



# NOVA NOTES

BI-MONTHLY JOURNAL OF THE HALIFAX CENTRE  
JAN-FEB 1982 VOL.13, No 1

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NOTICE OF MEETING

Date: Friday, 15 January, 8:00 PM

Place: Nova Scotia Museum: Meeting to be held in lower auditorium/theatre. Access from parking lot and side door.

Speaker: Mr. Peter Edwards, Halifax Centre (Past President).

Topic: Peter Edwards will be speaking on "Variable Speed Controls for Telescope Drives".

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COVER NOTES

M31, NGC 224, 0h 40.0m +41 00'

The Great Andromeda Galaxy

M31 has a total visual magnitude of about 4; hence it can be seen with the naked eye. It is of type Sb, marked by tightly wound spiral arms and a central condensation of intermediate size. M31 is approaching us at 68kms/sec. A recent determination of the distance to M31 is 2.2 million light-years. The cover photograph is reproduced from a slide made by a Celestron Schmidt Camera of 5" aperture and f1.65.

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MINUTES OF NOVEMBER MEETING OF HALIFAX CENTRE

The November 20, 1981 meeting of the R.A.S.C. Halifax Centre was held at the Nova Scotia Museum.

Dr. Murray Cunningham used his recent trip to China as a fine excuse to review for us the many achievements and contributions of Chinese astronomy - ancient and modern. His extra-ordinary dress for the evening brought the presentation to life, and his personal comments and impressions added much life to the evening.

Although it is a bit out of line, I would like to thank Murray, not only for his talk and the other specific duties he carries out for our group, but for the fun, joy and spirit he gives us. There is nobody quite like him.

The 1982 executive is: Walter Zukauskas, President; Dave Tindall, Vice-president; Randall Brooks, Secretary; Dale Ellis, Treasurer; Peter Steffin, Editor; Cathy Chiasson, National Rep.; Guy Harrison, Librarian; Kathy Oakley, Observing Chairperson.

Many of us, for the first time, got a chance to see the 1982 Observer's Handbook, edited by our own Roy Bishop. Hopefully, all copies will become dog-eared and dew-stained.

Walter Zukauskas

SURVEY RESULTS

A recent survey indicates that some out of town members would attend our monthly meeting more regularly if overnight lodging could be provided thus eliminating the long drive home so late at night. If you can help, please contact any member of the executive. Any help offered would be appreciated by all.

MINUTES OF DECEMBER MEETING OF HALIFAX CENTRE

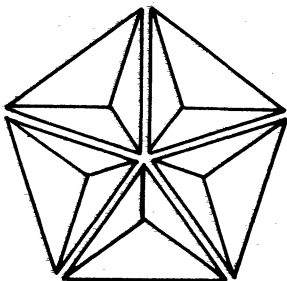
Our first speaker was Mr. Wilf Morley of Bridgewater, N.S., a small town, south of Halifax. He was inspired and encouraged by Roy Bishop, a Halifax Centre Member to teach astronomy in high school. He is presently using a text book and the Observer's Handbook (commonly referred to as the 'bible'). Wilf Morley has 25 students in his class and each has a pair of binoculars to use and he has as well one C-90. During his presentation he gave us an outline of the astronomy course that he teaches. The material includes basic instruction in constellation recognition and then goes deeper into familiarization of the solar system and finally the mathematics of the universe. Mr. Morley and his class plan to spend at least one night of the year at the Saint Mary's observatory. The astronomy course has shown that there is much interest in astronomy in Bridgewater. During the last Astronomy Day at least 75 people showed up. Plans are now underway to build a permanent observing site near the school.

The second speaker of the evening was our own Roy Bishop who is now editor of the Observer's Handbook. In its many years of publication Roy is only the fourth editor. He took us through the 1982 Handbook page by page and explained the changes made and how to get the most out of using the Handbook. We are very proud to have Roy Bishop as editor of this splendid publication.

Murray Cunningham

NASA EDUCATIONAL BRIEF

Since the successful flyby of Mars by Mariner 4 in '64 major improvements in imaging have come about. Mariner 4 transmitted data at 10 bits per second, requiring one week to transmit 21 pictures. The same amount of data in just one Voyager picture of Jupiter transmitted in 1979 in only 48 seconds.



## SIMON NEWCOMB AWARD for 1982

Originally proposed by the Halifax Centre, the Simon Newcomb Award was adopted by the council of the R.A.S.C. on 21 May, 1978. The award is named after a native of Nova Scotia, an astronomer who was the foremost man of science of his time in America.

Articles must be received by the Awards Committee of the R.A.S.C. between 1 January and 31 March of the current year. Members of Centres must first submit their entries to their Centre Executive with the Executive then choosing the entries they wish to represent their Centre. Winning entries from the Burke Gaffney Award are also eligible to enter the Simon Newcomb Award.

### RULES

1. Topics. Awards will be given for articles relating to astronomy, astrophysics or space science. Topics should interest average to well informed amateurs and may be of current or historical interest.

2. Presentation. Articles should be 1000 to 1500 words, written in proper grammatical form and presented typewritten and double spaced. Diagrams need not be in finished form but should be complete and ready for drafting. Photographs may also be submitted and if possible original negatives should accompany the submission. The author's name should not be contained within the paper.

3. Eligibility. Any R.A.S.C. member in good standing may submit articles. The intent of the Simon Newcomb Award is to recognize literary ability among non-professional members of the Society.
4. Judging. Articles will be judged by the Awards Committee. Criteria shall include scientific accuracy, originality and literary merit.
5. Presentation of Award. The Award will be presented at the General Assembly by the Halifax Centre Representative to the winner (or a representative of the winner's Centre). The Award will remain in the possession of the winner's Centre for display and will be returned to the National Office by 1 April of the following year. If the winner is an unattached member, the Award will be displayed at the National Office of the R.A.S.C.
6. Submission of Entries. Entries will be received between 1 Jan. and 31 Mar. of 1982. You may direct queries concerning the rules to the Halifax Centre Executive.
7. Previous Awards. The Simon Newcomb Award has been won by the Halifax Centre (79) Bill Calnen, (80) not awarded and by the Winnipeg Centre (81) Christopher Rutkowski.

SUBSCRIPTION RATES FOR 1982:

NOVA NOTES is available to non-members of the HALIFAX CENTRE R.A.S.C. at the rate of \$1.00 per single issue or \$4.00 for six issues per annum. For more information, please contact the editor.

FOUR YEARS AND COUNTING

by

Roy L. Bishop

An icy mountain of dust and rock comparable in diameter to Bedford Basin now hangs in the void beyond the orbit of Saturn. As it rotates slowly with the dim light of the distant Sun playing over its cold surface, it silently falls, each second bringing it nearly ten kilometres closer to the inner solar system. At magnitude 24 and brightening, it will soon be detectable with the largest telescopes. Four years from now its fall will culminate in a high speed pass well within the orbit of Venus. By then the Sun's radiation will have boiled off an immense luminous tail, and for the fourth time men on Earth will look skyward for a glimpse of that fabled apparition which they call Halley's Comet.

The return of Halley's Comet in 1986 is already being called the astronomical event of the decade. Even the popular press, having ignored comets after the refusal of Comet Kouhoutek to abide by their headlines, will once again give a comet front-page coverage. The irony in all of this is that, particularly for people in mid-northern latitudes, during its 1986 apparition Halley's Comet will be no better than Kouhoutek was eight years ago. i.e. Most people will not see it. From southern Canada, at its best Halley's Comet will be a 4th magnitude object within 10 to 20 degrees of the horizon during January and April of 1986. Only away from the light pollution of towns and cities will Halley be a naked-eye object, and then only dimly. The reason for this poor performance is no fault of the comet; it is merely that Earth will be in the wrong part of its orbit to give us a ring-side view. When Halley passes perihelion it will be more than 1.5 AU from us, on the far side of the Sun. Moreover, well after perihelion, as we close to within 0.5 AU of the fading comet, Halley will be heading southward beyond the descending node



of its orbit. In contrast, at its last appearance, in 1910, the comet passed within 0.15 AU from Earth and was well-placed for observers in the northern hemisphere.

Why is Halley's Comet so special? Brian Marsden of the Smithsonian Astrophysical Observatory has said: "To the man in the street, the Solar System consists of Mars, the Rings of Saturn, and Halley's Comet." Comet Bennett of 1970 (see the cover of the 1982 Observer's Handbook) and Comet West of 1976 were far more spectacular than Halley will be in 1986, but the news media scarcely acknowledged them and thus few people saw these comets.

The fame of Halley's Comet is due to several factors. It is the only short-period, bright comet, and thus the only significant one (in the popular sense) that can be anticipated. Its returns at intervals of about 76 years tick off the progress of eternity in units of human lifetimes. Many people on Earth have a chance to view this comet once; very few are fortunate enough to witness two returns. This is the comet that has appeared like a celestial exclamation mark to accompany events in recorded history for more than two millennia. It was observed by Kepler (in 1607) and by Newton and Halley (in 1682). This is the comet that Halley recognized first as a returning visitor, its path through the dark described by Newton's mechanics.

Like the gradual growth of a comet's tail, the first trace of a stream of publicity about the 1986 return has already begun. Scientific American has issued an authoritative and informative volume of reprints entitled Comets (Freeman and Co. 1981). The science popularizer Nigel Calder has produced an entertaining book with the title The Comet is Coming (Viking 1981). The December 1981 issue of the newsstand periodical Discover has a stylized comet on its cover and an article on the return of Halley's Comet. The best bargain of all is a detailed ephemeris called The Comet Halley Handbook, available free from the Public Information Office, Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91103.

FOCUSING ON CONSTELLATIONS

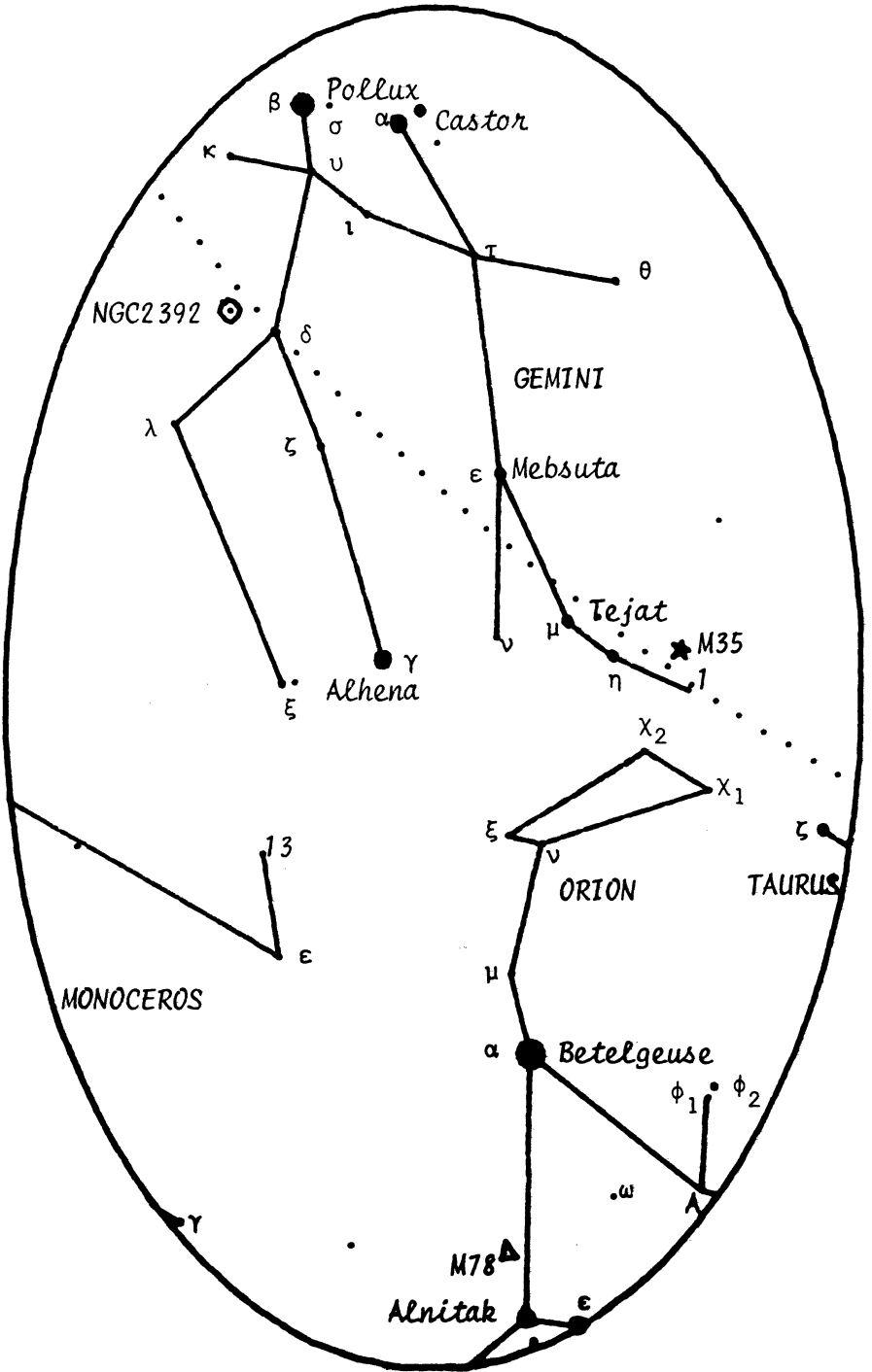
## GEMINI: The Twins.

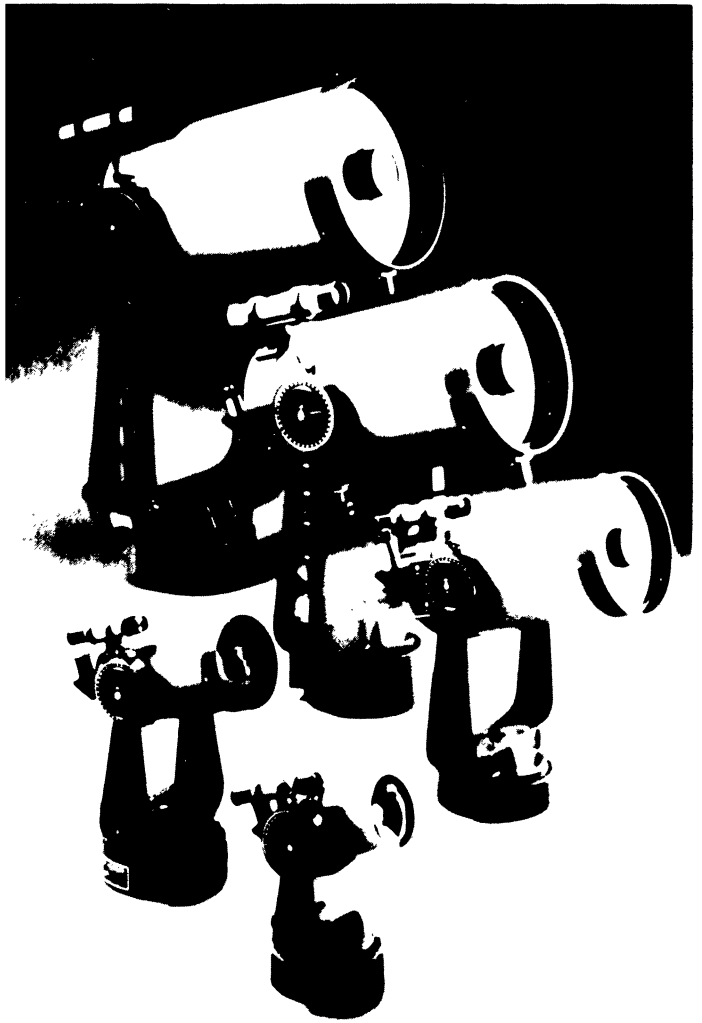
The Gemini twins, Castor and Pollux, form an easily found constellation standing above Orion in the winter sky. The two brightest stars named for each of the twins are very prominent and lie  $4\frac{1}{2}^{\circ}$  apart. Castor, slighter fainter, is the more northerly of the two. The legends of the twins are old and varied. To the Babylonians, they were "The Great Twins", and in India they were "The Horsemen". In the Greek stories they were the sons of Leda and Zeus. Pollux was immortal but Castor was not. When Castor was killed, Pollux pleaded with Jupiter to let him share his immortality with his brother, and so Jupiter placed them both in the heavens together.

Castor is a fine visible double ( $2^m0$  and  $2^m8$ ) with a faint  $9^m1$  companion making the system triple. Each of the three stars is itself a spectroscopic binary. Pollux has often been "discovered" to be a double, but it is now known that none of the "faint companions" to Pollux are physically related to the bright star. The star zeta is one of the brightest Cepheid variable stars in the sky. It changes by  $0^m8$  with a period of 10 days.

Since Gemini lies on the eastern edge of the Milky Way, the field within the constellation is rich with faint and numerous stars. M35 is a good open cluster for a small telescope or even binoculars. Those with sharp eyes claim to spot the cluster without aids on good dark nights. NGC 2392, the "Eskimo Nebula" or "Clown Nebula" is a planetary nebula about midway between kappa and lambda. In a small telescope it appears as a soft fuzzy star-like object. A larger telescope is needed to see the faint outer ring.

Norman Scrimger





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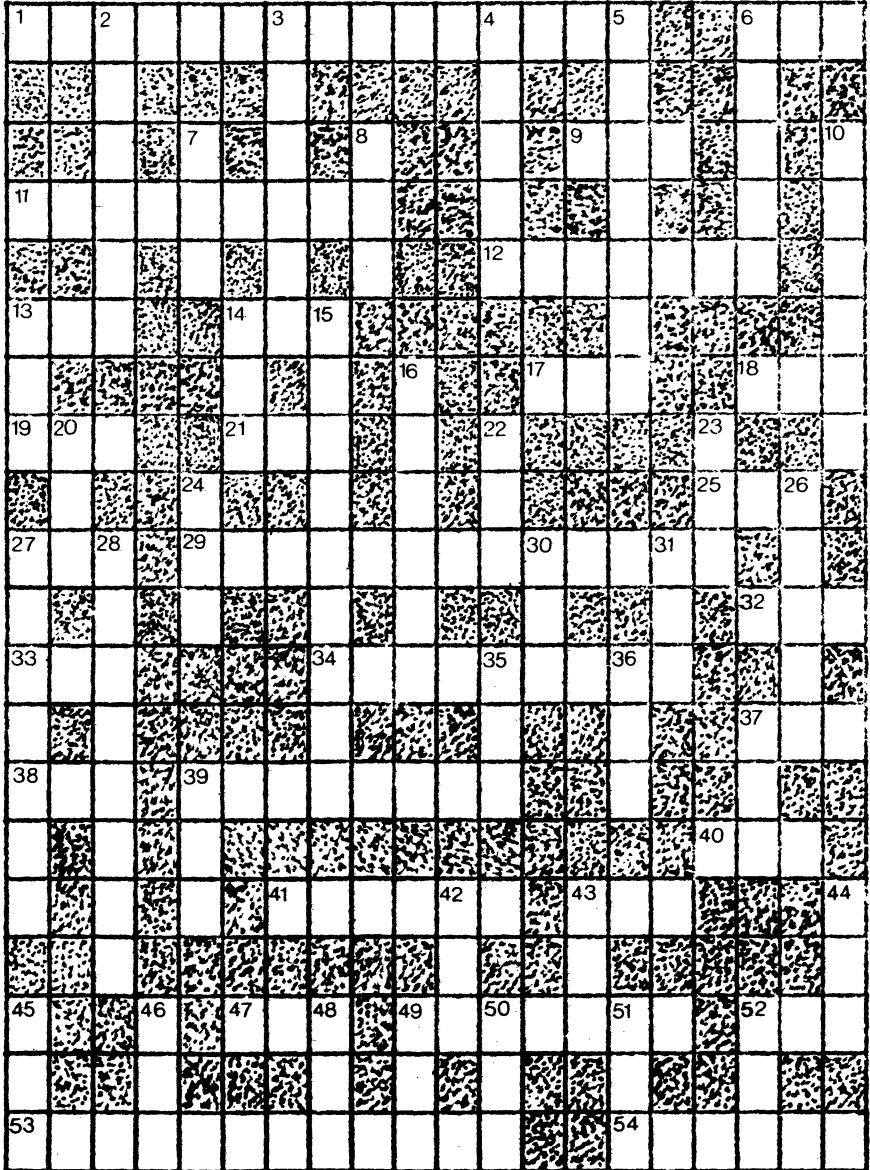
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## PUZZLE CORNER

### ASTRO CROSS WORDS

Lauren Burgoyne and Norman Scrimger



THE CONSTELLATIONS

Astro Cross Words will become a regular feature in Nova Notes. Each puzzle will have a common astronomical theme. This, the first, is the Constellations. Of the 88 constellations in the sky, 63 are represented here. None are used more than once, and some are to be used as their three letter abbreviations. Good luck. Answers will be in the next issue.

ACROSS

- 1) This one from down under is unnaturally drinking the whole outflow from the Urn.
- 6) This beautiful flying creature is found only in the Papuan Islands.
- 9) This bow-stretcher makes great tea.
- 11) A memorial to the reticle lying north of the greater cloud.
- 12) A commemoration of a 17th Century astronomer's tool.
- 13) Amber tresses lying southwest of the heart of Charles II.
- 14) The brightest star in the constellation is a translation of this beautiful bird's name.
- 17) Known in China as Seaou Tow, it separates 31 down from the pole.
- 18) A pathway to bring Pride to the Giraffe.
- 19) Driver of Asterion and Chara in pursuit of the Wain.
- 21) A Dove flying near the stern of the Ship.
- 25) Named for the mountain site of La Caille's Capetown observatory.
- 27) The immortal Firebird.
- 29) The leashed hounds of a hunter.
- 32) The starry Stream.
- 33) This heavenly long-legged bird is after a fishy diet.
- 34) Also has been variously called the Seven Shiners, the Seven Sages or Poets, the Seven Wise Men, the Seven Antelope, and even the Great Spotted Bull.

ACROSS (con't)

- 37) A vain matriarch.
- 38) The apparatus of a person who carves or models figures.
- 39) This Wassermann's age is dawning.
- 40) A scupltorium or graving-tool.
- 41) A little exotic golden cyprinoid.
- 43) "Behind him, Sirius ever speeds as in pursuit, and rises after, and eyes him as he sets."
- 47) This king of the air could be bald.
- 49) This creeping cousin of Sally Mander holds the radiant of a very minor meteor stream visible through August and September.
- 52) Tubus Astronomicus.
- 53) This tool of inner discovery comes to the meridian in September.
- 54) A sympathetic Wagoneer who likes goats.

DOWN

- 2) The Coat of Arms of the third John Sobieski, king of Poland.
- 3) In German, it is called the Luft Pumpe.
- 4) The first to discover the Americas.
- 5) Missile launched to slay Jove's eagle.
- 6) The bearer of fleece holds the first point.
- 7) The slayer of the giant being held at bay by the bowman.
- 8) This small 33 across currently holds a pivotal position.
- 10) A creature named for its nose bone.
- 13) This bore holds our core.
- 14) This three legged painter's stand holds Kapteyn's rapid receder.
- 15) The faint fox containing the Double-headed Shot.
- 16) Was the Raven in Chaucer's time, 2000 years ago lay equally on each side of the celestial equator.
- 20) Serpentarius, the great healer.
- 22) A horseman beast fighting the wolf.
- 23) Le Petit Chien.
- 24) Constellation to recognize the 1730 invention by John Hadley.



DOWN (con't)

- 26) The Carpenter's level.
- 27) The great baseball diamond rising in the fall at sunset.
- 28) This foal is found playing with the dolphin.
- 30) Where heavenly weddings occur.
- 31) The Keel of the great Ship.
- 35) This Indian Fly arrives with the cross about the middle of May.
- 36) Home of Mintaka.
- 37) The cup of the mirth maker, Bacchus.
- 39) Victim of a feud between her mother and Neptune.
- 42) Snake-like creature equiped with wings and claws.
- 43) With this, Orpheus charmed wild beasts, stones, and trees.
- 44) The flying fish.
- 45) "Such were the heavenly double-Dicks, the sons of Jove and Tyndar."
- 46) Symbol of Hippocrates.
- 48) This king holds a very questionable asterism.
- 49) This minor is always under foot.
- 50) This giraffe sounds more like a ship of the desert.
- 51) This triangle actually has four sides.
- 52) Home of the famous face-on spiral of the Local Group.

'NOVA NOTES' NUMERICAL SEQUENCE:

Readers of Nova Notes who wish to collect and store their past issues in the proper sequence may use the following guide.

The chronological order of Nova Notes is Jan-Feb, Mar-Apr, etc. and the year. Each issue is further identified by volume and issue number. All Nova Notes for 1981 are Volume 12 and Issue Numbers 1,2,3,4,5 and 6 respectively.

PROBABLY NOT PROBABLE YOU SAY?

Look up at the stars tonight and if it is clear you will see that some are bright while others are dim. As the night goes by the panorama changes, for the stars rise and set. Although the development of modern astronomy owes much to the progress of other natural sciences such as physics, chemistry and geology, it was the simple movement of the night sky which first kindled the sparks of man's curiosity. Thus the natural science of astrognosis was developed.

Well, we all have our own particular and (according to some) peculiar interests in this primarily nocturnal hobby of star gazing. Some find more pleasure and even joy in watching M82 expand while others would rather count the stars in M13. Still others try to capture these heavenly objects on film and some would like nothing better than to find a comet so as to have their name immortalized among the stars. There is, as you will recall, a star which has been renamed for the Halifax Centre with the name of 'Bluenose General Assembly'. It's really 5 Pupis but see NN of July-August '80 vol. 11 no. 4 page 66 for details.

Here is the punch line or perhaps I should say formula which I would like to present. We will call it the Edwards formula (for lack of a better name). It is the relation, however pessimistic, for finding the probability of clear weather existing on the date, hour and minute of any interesting astronomical event. By putting forth such a relation, the Edwards name will be placed before the astronomical observing community in a significant manner. And this is done without spending endless cold hours of counting stars or hunting for one of

those faint comets, at the risk of frostbite. Nevertheless the news of this relation will be of the same huge benefit as was the news of a comet's discovery which was first announced in Nova Notes a number of years ago. You might recall Comet Izzit-Hardly-Worthit.

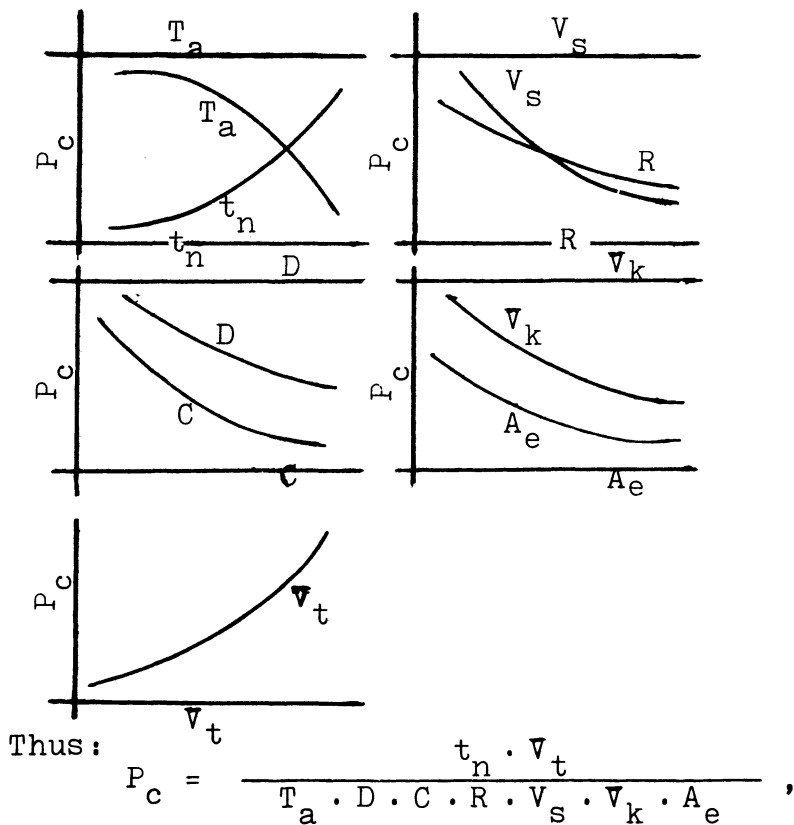
The following relations combine to yield the soon to be famous Edwards formula. The various variables were considered:

- $P_c$  --- Probability of clear skies, ie; no fog, cloud or overcast. Thus clear skies equals 9/10 clear.
- $t_n$  --- time of night of an event worthy of observation.
- $R$  --- Rarity of a specific event.
- $C$  --- Coverage or how widespread an event might be, eg; lunar graze is relatively localized whereas a transit of Mercury can be seen over a wide area.
- $A_e$  --- availability of equipment, the best you have which is most suitable for a given event, ie; binoculars vs telescope.
- $T_a$  --- outside or ambient temperature in deg. Fahrenheit (that is  $^{\circ}F$  equals  $1.8^{\circ}C$  & 32).
- $V_s$  --- the scientific value of an observation of an event is represented by  $V_s$ .
- $D$  ---  $D$  is the "symbol" for the duration in minutes of a given event.
- $V_k$  --- del, an operator, is the one variable which is more or less constant. It is the function relative to the observer or telescope operator. The younger the observer the keener and more energetic he is and thus the stronger the desire to observe an event.

# 19

$V_t$  --- in this case the variable refers to how tired the observer or operator might be after a day's normal work.

Now each of these variables will be shown in a graphical manner indicating their relationship to  $P_c$ .



The Edwards formula; as pessimistic as it might be, we are now able to predict clear or cloudy skies well in advance of a given date. Noting our blessings that we do not live on Venus or Jupiter is the only up-lifting part about this. Good viewing!

Michael Edwards

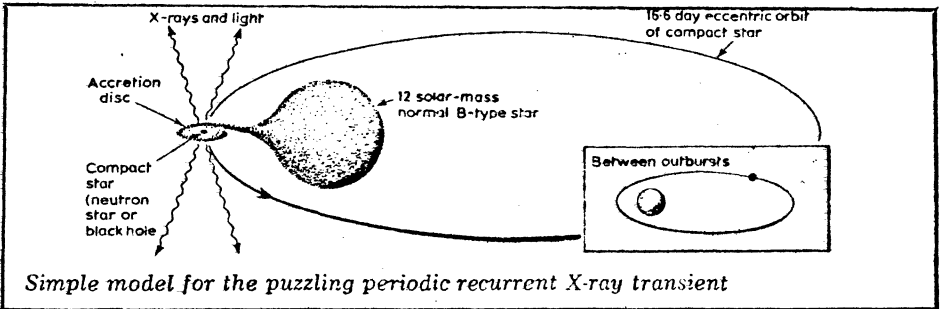
NEWS NOTES

## BLACK HOLES IN LARGE MAGELLANIC CLOUD

In 1978 two British astronomers discovered the most powerful x-ray source yet observed and one which may contain a massive black hole. The two, Nick White and Geoff Carpenter, discovered A0538-66 using the Ariel V x-ray satellite, and found the source to undergo bursts, in a period of 16.6 days. The direction, RA  $5^{\text{h}} 38.$ , DEC  $-66^{\circ}$ , is close to the edge of the Large Magellanic Cloud, which may be coincidence, but a fact which has been investigated carefully.

At the position of the x-ray source there is found a normal B star which has spectral line doppler shifts which are the same as those of the LMC. Old photographs of the region have been carefully inspected and optical outbursts were found with a period of 16.6 days. The 15th magnitude star becomes bluer during the flare, but for periods of up to a year it may not undergo any outbursts. If we conclude that the source is in the LMC, then the power output of the source is something like  $10^{32}$  watts - ten times more powerful than any such object in our galaxy and, in fact, it is about equal to the total x-ray output of a normal galaxy like the Milky Way.

X-ray sources are usually associated with compact neutron stars with a mass equal to the Sun's, but only 15-25 km in diameter. The bursts of x-rays result from infalling matter stripped from a companion and heated up in an accretion disc. The 16.6 day period for A0538-66's x-ray bursts indicates that the orbit of the neutron star is elliptical and that material is pulled off the B star only when near perihelion. When further apart, the spectrum indicated a 12 solar mass B star but when closer, the accretion disc outshines the B star by a factor of 10.



The large amount of x-radiation is a problem because the radiation pressure outward from the source must be less than the gravitation pull of the neutron star and this limits the x-ray output. But since this star undergoes bursts, this restriction does not need to hold and the x-ray power can be abnormally high. During one burst the accretion disc remained for three days, indicating that the gravitational pull was, indeed, very large and this could be explained by a 10 solar mass star. But neutron stars have an upper limit of 3 star masses, therefore, the companion to the B star is possibly a black hole. A0538-66 may, therefore, join the Cygnus X-1 x-ray source as the best candidates for black hole status, and it will, no doubt, be scrutinized more carefully in the future.

Randall C. Brooks

### CELESTRON-8 STOLEN!

Mr. Alexandre Farkas of 565 Viau #6 in Montreal, Quebec; H1V 3G5 had his Celestron-8 stolen. If anyone should come across this telescope, serial no. 360576 please contact Mr. Farkas at - day: 514 645-8741 ext. 238  
 evening: 514 256-0436  
 week-end: 514 243-5369  
 or the Montreal Police, Station 52 at:  
 514 934-2252

PLANETARIUM NOTICE

The Halifax Planetarium has an opening for a volunteer planetarium lecturer to provide popular evening shows to childrens' groups and families. Our shows emphasize star and constellation recognition, accompanied by both legends and factual information.

This planetarium uses a Spitz A-1 projector under a 20 foot dome, accommodating about 25 people in an informal setting. It is housed in the Sir James Dunn Building, Dalhousie.

No planetarium experience is necessary, but lecturers should be familiar with naked-eye sky features and enjoy talking about astronomy with people of all ages.

Training will be provided. Contact Debra Burleson at the Nova Scotia Museum, phone 429-4610.

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