barred?*. Canadian Institute for Theoretical Astrophysics, 23-Oct-1990.
- Kuijken, K., *Further limits on disk-like dark matter from K dwarf kinematics*. Canadian Institute for Theoretical Astrophysics, 23-Oct-1990.
- Kuijken, K., Gilmore, G., *The galactic disk surface mass density and the galactic force K_z at $z=1.1$ kpc*. Canadian Institute for Theoretical Astrophysics, 4-Dec-1990.
- Kuijken, K., *Galactic disk warps*. Canadian Institute for Theoretical Astrophysics, 4-Dec-1990.
- Landecker, T.L., Anderson, M.D., Routledge, D., Smegal, R.J., Trikha, P., Vaneldik, J.F., *Ground radiation scattered from feed support struts: a significant source of noise in paraboloidal antennas*. Dominion Radio Astrophysical Observatory, 30-Nov-1990.
- Leahy, D.A., *Deprojection of emission in axially symmetric transparent systems*. University of Calgary, 28-Nov-1990.
- Leahy, D.A., Roger, R.S., *Radio emission from the supernova remnant G160.9+2.6 (HB9)*. University of Calgary, 28-Nov-1990.
- Leahy, D.A., Nousek, J., Hamilton, A.J.S., *HEAO-1 A2 LED X-ray spectra of the Lupus Loop and SN1006*. University of Calgary, 28-Nov-1990.
- Leahy, D.A., *Modelling observed x-ray pulsar profiles*. University of Calgary, 28-Nov-1990.
- Leonard, P.J.T., Fahlman, G.G., *On the origin of the blue stragglers in the globular cluster NGC 5053*. University of British Columbia, 27-Nov-1990.
- Likkel, L., et al, *CO observations of cold IRAS objects: AGB and post-AGB stars*. Herzberg Institute of Astrophysics, 25-Sep-1990.
- Madore, B.F., Freedman, W.L., *The reddening to the galaxy IC 342 from CCD BV photometry of its brightest stars*. IRAS, 20-Nov-1990.
- Madore, B.F., Freedman, W.L., *The period-luminosity relation and the cepheid distance scale*. IRAS, 20-Nov-1990.
- Mateo, M., Nemec, J., Irwin, M., McMahon, R., *Deep CCD photometry of the Sextans dwarf spheroidal galaxy*. University of British Columbia, 11-Oct-1990.
- Matthews, J.M., *Stellar seismology and the pulsating Ap stars*. University of British Columbia, 11-Oct-1990.
- Milone, E.F., Stagg, C.R., Kurucz, R.L., *The eclipsing binary AI Phoenicis: new results based on an improved light curve analysis program*. University of Calgary, 29-Oct-1990.
- Mitchell, G.F., Maillard, J.-P., Hasegawa, T.I., *A new class of outflow from high mass protostars*. Canada-France-Hawaii Telescope, 4-Oct-1990.
- Neff, S.G., Hutchings, J.B., *Evolution of radio quasars from redshift 0.6 to 3.7*. Dominion Astrophysical Observatory, 18-Sep-1990.
- Pudritz, Ralph E., Gomez de Castro, Ana I., *Wave dynamics and star formation in Taurus*. McMaster University, 10-Sep-1990.
- Ratnatunga, K.U., Yoss, K.M., *Metallicity and velocity distribution of giants towards the galactic poles*. Dominion Astrophysical Observatory, 23-Oct-1990.
- Richer, H.B., Fahlman, G.G., *CCD detectors applied to globular cluster research*. University of British Columbia, 11-Oct-1990.
- Rouleau, F., Martin, P.G., *Shape and clustering effects on the optical properties of amorphous carbon*. Canadian Institute for Theoretical Astrophysics, 12-Nov-1990.
- Roy, J.-R., Wang, J., Arsenaault, R., *Is NGC 4631 a barred spiral galaxy?*. Université Laval, 10-Oct-1990.

- Rucinski, S.M., *The radio light curve of FK Comae at 3.6 cm.*. Institute for Space and Terrestrial Sciences, York University, York University, 29-Oct-1990.
- Ryden, B.S., *Compression of dark halos by baryon infall: self-similar solutions.* Canadian Institute for Theoretical Astrophysics, 18-Oct-1990.
- Stetson, P.B., *On deriving globular-cluster luminosity functions from CCD observations, with a particular application to the main-sequence turnoff/subgiant branch in metal-poor clusters.* Dominion Astrophysical Observatory, 18-Sep-1990.
- Turner, D.G., *Observational confirmation of mass segregation in the dynamically well-evolved open cluster Roslund 3.* Saint Mary's University, 19-Sep-1990.
- Turner, D.G., *Transformations between Stromgren and UBV colors for early-type stars.* Saint Mary's University, 19-Sep-1990.
- van den Bergh, S., *The frequency of SNIa in galaxies of differing Hubble type.* Dominion Astrophysical Observatory, 18-Sep-1990.
- van den Bergh, S., *Star clusters in the Clouds of Magellan.* Dominion Astrophysical Observatory, 18-Sep-1990.
- van den Bergh, S., *Supernova rates: a progress report.* Dominion Astrophysical Observatory, 23-Oct-1990.
- van den Bergh, S., *Supernova rates, galaxy emission and Hubble type.* Dominion Astrophysical Observatory, 19-Nov-1990.
- Veilleux, S., *The line-emitting regions of the exceptional Seyfert galaxy Mrk 359.* Lick Obs., 21-Nov-1990.
- Wehlau, A., *Variable stars in globular clusters and related systems.* University of Western Ontario, 14-Sep-1990.
- Wehlau, Amelia, Butterworth, Steven, *Two-color photographic photometry of variables in the globular cluster M28.* University of Western Ontario, 14-Sep-1990.
- West, M.J., Van den Berg, S., *The correlation function of cD clusters.* Canadian Institute for Theoretical Astrophysics, 3-Oct-1990.
- Wietfeldt, R.D., Frail, D.A., *Burst mode VLBI and pulsar applications.* NRAO, 20-Nov-1990.

PETER MACKENZIE MILLMAN, 1906-1990

One of Canada's most distinguished astronomers, Dr. Peter M. Millman, Researcher Emeritus at the National Research Council, Ottawa, died December 11, 1990 at the age of 84. As the first Secretary of the Canadian Astronomical Society, 1971-77, Peter Millman made a fine contribution to the society which soon grew into CASCA. Long known for his great physical vigour, as Canada's second oldest astronomer still working, in the last couple of years his activities were affected by pulmonary fibrosis which culminated in his death in Ottawa.

Peter Millman was born in Toronto on August 10, 1906, the oldest of four sons of the Rev. Robert R. Millman, D.D. and his wife Edith Middleton. He grew up in Japan, where his father was a missionary, attended school there, and always preserved a great fondness for that country. In his youth there he became a member of the Royal Astronomical Society of Canada, the start of a lifelong interest in that society. His education in Canada began when he entered the Math and Physics course of the University of Toronto in 1925. During his undergraduate years he spent two summers as assistant at the Dominion Astrophysical Observatory. There the beneficial interest and scientific training given him by the late Dr. J. A. Pearce was so noteworthy that ever after Peter referred to him as "my astronomical Godfather".

In 1929 Millman received his B.A. and became one of a group of notable astronomers who have been awarded the

gold medal of the R.A.S.C. For his post-graduate work, under the influence of Dr. C.A. Chant, whom he greatly admired, Millman chose Harvard University. I was in my fourth year as a graduate student at the Harvard College Observatory when Millman arrived there in September, 1929. My fiancé, Frank Scott Hogg, had three months earlier been awarded the first Ph.D. in Astronomy ever given by Harvard University, and was headed for Europe on a Harvard travelling fellowship. With his thesis on meteor spectra, Millman began the study of meteors which continued throughout his life after he received the doctorate in 1932. Before graduating, however, he had a brief illness in the Harvard Infirmary during which he met Nurse Margaret Gray from Nova Scotia and realized immediately that he wanted her to share his life. They were married on July 10, 1931 and enjoyed 59 fine years of life together.

In 1933 Millman joined the staff of the Department of Astronomy of the University of Toronto as demonstrator when Dr. Chant was preparing for the new David Dunlap Observatory. For many years Millman was the earliest surviving appointee to this staff.

Millman remained at the University of Toronto until his enlistment in the Royal Canadian Air Force in 1941 for World War II. In 1939 he started the weekly astronomy column in the Toronto Daily Star and turned it over to Frank Hogg when he went on active duty as Navigational

and Operational Research Officer. The column celebrated 50 consecutive years in May, 1990, and the photograph accompanying this article was taken for the occasion.

In 1945, after the war, Millman joined the staff of the Dominion Observatory, Ottawa, as Astrophysicist, moving to the Reserve the following year with the rank of Squadron Leader. He became Chief of the Stellar Physics Division in 1951, continuing until 1955 when he joined the National Research Section of its Radio and Electrical Engineering Division. From 1955 to 1975 he was an Associate of the Harvard College Observatory.

His enormous zeal for research originality, meticulous attention to accuracy in details, and outpouring of high quality scientific papers won him a series of great distinctions for his meteor work.

He had an impressive list of about 150 publications on many diverse subjects of meteors and the upper atmosphere, in addition to many issues of Meteor News in the Journal of the R.A.S.C. and book reviews. He had more than a dozen well-known collaborators in several dozen of his papers.

In 1954 he was awarded the prestigious J. Lawrence Smith Medal of The National Academy of Sciences, Washington, D.C., (still the only Canadian recipient), and in 1980 the Gold Medal from the Presidium, Academy of Sciences, Prague, Czechoslovakia for his merit in advancing of physical sciences. (He also

did noteworthy mountain climbing in Czechoslovakia). Other medals were Canada's Centennial in 1967, and the Queen's Jubilee in 1977.

Peter Millman made a notable contribution to 20th century astronomy in his support of many societies. He became President of several - the Royal Astronomical Society of Canada in 1960-62 (Honorary President 1981-85); President of IAU Commission 22, 1964-67; President of the Meteoritical Society 1962-1966. He was Counsellor of the Smithsonian Institution, Washington, D.C. 1966-1972, of the American Astronomical Society 1947-1950; President of the Working Group for Planetary Systems Nomenclature 1973-1982. In addition he was a member of many other societies including the Canadian Association of Physicists, the Canadian Astronautics and Space Institute and the A.A.V.S.O.

Millman was a born collector. Among other hobbies he had a fine collection of postage stamps, and of photographs made with his expert talent on his many travels. Some of the CASCA members will remember his beautiful Christmas cards.

Peter Millman will be greatly missed, not only by his family and friends, but by many members of the astronomical community.

HELEN SAWYER HOGG
DAVID DUNLAP OBSERVATORY
January 11, 1990



Peter M. Millman, 1906-1990
photo: Terence Dickinson

C.A.S. BOARD OF DIRECTORS

President
First Vice-President
Second Vice-President
Secretary
Treasurer
Directors

S. van den Bergh, D.A.O.
L. Higgs, D.R.A.O.
W. Harris, McMaster U.
N. Broten, H.I.A.
C. Clement, U. of Toronto
D. Crampton, D.A.O.
C. Dyer, U. of Toronto
R. Taylor, U. of Calgary
G. Michaud, U. de Montréal

vandenberg@nrcdao.nrc.ca
lah@drao.nrc.ca
1013967@mcmaster.bitnet
broten@hiaras.nrc.ca
cclement@vela.astro.utoronto.ca
crampton@nrcdao.nrc.ca
dyer@manitou.astro.utoronto.ca
artaylor@uncamult.bitnet
3808@cc.umontreal.ca

Past President

C.A.S. COMMITTEE CHAIRMEN

Awards
Education
Heritage
Optical and Infrared Astronomy
Radio Astronomy
Small Grants
Space Astronomy
Theoretical Astrophysics
1991 Nominating

C. Dyer, U. of Toronto
R. Bochonko, U. of Manitoba

D. Crampton, D.A.O.
L. Avery, H.I.A.
C. Purton, D.R.A.O.
G. Fahlman, U.B.C.
C. Dyer, U. of Toronto
G. Michaud, U. de Montréal

dyer@manitou.astro.utoronto.ca
bochonk@ccm.umanitoba.ca

crampton@nrcdao.nrc.ca
lorne@hiaras.nrc.ca
crp@drao.nrc.ca
usergrgf@ubcmtsg.bitnet
dyer@manitou.astro.utoronto.ca
3808@cc.umontreal.ca

Cassiopeia Editor: J.D. Fernie
Assistant Editor: Brian Beattie
E-Mail: fernie@centaur.astro.utoronto.ca
beattie@centaur.astro.utoronto.ca

DEADLINES FOR THE VERNAL EQUINOX ISSUE:
E-MAIL: MARCH 12 OTHER: MARCH 5

CASSIOPEIA

Canadian Astronomical Society
Société Canadienne d'Astronomie
c/o David Dunlap Observatory
P.O. Box 360
Richmond Hill, Ontario
L4C 4Y6

ALAN H. BATTEN
DOMINION ASTROPHYSICAL OBSERVATORY
5071 WEST SAANICH ROAD
VICTORIA, BC
V8X4M6



Printed on Recycled Paper