

NOVA



BI-MONTHLY JOURNAL OF THE HALIFAX CENTRE

STARS



"AMATEUR". The French coined the term to denote a connoisseur of the polite arts, someone who selflessly pursued a private and intellectually enlightening hobby.

1977
VOL 8
NO 4
JULY-AUG

1977 Halifax Centre Executive

Honorary President: Rev. M.W. Burke-Gaffney

President: Dr. David L. DuPuy, Dept. of Astronomy
Saint Mary's Univ., Halifax

Vice-Pres.: Dr. Larry Bogan, PO Box 153 Wolfville

Secretary: Dr. Peter Reynolds, Dept of Physics,
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Treasurer: Alan Bent, Apt. 712, 1030 South Park St.
Halifax

Centre Rep.: Dr. Roy Bishop, Dept. of Physics,
Dalhousie Univ., Halifax

Observing
Chairman: Mike Edwards, 8 Sullivan's Hill,
Bedford

Librarian: Diane Brooks, 71 Woodlawn Rd., Dartmouth

Editor: Randall Brooks, Dept. of Astronomy,
Saint Mary's Univ., Halifax

UP COMING MEETINGS:

Friday 15 July, 8:00 pm at the Nova Scotia Museum,
Summer St. Halifax

Dr. Roy L. Bishop An Eighteenth Century Nova Scotia
Observatory

Under the granite backbone and forests of central Nova Scotia, an observatory was erected in the year 1765. Initially it was used as a station for the checking and calibration of surveying instruments; however, in 1767 and again in 1769 it was equipped with some of the best astronomical instruments from Dollonds of London. Conceived by one of the most remarkable and capable individuals of the eighteenth century, and eventually but reluctantly paid for by the British Admiralty, this building merits consideration as possibly the earliest, optically equipped, astronomical observatory in the Western Hemisphere.

22, 23 and 24 July: Observing Weekend at Blomidon Provincial Park, Kings Co. This camping trip will include observing, hiking, etc. (ie whatever interests you) and for those who want to attend but do not wish to camp, there are motels within a short driving distance. Those planning to attend should call Mike Edwards (835-3615) or Randall Brooks(434-7274). There are a few members who might like transportation to the site so if you can help here, please let us know.

20 August (Saturday): Picnic at Crystal Crescent Beach. To get to the beach go to Sambro where the road meets in a 'T', turn right and follow the signs. The picnic starts anytime you want to arrive (officially about mid-afternoon). Bring your ball and bat, frizbee, kite or what ever. But don't forget your telescope for the observing party! More details later.

SOCIETIES'S SHOW WIND-UP

I would like to take this opportunity to thank the people who helped out in the setting up and running of the show this year. They include Bill Calnen, Doug Forbes, Glen Graham, Brian Guest, Guy Harrison, Jody LeBlanc, Peter Steffin and Walter Zukauskas. In addition Roy Bishop, Glen Johnson, Lamont Larkin and Colin Calnan supplied articles for display. I wish to especially thank Mike Edwards for taking a good deal of the responsibility for the planning for the show as my co-coordinator. We hope you were able to attend and saw the efforts of our members. The morning in the Museum's Project room was reasonably successful and the observing meeting was well attended, and, with the bright fireball which graced the late evening skies, an unqualified success. Last year over 19,000 people went through the Museum during the three weeks of the Show and I expect that number was exceeded this time. Tentatively the next show will be in 2 years (1979). Again hearty thanks to all who helped out!

BK

NEW LIBRARY HOLDINGS

Since the list was published in the last issue of Nova Notes, we have had a number of books donated to the Centre. I would like to extend our appreciation to Larry Bogan and Walter Zukauskas for their contributions and I am sure they will be pleased to see them used by you. Amateur Telescope Making (Bk 1) and the booklet on the MacLaughlin Planetarium have been returned to the locker as well. The new books are:

Exploration of the Universe--Abell
 We Are Not Alone--Sullivan
 The Face of the Sun--Newton (H.W. that is)
 From Atomos to Atom--van Melsen
 Fact and Theory in Cosmology--McVittee
 The Unity of the Universe--Sciama
 An Elementary Survey of Celestial Mechanics--Ryabov
 Modern Astronomy--Birney
 Red Giants and White Dwarfs--Jastrow
 An introduction to Astronomy--Hirffer/Trinklein/
 Bunge

Introduction to Astronomy--Baker & Fredrick
 Telescope Making Techniques (a new magazine to which
 the Centre has subscribed--Vol 1, No 1 has arrived)
 Copernicus and the Changing World--Stachiewicz
 Astronomy With an Opera Glass--Serviss/Bridgen
 NASA sounding Rockets--1958-1968
 Planets, Stars and Galaxies--Inglis

In addition, we have now bound (in a manner of speaking) the set of RASC Journals we received when the National Office moved last summer. These are almost complete from 1918 and the early issues are amusing to peruse. You are welcome to borrow these, but we would ask you to handle them with some care as the bindings have not been stitched and would not hold up to constant use. If you have any books you would like to donate to the Centre, please bring them to a meeting or mail them to the Librarian (address on inside front cover). If you would like to borrow any of the volumes listed in our holdings but live outside the Halifax area, please write our librarian and she will attempt to arrange the loan. We have also made application for a grant to purchase new books and hope to have them by early fall.

Minutes of May Meeting

The regular monthly meeting was held on Friday, May 20 at 8:00 p.m. in the Nova Scotia Museum with our President, Dr. DuPuy in the Chair.

First among the announcements was word of the upcoming special meeting with National President, Dr. A. H. Batten, a chance for all members to contribute to and learn about the overall operations of our Society. Dr. DuPuy also announced that a 6" mirror kit had been purchased and called upon members to contribute ideas for the design of the complete telescope.

The main speaker for the evening was Roy Bishop, certainly no stranger to us. His talk entitled A Prelude to Summer Observing, was Part I of a two-part series, the second half to be given by Larry Bogan at the regular June meeting which will be held at Acadia University in Wolfville.

Roy set out to describe the content and arrangement of the Universe. The main element is hydrogen, concentrations of which tend to collapse under gravity to form stars which 'burn' hydrogen and eventually other elements to produce energy which in turn prevents further gravitational collapse. Ultimately, of course, gravity wins out and white dwarfs, neutron stars and perhaps black holes result.

Roy then described a very appropriate 2-dimensional model of the Universe: street lights as stars, head lights as binary stars, the Halifax Container Terminal as a star cluster, flying insects attracted to the lights as planets and perhaps bacteria on the bugs as life. Towns and cities are of course galaxies and clusters of galaxies. Bedford would be the Magellanic Clouds if Halifax-Dartmouth is the

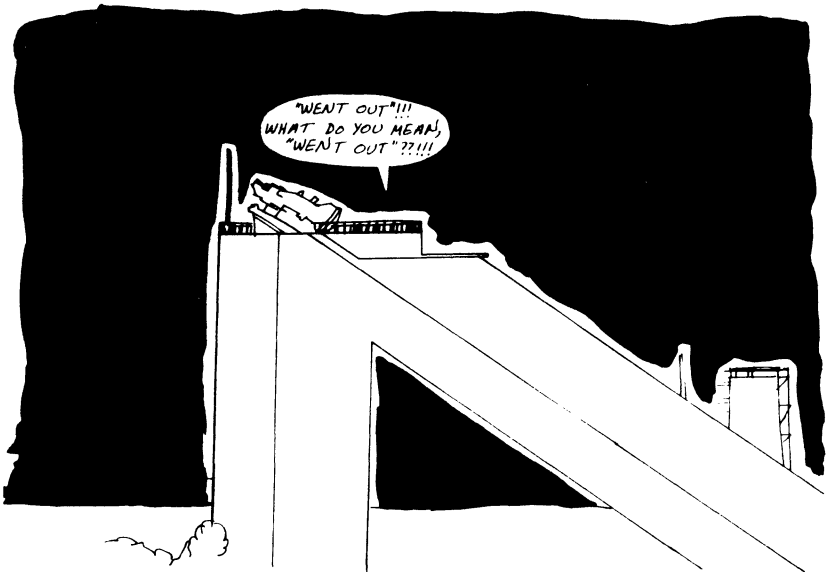
Galaxy and Saint John would represent M31. The cluster of cities along the American eastern seaboard could be the great Virgo Cluster.

It was pointed out that space is really quite empty, galaxies making up only about one-millionth of the whole. Galaxies in turn are empty; if the Sun is a pingpong ball in Halifax, the nearest star would be a similar ball in Ontario!

Roy concluded his talk with a very interesting and complete slide show, the subjects ranging from the Solar System to star clusters, nebulae, constellations and galaxies. His final bit of advice to beginners was to start with star charts and learn the constellations thoroughly before worrying about telescopes.

The Meeting adjourned over coffee about 10:00 p.m.

P. H. Reynolds
Secretary



Special Meeting

with Dr. A. H. Batten, National President

In an attempt to take the real pulse of the Society at the grass roots level, Dr. Batten has taken upon himself the task of visiting each and every Centre at least once during his term as President. Consequently, this special meeting was arranged and was held at St. Mary's University on Wednesday, June 1 at 8:00 p.m. Despite the mid-week date, there was a respectable turnout.

Dr. Batten, introduced by Roy Bishop (who was standing in for David DuPuy), gave a very entertaining talk on the famous Struve family, 7 astronomers (including 4 R.A.S. gold medal winners) spanning 5 generations. I will not try to summarize the talk in this space since it has been submitted to our own RASC Journal. So watch for it there; you will certainly find it fascinating reading.

Following his talk and a brief coffee break, Dr. Batten turned to what was perhaps his main purpose in coming to Halifax, an informal give and take session with members concerning any and every aspect of Society business. He pointed out that the Society was operating on a current account deficit of \$9,000 on the year's operation. However, it does of course have a large amount of capital in the bank, the proceeds from the sale of the old National Office building on College Street in Toronto. Two questions which must be faced in the not too distant future are (i) the future of the National Office, whether to continue renting or to buy and (ii) the future of the Journal, whether or not it meets the needs of members, how its content might be altered, any

added production costs arising out of such alterations, etc.

Dr. Batten was warmly thanked for his talk and also for making the effort to visit the Halifax Centre and giving us an increased awareness of the National Society and its problems.

MINUTES OF THE JUNE MEETING

The June meeting was held in Rm 141 of the Huggins Science Building at Acadia Univ. This marked the first time that the Halifax Centre has ever met outside Halifax. The meeting began with a brief tour of the roof and observing room where students in Acadia's astronomy course have an opportunity to view the skies. Roy Bishop then introduced Larry Bogan, the evening's speaker. Larry continued the second part of the May/June series on practical observing tips and methods. He related much of his talk to objects which will be visible on our trip to Blomidon in July. He attempted to answer the questions what, when and where by first giving a description of how sidereal time is related to solar time and some simple ways of determining it. Once we have the co-ordinate systems worked out in our minds we can begin to ask what we should look for and he projected slides showing the summer constellations. He pointed out his favorite objects (and others noted some of theirs) and demonstrated how to use the bright stars of the sky to locate the objects of interest.

Following the talk, most of the almost 30 persons present, retired to visit Dr. Bishop's observatory, Maktonkus Observatory. Mrs. Bishop had refreshments ready and despite the heavy rain, all had a delightful visit. We all want to thank Mrs. and Dr. Bishop for the invitation and opportunity to visit their home.

By the time you read this, the report of the committee set-up last summer to investigate the Society's finances, will have been presented to the National Council. It is sufficiently important that we devote some space and time on its consideration. The 16 page report is too long to reprint in its entirety so I have chosen only what I consider the most significant points as far as they effect the Halifax Centre and your membership. I will attempt to restrain editorial comment but a few criptic notes may slip in.

THE REPORT: (preamble)

The Royal Astronomical Society of Canada began over a century ago as a small astronomy club in Toronto. (hence the notion they rule by devine right-Ed.). Even at that time, the 'club' attracted members with a diversity of backgrounds, an interest in astronomy being the common denominator. By the early 1900's, the Society included professional astronomers, serious amateurs and other interested laymen. Its reputation grew internationally, especially due to the publication of the Journal and Observer's Handbook. As years passed, the Society developed local centres in many cities. The national council continued to provide leadership, and produced the publications which were so essential in giving the Soc. a common focus. Now, the Society finds itself with a membership of over 2000, scattered clear across Canada (and elsewhere), comprising professional astronomers and elementary school students, anglophones and franco-phones, active observers and armchair astronomers, beginners and 50-year veterans. This diversity is both the greatest asset and the greatest problem in our society. AS long as our members accept this situation as a reality and a challenge, the Society will prosper. As soon as our members sink into acrimonious debate between one faction and another, the Society will gradually crumble.

Consider first the amateurs and professionals. Professional advice and encouragement are desirable if not essential to the amateur. In turn, the help of the amateur is invaluable in many aspects of astronomical

research and education. Astronomy is unique in the extent to which amateurs and professional can collaborate. Many amateurs regard professionals as intruders in our society; many professionals regard amateurs as a nuisance. These attitudes must be overcome. This is especially true since the formation of the Canadian Astronomical Society (in retrospect, an illconceived idea—Ed.) and the Planetarium Association of Canada. Whereas in past years, our Society provided a focus for many aspects of astronomy in Canada, the astronomical community is in danger of fragmentation. We must identify our role in the astronomical community, and we must enlist the aid of the CAS and PAC and of their members, and we must carry out our role with clear direction.

Consider next the geographical problem. This is best realized by noting how effectively the British Astronomical Association functions (in a country of 50 million, the size of southern Ontario), and by noting the problems of travel and communication, for a small society in a large country, are almost insurmountable. Nevertheless, we must accept them: the alternative is 18 local astronomy clubs.

Consider finally our financial situation. Although our present assets (proceeds from the sale of 252 College St.) have been described as a 'windfall', we must remember that two societies most similar to us in size and purpose (the Astronomical Society of the Pacific and the American Association of Variable Star Observers) have, or have had assets in excess of \$1,000,000. The health of our Soc. during the past few decades seems even more remarkable on this account.

We must thrive on the enthusiasm of our members. We must attract as members professional astronomers, planetarium personnel, and teachers, whose abilities are so necessary for the advancement of astronomy in Canada. We must attract and encourage young people (yea for sure—Ed.) and other new members. We must use our financial and human resources wisely but effectively: both money and people are of no use unless they are "put to work". We must accept our diversity of language, culture, education and geography, and cope with them as best we can. In this way, our Society can be assured of a vigorous and

(The remaining 15 pages concern recommendations of the following:

- 1: The National Council
- 2: The National Office
- 3: Finances
- 4: Finances: re sale of 252 and its proceeds
- 5: Membership
- 6: The Observer's Handbook
- 7: The Journal
- 8: The National Newsletter
- 9: Other Publications
- 10: National Library

The following is a brief summary of the more important recommendations.

The National Council:

Steps are to be taken to increase the activities and the participation in Council especially by adding a system of rotating travel grants for members outside Toronto such that they will be able to attend one extra meeting every two years. In addition it is suggested that new committees should consider membership, advise on the publication of the Handbook, Journal and National Newsletter. In general the National Council will be expected to concern itself with the general well being and conduct of general and centre activities. Its activities will contribute to the better and smoother operations of local groups much more than it has in the past (this will really take some effort on their part--their record for the past few years is not very great I'm afraid and will require dedication on their part but will be rewarded with new interest and activity in the Society-Ed.)

The National Office:

The prime problem here appears to be a poor understanding of how services may be obtained and what services may be obtained through the National Office and Council (I and the rest of the Halifax Executive must plead guilty here but we are learning with experience-Ed). To remedy this there will be a handbook describing the services, funds etc. and how to go about using them prepared for distribution to new executive members of the various Centres. It is expected that the Office will remain in Toronto.

Finances:

The general finances of the Society are fairly healthy but a general review of fees and the general running

expenses will be reviewed for 1978 when the total view of the finances are clearer following a decision on the purchase of new office facilities. Again project funds will play a greater part in Centre activities since it is suggested that interest from various funds have not been fully used in recent years but put back into the capital of the funds.

Finances: funds from sale of old headquarters

The present report resulted from a motion concerning the disposition of the capital sum realized from the sale of the Toronto headquarters in 1976. The recommendations are that the bulk of this money should be reinvested in the form of a new property which might be income producing. Of that sum, \$35,000 may be set aside for a local projects fund. Such projects funded from this source would be undertaken under guidelines set out by Council and distributed according to stability, size and merit (of the project) of the Centre making application.

Membership:

The committee has recognized the need to increase membership and to accomplish this they will be looking at the reasons for the high turnover in members from year to year. A membership brochure will be produced to attract new members including young people (I think that the Halifax Centre is ahead of most, if not all, centres in the proportion of young members among its members and we have taken some steps to encourage their participation. We could do much more along these lines with the commitment of more members—Ed.) New members may receive information describing what and when they can expect to receive RASC services and publications (one of my pet peeves with the Society is that one pays dues in Oct. and does not receive any of the fruits thereof until Dec, If lucky, and the Journal arrives, maybe, in March—a six month delay!! The least we can do is to make sure new members are aware of this so they won't go away mad. The reasons for such delays should be investigated and corrected—ie., is it necessary to run memberships on a Oct. to Sept. basis—Ed)

Observer's Handbook:

This publication is the bread and butter of the Society and in general is above criticism. There are of course some modifications which could be made to improve it; however, these depend on adding more pages at some expense.

Considering its wide reputation and wide circulation, efforts will be made to increase the press runs further and with the additional revenue thus generated, increase the material. An advisory committee has been suggested to help the Editor oversee the production of the Hdbk.

The Journal:

It has been recommended that the present type of material be continued in the Journal in the same proportions as we are presently used to. It has been recognized that the relationship of the Journal and Newsletter requires clarification. (Indeed the necessity of the Newsletter can very seriously be questioned. The rationale has been that if material carried in the Newsletter were incorporated in the Journal, as it should be in my opinion, the National Research Council would not oversee the publication costs of technical papers with the resulting loss of material for publication. Considering the gov't policy to support things Canadian, I suggest we should try some brinksmanship and actually see if they would cut these funds off. There is no other alternative for publication of astronomical technical literature within Canada. Considering the role of the Journal in the RASC and its importance in drawing new and retaining present members, there is little room for sentimentality. When you pay your fees, I expect you want something worthwhile from the Journal and from our recent questionnaire the greater percentage are not satisfied with its content. If the RASC wants to include both professionals and amateurs on an equal basis, then the material they submit should be dealt with on an equal basis and not be segregated one from the other. The single most critical problem faced by the RASC is the Journal and it continues to be the most difficult to solve and despite the other strengths of the Society it will be a thorny problem for a long time, so don't look for any meaningful changes in that direction-Ed.) An advisory committee will be recommended for the Journal and more effort will be made to increase and improve the material submitted for publication. Prizes may be instituted to this aim (must we succumb to bribery?-Ed.). The 2½ pages of the report testify to the problems faced by the Journal.

The National Newsletter; Other Publications:

The newsletter suffers an identity crises and material submitted has in the past not served the purpose for which it was intended--a place where items requiring a shorter publication lag-time could be handled. As it turns out the time to set up the Newsletter for publication is about the same for both it and the Journal. Until members contribute more freely without prying, little change will be apparent with most material coming from reprints from Centre Newsletters like Nova Notes. Under the heading of Other Publications comes the Supplement to the Journal. This is an annual thing to transmit data concerning the operations of the National Society and individual Centres. It is valuable to check out the activities and standings of the various groups and occasionally one even gets some ideas for programs, activities etc. It has been recommended that a "mini-Handbook" be produced along with other pamphlets to produce revenue for the Society.

The National Library:

The library in Toronto has been just holding its own in recent years but despite the problems with its operation it will be continued with new acquisitions being obtained in the form of books, slides and occasionally, films. Members will be supplied with information on the holdings and borrowing information. This has not been done extensively in the past due to the amount of work involved for the librarian. A part-time librarian may be hired to help extend the use and care of the holdings.

Well if you made it though the preceeding, you are a likely candidate for the Halifax Executive--let me know if you read it all the way through! If you would like to read the report of Dr. Percy's committee, let me know and I will arrange for you to borrow a copy. If you have comments, suggestions etc., we would like to hear them, especially if they relate to the Halifax Centre and what we can do to improve the value you receive for your \$12.50 membership fee.

R. Brooks

Peter Waller,
NASA News Release
15 June 1977

Discovery of a 'disc-star' which may well be in the process of forming its own planets has been made by a Univ. of Arizona-NASA Ames Research Centre team. The find marks the first discovery of probable planet formation in process, and is the first identification of a flat, disc-shaped, highly luminous stellar object.

The star, MWC 349, in the constellation Cygnus, is estimated to be only 1,000 years old. Its surrounding disc of intensely glowing gas appears to have a diameter 20 times that of the central star, and to emit about ten times as much light as does the star. The disc at its outer edge is calculated to be about as thick as the star's diameter. Total brightness of the new stellar object appears to be declining about 1% a month as luminous material from the glowing disc spirals into the central star. Hence, the luminous disc is expected to be gone in about 100 years. The new star is about 10 times the size and 30 times the mass of our Sun, and is expected to live only 100 million years. This is only 1/100th as long as our Sun, whose calculated life is 10 billion years.

The discovery was made by a team of astrophysicists headed by Dr. Rodger Thompson, Steward Obs., Tucson. Observations of the star were made with the 91 cm infrared telescope of the Kuiper Airborne Observatory, largest in existence, and the Steward 2.3 m infrared telescope. The Kuiper airborne telescope saw the large portions of the infrared spectrum which do not penetrate the atmosphere and cannot be seen from Earth. The larger Steward telescope had better resolution. Both were needed for the discovery. Infrared observations were essential to see through the veil of dust shrouding the disc star.

The scientific team believes the significance of the find lies in the fact that planets may well be forming now in the luminous disc or have just formed in the gas outside the star's luminous disc. Characteristics of this rapidly changing disc should shed light on planet formation processes in our solar system, and around other suns. Scientists do not have a satisfactory model to explain how planets form around Suns. Existing theories do agree that in formation of stars, rotating clouds of hydrogen and other elements contract due to gravity. The rotation produces a flat, spinning disc. Material in the disc is then believed to move toward the centre, eventually piling up enough mass to ignite the nuclear fusion reaction which produces starlight. However, mechanics of the process of planet formation are not understood.

With MWC 349, astronomers believe they are now watching a star and planet-formation process as it happens. It is believed that a glowing stellar disc, like that of MWC 349, cools, planets condense out, first in the outer reaches of the gas cloud and then closer to the parent sun. The luminous disc of MWC 349 is believed to be the inner part of a surrounding larger disc of non-luminous gas in which outer planets may already have formed. Superimposed on our solar system, this non-luminous disc would extend out beyond Pluto, the outermost planet. The luminous disc would reach out beyond the Earth's orbit. The intensely luminous disc is wedge shaped in cross section. It joins the star's glowing surface and its thickness there is about 1/40th of the star's diameter.

Light coming from the glowing disc is due to the frictional heat of the atoms of gas rubbing against each other. This friction also reduces the atoms' speed of revolution around the parent star, causing them to spiral in to the star. Continuous loss of this luminous gas into the central star accounts for the 1% a month loss in brightness and explains the calculated disappearance of light from the disc in about 100 years.

Dr. Thompson presented these findings at the American Astronomical Society meeting in Atlanta. The three basic pieces of evidence for the discovery are: that the star is much brighter in visible light wavelengths than it should be, that it is steadily losing brightness since its first identification in the 1930's and that the spectrum of energy radiated is not that for a hot star. Instead, its spectrum is that for a hot glowing disc as predicted by English astronomers Drs. Lynden-Bell and Pringle.

Since the star is thought to be about 10,000 light yrs. away, all observed star events actually occurred 10,000 years ago, the time required for its light to reach Earth.

OBSERVING WEEKEND

JULY 22, 23 and 24

This is a reminder of the observing session we have scheduled for the days of Friday, Saturday and Sunday July 22, 23, 24. It will be held at the Blomidon Provincial Park near Wolfville. Apparently in the original notice I made a mistake in describing its location. It is beyond the Blomidon Lookoff 5 or 6 miles. You should attempt to arrive as early as possible as weekend demand for space will be great. We can not reserve space ahead of time. It is not necessary to have your own telescope, but bring it along if possible and don't forget your binoculars camera and walking shoes.

Daytime activities might include a walk out to Cape Split, a swim at Evangeline, kite flying on Blomidon or canoeing on the Guysbrough River. Come along and join the fun and hope for great weather (or at least some clear night skies)!!

TELESCOPE RAMBLINGS

To Build a Telescope

There must be as many different ways to build a telescope as there are people interested in building one. Designs vary from plain, with two-by-fours and plumber's pipe, to elegant, with variable frequency drives and burnished setting circles. However, the usefulness of the result sometimes bears little correspondence to its polish. The reason is two-fold. Firstly, any instrument, plain or otherwise, can possess basic design flaws which limit its usefulness. Wobbly mounts and balky controls are all too common. Secondly, the telescope should be designed to match the sort of observing which appeals to its owner. Instruments without slow motion controls and a motor drive are of little use for photography; however, elaborate telescopes are often left in storage by those who find that their main interest is visual work. To demolish the myth that only elegance is respectable, I refer the reader to the article on William Bradfield's telescope in the April '77 issue of Sky & Telescope.

Why build your own telescope? The main reason is the enjoyment, knowledge, and satisfaction involved. True, a measure of frustration and long hours are also guaranteed, but if one possesses at least an ordinary amount of manual skill, the result can be very favorable. The degree of satisfaction is closely related to the amount of yourself that you put into the design of the telescope. There are enough variables involved that any amateur can come up with a design that is unique in one or more respects.

Another reason for building your own telescope is related to a basic reality of the market place: a commercial manufacturer builds telescopes for one main reason — to make a profit. Thus his products are built only as well as they need to be both to satisfy a majority of customers and to compete with other manufacturers. One glaring product of this philosophy is the department store - camera shop telescope. Here the intended customer is not the serious amateur astronomer, but the general public whose knowledge of "magnification and astrology" is close to zero. Hence, with chromed knobs and fancy names, these telescopes are produced with poor optics and mounts so wobbly as to make them next to useless. Instruments aimed at the amateur astronomer market have to be much better, but even here most manufacturers cannot afford to provide really steady mounts or optics more accurate than a quarter of a wavelength. The patient and skillful amateur, however, can produce a telescope which is not only unique in design, but which optically and mechanically is better than most commercial instruments. The secret is time. The amateur is willing to spend the time required to do a really outstanding job.

Yet a third reason for building your own telescope is a monetary one. With a little care, and if he does not put a dollar value on his time, the amateur can provide himself with a serviceable telescope at a small fraction of the cost of a commercial instrument. One saving is in grinding and polishing your own mirror. Other substantial savings are possible if one is careful and uses imagination. For instance: for about \$30 or less, an inexpensive set of 7x50 binoculars can be had.

With a few careful strokes of a hacksaw and file, some epoxy cement and bits of scrap, this item can be converted into a 7x50 monocular, erect field finder (What commercial instruments have such an accessory?), plus a wide field Kellner eyepiece for your telescope, and a 50mm achromat plus two porro prisms for your box of spare optical parts. If purchased separately these items would cost \$100 or more.

Another item is the all important mounting for the optics. Here stability and convenience are paramount. Good articles occasionally appear on this topic (See, for instance: RASC Newsletter, August 1975, 135; Sky and Telescope, June 1976, 423, & January 1977, 64). If one is not keen on photography the neglected altazimuth mount should be considered. It has several advantages over the equatorial design simply because it recognizes the fact that most telescopes are used by people at the surface of Earth. One axis is vertical and provides motion parallel to the horizon (the azimuth motion); the other axis is horizontal and provides motion in a vertical plane (the altitude motion; and altitude + azimuth = "altazimuth"). As a consequence the loading on the bearings is fixed and is either parallel to or at right angles to the axes. Hence bearings can be very simple, no heavy, awkward counterweights are needed, the eyepiece is always conveniently located, and the design of the mirror cell can be simplified. It is true that motion about both axes is generally required to compensate for Earth's rotation, but if these motions are designed without backlash and with a smooth, friction-stopped action, tracking of astronomical objects requires only a little

practice. Most amateurs in North America will scoff at the suggestion of an altazimuth mount, but how many of these sceptics have tried one? For time exposure photographs you do need an equatorial mount; but, for general visual use a well thought out altazimuth mount is, I believe, superior to an equatorial. After all, the largest optical telescope has an altazimuth mount.

What components must one buy? A mirror grinding kit, probably the diagonal mirror (since it is relatively inexpensive anyway, assuming a Newtonian design), and perhaps a rack and pinion eyepiece focuser. All the rest any amateur should be able to whip up himself. Instruction is required, especially for forming the primary mirror. I recommend the paperback: *How To Make A Telescope*, by Jean Texereau, Anchor books N31, 1963. Read it through carefully at least twice before you begin. On reading this and the other articles mentioned above, certain design principles become apparent. For instance: the beauty of three, as in the rigidity of a triangle, and the stability of a three point support; the low mass yet high rigidity of hollow, box-like components; the stability without mass associated with widely spaced support points; the strength, low mass, low cost, ease of forming, and vibrational damping properties of wood. Also, don't fall for standard assumptions, such as: the tube of a telescope has to be a cylinder. Use your imagination. A key theme here is simplicity. For each part of your telescope, search for the simplest design that will do the job. This will ensure both ease of construction and more reliable operation in use. For instance: a pipe resting in a wooden "V" notch

makes a superb altitude bearing for an altazimuth mount. There is a subtle elegance in such simplicity.

One of the intangible rewards in all of this and one which is becoming rare in today's world, comes when viewing scintillating stars through the finished instrument. It is the thought that one's own hands have shaped the delicate optical surface which forms those diamond-like points. (The following poem is taken from page 3, volume 2 of *Amateur Telescope Making*, published by Scientific American. By C. A. Olson.)

A Piece of Glass

He labored late into the night,
 At early morn' his task resumed,
 To fashion thus a disk of glass
 Into a subtle curve, not deep,
 But measured only by shades of light
 From a simple pinhole made in foil,
 Revealing to his practiced eye
 Imperfections infinitesimal;
 Until at last his skill produced
 A curve so true the mind of man
 Could not discern the wavering of a breath.
 Just a piece of glass, 'twas said,
 But in that simple disk
 The heavenly host
 Of suns and stars, yea, universes,
 Revealed their glory in the sky
 For man to ponder — and adore.

Roy L. Bishop
 Maktomkus Observatory

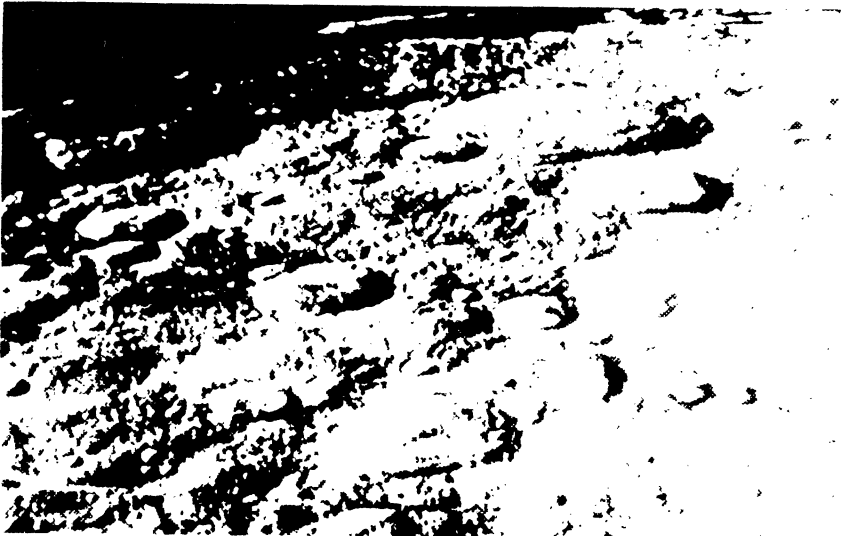
NOTES ON MERCURY

Mercury, the closest planet to the Sun, has a diameter only 40% that of the Earth's and a mass of only 0.055 times the Earth's. It, like the Sun and Earth, formed 4.6 billion years ago and its history is not completely understood. However, the passage of Mariner 10 past the planet in 1974 and 1975 has shed much light on the past events which shaped the Sun-baked planet. One of the more surprising discoveries was that Mercury has a magnetic field of higher strength than can be explained by interaction with charged solar wind particles. In fact, the solar wind is deflected from its surface by its interior magnetic field in much the same manner as the Earth traps charged particles in the famous Van Allen belts well above the planet's surface. That Mercury has a strong magnetic field has some interesting consequences for our understanding of its interior structure.

As the planet was forming, it was almost completely molten. The melting of the coalescing rocks resulted from heavier elements "falling" towards the centre of the planet, thus converting gravitational energy to heat, the level of which was sufficient to melt all material. The process of heavy atoms being attracted to a planet's centre is called differentiation and creates distinct layers in the planet--the core (iron and nickel), the mantle and the crust (both mainly oxygen and silicon). The thick mantle insulates against heat loss from the core but in the case of Mercury it is unclear how it could maintain a liquid core to the present time. In the Earth, the mantle contains substantial amounts of radioactive elements to offset internal heat loss and it is estimated that Mercury should have become completely solid 1 to 1½ billion years after formation. Because of Mercury's smaller mass, one would expect its mantle to contain sufficient radioactive material to offset only a fraction of the core heat loss leading to rapid solidifying of the planet. If the mantle is of higher viscosity than expected or if the core has more iron sulfide (FeS), it might be possible for Mercury to maintain its liquid core for the 4.6 billion years since

its formation.

Why do we expect Mercury to have a molten core? The existence of a liquid core is inferred by the presence of the magnetic field detected by Mariner 10. The only mechanism known to produce such a planetary magnetic field is by a "self-induced dynamo". In the Earth, it is believed that the magnetic field is produced by motions of the liquid, electrically conducting core. The motions are created by the rotation of the planet and by thermal convection (motion caused by heating and cooling of different regions). How these two factors work to produce a magnetic field is by no means thoroughly understood and to apply the dynamo mechanism to Mercury is tricky. At present it is the only known method to create a planetary magnetic field. No doubt we will eventually succeed in recreating the past histories of the planets, but, as is always the case and for the foreseeable future, more questions will be raised than answered by our space probes.



Mercury photographed by Mariner 10. This view of the southern pole area shows the cratered and wrinkled nature of the surface. Mercury shrank 2 km in diameter as it cooled causing these features. JPL photo.

JULY/AUGUST

- 1 July 1847--Discovery of sixth asteroid, Hebe, by K.L. Hencke.
1911--Last observation of Halley's Comet.
1952--Allan Sandage joined staff of Mt. Wilson and Palomar Observatory.
1957--Beginning of International Geophysical Year
- 2 July --Earth at aphelion and sun's disc appears smallest-31'31".
- 3 July 451--Halley's Comet associated with death of Attila.
1841--Memo from John C. Adams concerning irregularities of Uranus' motion which may indicate undiscovered planet. Memo is a sacred souvenir of St. John's College, Cambridge.
- 4 July 1054--Crab Nebula became visible in daylight for 23 days.
1819--Sir William Herschel made last observation of comet of 1819 at age 80.
- 5 July 1054--Crescent moon stood in configuration of 2⁰N of supernova.
- 8 July 1967--Very "slow" nova discovered in Delphinus by G.E.D. Alcock of England; it maintained naked-eye visibility for many months.
- 9 July 1969--X rays detected from new source--Cen x-4; they were not present on July 6.
- 10 July 1921--Last of 23 letters between Curtis and Shapley pertaining to their debate.
- 13 July 1954--Death of Abbé T. Moreux, French popularizer of astronomy.
1958--Third recorded outburst of recurrent nova, RS Ophiuchi.
- 14 July 1965--Mariner IV bypassed Mars at 6118 miles.
- 15 July 1944--Greenwich Observatory damaged by bomb.

- 121 1965--Mariner IV televised first close-up pictures of Mars.
- 16 July 1746--Birth of Guiseppe Piazzi, director of Palermo Observatory.
2186--Solar eclipse will last 7 minutes 29 seconds
- 17 July 1850--First photo taken of a star at Harvard Obs.
1908--Death of Isaac Roberts, a talented English amateur.
- 18 July 1860--Photos of total solar eclipse revealed that prominences and corona are part of the sun.
- 19 July 1912--Thousands of meteoritic fragments fell near Holbrook, Arizona.
1917--Plate taken on which Ritchey at Mt. Wilson discovered nova in spiral nebula, NGC 6946; one of the best distance indicators for spiral nebulae.
- 20 July 1945--Death of Richard Prager, German cataloguer of variable stars.
1961--Death of Paul Merrill, Mt. Wilson and Palomar expert of stellar spectroscopy.
1969--First man on moon and first moon samples selected.
1976--Viking A landed on Mars.
- 21 July 1931--First direct photo of corona without eclipse.
1950--Expedition to New Quebec (Chubb) Crater after aerial photos disclosed its existance. No meteorite has ever been recovered.
- 22 July 1972--First soft landing on Venus, by Venera 8.
- 25 July 1930--First coronagraph, built in Observatory of Pic du Midi.
- 26 July 1938--Brilliant evening fireball over New York City.
1971--Longest lunar mission launched--Apollo XV's command module, Endeavour.
- 27 July 1801--Birth of George Biddell Airy, Astronomer Royal and Director of Greenwich Observatory, 1836-1881.
- 28 July 1851--First daguerreotype of a total solar eclipse at Königsberg, East Prussia.
1964--Ranger VII launched for moon where it ob-

- 30 July --Maximum concentration of Southern Aquarids.
- 31 July 1957--Comet Mrkos discovered unofficially by Pilot Peter Cherbok at 20,000 feet--the first comet discovered from an aircraft.
- July 1676--Flamsteed began work at new Greenwich Obs.
- July 1687--Principia appeared in print.
- 1 Aug. --Maximum concentration of Capricornids.
- 2 Aug. 1957--Comet Mrkos officially discovered by Czech astronomer, Antonin Mrkos.
- 4 Aug. 1846--Telescopic sky-sweep revealing Neptune which had been thought to be a star.
1956--Death of G.A. Shajn, a leading Soviet expert on stellar spectra and gaseous nebulae.
- 5 Aug. 1864--First observation of spectrum of a comet (1864II) by G.B. Donati at Florence.
- 6 Aug. 1961--Youngest man launched--Major Titov, age 25.
- 7 Aug. 1869--Discovery of green emission line in coronal spectrum, by Harkness and Young during total eclipse
1972--Greatest flare from sun since 1960; very intense x-ray and radio activity recorded.
1961--Yuri Gagarin in Pugwash, N.S.
- 8 Aug. 1974--Comet 1974g, most distant comet found, reached perihelion--560 million miles from sun.
- 11 Aug. 1877--Deimos discovered by Asaph Hall of Washington.
1908--Premature death of Alexis Hansky, Russian solar expert, at age 38.
- 12 Aug. 1923--Discovery of asteroid 1000, Piazzia, by K. Reinmuth at Heidelberg.
--Maximum concentration of Perseids.
- 13 Aug. 1596--First long-period variable discovered, Mira, in Cetus by David Fabricius. This is the first of which there is a written record of its variation.
1958--Death of Albert G. Ingalls, whose books and department in Scientific American taught amateurs how to build telescopes.

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- 17 Aug. 1877--Phobos discovered by Asaph Hall.
1885--S Andromedae, first supernova discovered, by M. Ludovic Gully of Rouen.
1933--USSR's first rocket, semi-liquid fuelled.
- 18 Aug. 1868--Spectroscope of prominences during eclipse proved that they are composed of hydrogen.
- 19 Aug. 1868--P.J.C. Janssen first observed solar prominences outside of eclipse.
1957--Maj. David Simons attained a record of 100,000 feet in a balloon.
- 20 Aug. 1897--Ahnighito meteorite recovered by Robert E. Peary on north shore of Melville Bay after 5 days and nights to load it onto the ship.
- 21 Aug. 1560--Tycho Brahe was attracted to astronomy by an eclipse occurring on the predicted day.
1822--Death of William Herschel.
- 25 Aug. 1943--Plate of M32 helped lay basis for theory of stellar populations, (with 2 other plates).
- 26 Aug. 1803--Meteor shower at Laigle, France; about 3000 fragments were scattered over an area of 6 miles by $2\frac{1}{2}$ miles.
1870--Zurich daily sunspot number was 317, highest value in 19th C. and a record till 1947.
- 27 Aug. 1962--First successful Venus probe, MarinerII, was launched.
- 28 Aug. 1789--Herschel discovered sixth moon of Saturn, Enceladus, with his new 40' telescope.
- 29 Aug. 1864--William Huggins made first inspection of planetary nebula's spectrum and found bright lines.
- 30 Aug. 1975--Nova Cygni
- 31 Aug. 1846--Leverrier determined Neptune's orbit.

Perseid Meteors--12 Aug

The Blomidon Naturalists Society is holding an observing session at Wolfville to view the Perseid shower. We have been invited to join them (informally). If you are interested in going, contact Roy Bishop or Larry Bogan at the July meeting.

When crooning breezes whispered
 Their lullabys of rest
The evening star was sinking
 To cloudlands of the west,

And tired folk lay breathing
 'Neath brooding wings of sleep
While through his lens of wonder
 The star-man scanned the deep.

Three, spread the dome of knowledge
 Inverted to his sight,
The dark, mysterious concave,
 The all-revealing night,

where tranquil planets floated,
 Each in its fitful track--
Those vagabonds of heaven
 The dot the zodiac;

And, more intensely burning
 In horde and fiery clan,
Far up the gleaming archway
 A starry pageant ran.

The bright celestial torches
 Glowed with a pomp sublime;
The star-man marked their motion
 And called its measure "time."

One truth in beauty blazing,
 Graved on the night he saw,
A truth the stars were singing--
 The sovereignty of law.

Albert Durrant Watson

taken from the JRASC, April 1921 (Vol 15)
found by Roy Bishop.

Dr. A.D. Watson was a President of RASC

OBSERVING MEETINGS

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Again for both the April and May observing meetings, held at the Burke-Gaffney Observatory at St. Mary's University, the sky was cloudy. The alternate program of mirror grinding was pressed into service. These meetings have attracted a fairly regular group. Since the weather has been cloudy for each of the planned sessions it has been necessary to make use of room at the observatory for mirror grinding. The people who have been coming to the sessions are learning the techniques of mirror grinding with square slabs of plate glass. When they have mastered the technique they will move on to the more familiar disk of pyrex. Then they will have the optics for a telescope which they can use if and when the skies clear.

Apart from the regular observing meetings, there have been two other observing sessions in the Centre. On May 20 the most successful session to date was held. The sky was relatively clear! There was a good turnout of members with telescopes and members without. The spectral of the night was, without question, a meteor which moved slowly from south-west to north-west. This object left a vivid smoke trail through which small fragments could be seen falling from the head. It was easily -5 in magnitude, casting a violet hue. Since it was not audible and as Dr. Bishop has heard from people in Wolfville and Musquodoboit who had seen the meteor, it can be found that it must have been at least 70 miles in altitude. From this it can be seen that when clear weather falls on the night of an observing session (not the reverse---) we will have a note-worthy evening.

The second session was to be held at Maktomkus Observatory at the home of Roy Bishop, following the June meeting at Acadia. Though cloud prevailed and rain fell heavily a most enjoyable evening was spent at Bishop household.

Michael P. Edwards
Observing Chairman

FUMBLING THROUGH THE SUMMER SKIES

Mike Edwards (OC)

Now that you have brushed the winter's dust from your telescopes and have become re-acquainted with the stellar distribution overhead, it is now time to look into deeper space. If you are planning to come to the camping-observing weekend at Blomindon Provincial Park (as I hope you are) it might be advisable to spend whatever time possible in skanning the skies. This will increase your ability to show the uninitiated at the camp grounds the skies and where to find what. Sharpening your skills will help you through the observing competitions, presently on the drawing board. It will give you more time for finding objects which are not easily found in the skies over the bright city lights. You will quickly find the usual items then be able to spend the following hours in finding the fainter objects. Much use can be made of the information given in the presentation of our VP, Dr. Bogan at the June meeting at Acadia. By the date of our trip, July 22, 23, 24, you will see the more familiar summer constellations of Hercules, Lyra, Cygnus, etc. high in the sky. So take your charts, binoculars, telescopes, observer's handbooks and lawn chairs to the great out-of-doors and study the beautiful summer skies. Try to find the deep sky objects you haven't seen. When you do find them you will wonder why you did not take time to find them sooner. Then plan to come to the Blomindon Park on the July 22 weekend. More news of this event will be forth coming, but please let your intentions be known as soon as possible so that we can plan a program (daytime as well as night) which will suit everyone. In the mean time good viewing, or should that be good fumbling!

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NOVA NOTES are printed bi-monthly in January, March, etc, through the courtesy of the Nova Scotia Museum. Articles pertaining to any aspect of astronomy will be considered for publication. To be included in the Sept. issue, articles should reach the Editor not later than 20 August and if photos are to be included, not later than 17 August.

PUBLISHED BY THE HALIFAX CENTRE, R.A.S.C.

PRINTED BY THE NOVA SCOTIA MUSEUM

1747 Summer St., HFX