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La Société Royale d'Astronomie du Canada

Reflections — Is the Universe Conscious?

Louie Bernstein
Montreal Centre
reprinted from *Skyward*

It is rather sobering to learn that the very atoms which make up our bodies originated long ago in supergiant stars and that, in effect, we are all made of stardust. However, this is just the beginning. Our connection with the universe goes much deeper than that.

We normally think of ourselves as existing within the universe, but separate from it. In other words, the universe begins where our body ends. Our skin forms the boundary between us and the cosmos. This view of our relationship to the universe is one that dates back to childhood infancy. Babies learn spatial coordination by differentiating their bodies from the surrounding environment. So, we learn the spatial extent of our bodies at a very early age, and this reinforces the idea that we are separate from the space around us. But is this really so?

If we look at our bodies on the sub-atomic level a different picture emerges. We see trillions upon trillions of sub-atomic particles, mostly protons, neutrons and electrons. Now let us imagine that we are moving beyond our skin into the surrounding air. What do we see? Essentially the same thing. Trillions upon trillions of protons, neutrons and electrons. The sub-atomic particles that make up our bodies are *exactly* the same as those that make up the air, the rocks, the trees, our planet and everything else for that matter. In other words, we are made up of the same stuff as the rest of the universe!

On the sub-atomic level, we begin to merge with the universe. The boundary between us and the cosmos begins to blur and becomes indistinct. We are no longer separate from the universe - we become a part of it. In fact, on this level we blend with the universe like tiny drops of water in a vast sea.

If we view the universe as a sea of sub-atomic particles, there are tiny regions in that sea in which the spatial arrangement of those particles gives rise to consciousness. We call those tiny regions human beings! Put another way, once we accept that we are not separate from the universe then we must conclude that small parts of the universe are actually conscious. Those parts are us! That much is undeniable. The real question now becomes: is the universe conscious of itself through us, or is our experience of the universe insular? In other words, does the whole know what its parts are experiencing?

Of course, such questions boggle the mind and take us to the outer limits of science. They lead us into the realm of metaphysics and philosophy, and yet a number of reputable scientists have been seriously pondering such questions recently, and some are even speculating that there may be much more to cosmic consciousness than we think. ✪

Charting a Course for the Society's Future - II

Defining the Amateur's Needs

Derek Baker

"Am I getting my money's worth?" This is a fair question to ask of the R.A.S.C., especially in these difficult economic times. No less valid are the general problems and concerns that were outlined in my article in the previous BULLETIN. From my observations and interviews over the years, these *do* reflect the way that many amateur astronomers feel about the R.A.S.C. In my opinion, the link between the society and its clients, the membership, have weakened over the past two decades, and it will continue to do so unless the society's leadership, on a continuing basis, re-evaluates the needs of its clients and adjusts the society to meet these changes. In this instalment, we will wipe clean the slate and look at what amateur astronomers, in general, would want from a national society.

With thousands of amateur astronomers in the country to consider, one faces a bewildering array of reasons and opinions to address. To effectively organize these inputs requires a generalized framework; specific details must be worked out afterwards. In addition, discussions on individual topics without an overall general framework usually leads to personalized judgements. Debate over entrenched ideas of the society's main functions invariably precipitates negative political conflict and misunderstanding. This must be avoided, given the emotional content of some of the issues to be resolved.

How should we set up the required framework? We must ask "Why does someone join the R.A.S.C.?, and "What keeps an amateur astronomer involved and satisfied?". These questions get to the core of the matter. Once we answer them, we are in a position to create a framework to deal with controversial items, and prescribe programs and services.

As amateur astronomers we are, in essence, life-long learners and explorers of the cosmos, who all start off with an insatiable curiosity.

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BULLETIN

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Letters to the Editor

Big Bang for Little Bucks

Derek Baker deserves a lot of credit for his thoughtful analysis of the R.A.S.C., the first part of which appeared in the December **BULLETIN**. He has raised many points which will give the Long Range Planning Committee much food for thought. While I agree with just about everything Derek said, surely some of the problems which he raises are problems of perception rather than real problems. In other words, when Derek says "There is a strong feeling that..." or "Many members feel that...", I have no reason to doubt him. My purpose in writing is to say that many of these feelings are not based on fact.

Approximately two-thirds of the voting members of national council are centre representatives. The rest are officers and committee chairpersons, either directly elected by the membership or appointed by the council. Even at the fall council meeting, where centre attendance is usually lowest, thirteen of the twenty-two voting members were centre reps. So, if centre members feel that their ideas are being "shot down in flames", that the council is a "reactionary body of bureaucrats" or that the "National Council is not fiscally responsible", whose fault is it?

Here are some answers to the question "What am I getting out of this?" I will restrict myself to the services provided by the $19.20 received by the national society for each regular member:

a) Six issues per year of the *Journal* and **BULLETIN**, for which libraries and institutions pay an annual subscription fee of $72.

b) The *Observer's Handbook*, which retails at $15.50. The *Annuaire Astronomique* is available to francophone members.

c) $2,000,000 in liability insurance permitting centres to run programs for the public.

d) Financial support to enable speakers to travel from one centre to another.

e) Financial support for special centre projects. The Winnipeg Centre received $1,500 for computerization of photometry in 1989; Montreal got $1,500 for video equipment in 1991.

f) Use of the extensive reference library and borrowing privileges of videos and slides at national headquarters.

In addition, the society gives its members the opportunity to serve on committees, to share their ideas, observations, photographs, etc. with others at the annual General Assembly or to submit them to the society's publications. An excellent *Beginner's Observing Guide* and an astronomical calendar are available for only $5 each (plus G.S.T.). Lastly, surely we can all take pride in belonging to an internationally admired organization with more than a century of success behind it.

I am not saying that everything is perfect. That is why we asked all members to complete a survey and why we have a long range planning committee. However, it seems to me that those who know what the society has done and continues to do, have a duty to tell those who might be "in the dark". Those who perceive that their needs are unmet should tell both their representatives on council and the long range planning committee, so that their ideas can become part of the plan.

Finally, I would like to reflect on Derek's statement that "the leadership should be viewing the members as clients". My personal attitude is to view the members as colleagues. We all have a duty to share our strengths and let others help us overcome our weaknesses. That is what this dialogue is all about, isn't it?

Peter Broughton, National President
31 Killdeer Crescent, Toronto, Ontario M4G 2W7

Last But Not Least

As you might expect, I was very interested to see a reprint in the June **BULLETIN** of my first *SCOPE* article concerning the *Journal of the R.A.S.C.* Contrary viewpoints were published in the August **BULLETIN** and I had fully expected my answer to them to appear, since, as I stated in it, many people have entirely misinterpreted my opinions. With the dialogue halted in the August issue, members nationwide have a distorted view of my beliefs. If part of this dialogue is to be reprinted, then I think that all of it should be. I would appreciate it, then, if you would run the third and final part of this discussion as it appeared in *SCOPE*.

Philip Mozel
1281 Falgarwood Drive, Oakville, Ontario L6H 2L7

[I somehow missed the last part of this discussion in SCOPE. It is reprinted below. - PMK]

Since my article on the *Journal* appeared, a number of people have raised concerns which I would like to address. While appreciating the fact that no one attempted to "shoot the messenger", I think some clarification is in order.

One person has called my analysis "meaningless". I made no analysis per se. I simply presented numbers which, like them or not, are available to anyone who cares to look for them. They are open to interpretation, of course, and have been interpreted in different ways. I refrained from doing this, but am glad that their presentation has stimulated debate. My intent, after all was to provide a new basis for discussion. Interestingly, all reaction that I am aware of has centered on the "impact factor" and ignored the other issues raised (i.e. who writes for the *Journal* and how often).

It has also been suggested that many *Journal* articles "taken collectively, will record a vast store of information for future researchers". This is true, as far as it goes. I, myself, have searched every *Journal* over an eighty year period for information in which I was interested. However, 90% of the material published by the astronomical community in this country is published elsewhere (which is the author's prerogative). This means that future researchers will have to conduct most of their searches in foreign publications.

Finally, I am concerned with the way that some people have looked at my article and then written about what they think I believe. For the record: *I support the continued existence of the Journal.* It, with our other publications, makes up an important piece of the society's fabric. From a personal perspective, the *Journal* has not only encouraged me to read astronomy, but to write astronomy as well. I am grateful to the *Journal* and its editors, for this continuing opportunity. My only desire is to see the *Journal* flourish by appealing to the widest number of readers and potential authors among the membership.

A Biased View of Membership Fees

The crux of the financial squeeze facing the R.A.S.C. is its membership fee structure. However they are expressed, our fees are unrealistically low considering the services and benefits members receive. For Canadians, our regular membership fee is only half that of a membership in the A.A.V.S.O., two-thirds that of a membership in the A.S.P. (their non-journal membership), two-thirds of the cost of a subscription to *Sky & Telescope*, one-quarter of the cost of a Plössl eyepiece or about the price of a meal for two at a modest restaurant.

Members missed their chance to give Terry Hicks, our new Treasurer, a hand at balancing the 1993 budget when, at the Annual Meeting last July, they turned down Karl Miller's carefully reasoned proposal for a modest increase in fees. It really bothers me that when members ask someone to take on the demanding job of Treasurer, they then do not respect that person's informed judgement, but shoot him down with a proxy ballot. As reported in the October 1992 **BULLETIN**, those who were actually present at the meeting last July to hear the arguments for and against a fee increase voted 2-to-1 *in favor* of the proposed increase.

Roy Bishop
Avonport, Nova Scotia B0P 1B0

Errata - Successful Messier Marathon

Contrary to what is implied in the second table of the article on performing a successful Messier marathon from Toronto, (in the October **BULLETIN**), the sky's apparent rotation over Toronto does not change from the evening to the morning! The numbers in the columns in the second table (the one containing the "first" seven Messier objects) should be reversed so that the objects are lower in the sky at 8:30 P.M. than they are at 8:00 P.M. ✪

Book Reviewers Wanted

As you know, the "Book Reviews" column in the *Journal of the R.A.S.C.* contains information about a wide variety of astronomical books that are of interest to the general reader. We strive to commission interesting reviews by knowledgeable reviewers. If you would be interested in being considered as a reviewer, please send your name and address, your areas of expertise/interest, your qualifications and a reference to some of your recent published work (which can include articles in the *Journal*, **BULLETIN** or centre newsletters) to:

Book Review Editor
R.A.S.C. National Office
136 Dupont Street
Toronto, Ontario
M5R 1V2 ✪

Items of Interest

Dr. Bishop's Brother's Bones

A new fossil, containing the footprints of a long-dead amphibian, was recently added to the geology display at the Nova Scotia Museum. The creature has been named *Perotodactylopus bishopi.* It was "discovered" by George Bishop, the younger brother of Dr. Roy Bishop, who first noticed it in 1974. The rock which contained the trackway was one of several that their father had purchased from an older fellow who scavenged the beach looking for flagstones to sell to people to use in walkways, etc. At the time of the discovery, this particular rock was doing duty in the trunk of the family car to provide better winter traction! ✪

Event Horizon

July 2nd - 5th

1993 General Assembly
Mount Saint Vincent University
Halifax, Nova Scotia
For registration information, contact:
David Lane
26 Randall Avenue, Apt. 4
Halifax, Nova Scotia
Canada
B3M 1E2
(902) 420-5633 ✪

Papers Anyone?

Have you done some interesting observing this year? Read some interesting research lately? Acquired any fabulous astrophotos recently? Or maybe you have been involved in some aspect of public education in the field of astronomy and related sciences? Of course you have, and now we want you to share your experience and knowledge with the rest of the society! The dates for the Halifax General Assembly are July 2nd to 5th, 1993 and the G.A. Organizing Committee invites you to be a presenter for this event. The G. A. is fast approaching (but not so fast that you don't have time to prepare!) and will be the perfect opportunity for you to share what you have been doing with the rest of us.

We are eager to hear from you about your presentation and would appreciate the following information: author(s) name(s), presenter's name, author's address, phone/FAX number, electronic mail address (if any), the title and a short abstract of your talk (200 words), along with a short biography of yourself. Also, let us know if any special presentation equipment (other than slide and/or overhead projectors) will be required. Please type the information, double-spaced, on a single letter-size page. The deadline for the receipt of abstracts is May 31st, 1993.

Papers should be limited to ten minutes in length and, schedule permitting, there will be a five minute question period after each speaker. There may be a limited number of twenty minute time slots available for longer presentations but these will be allotted on a first come, first served basis. We look forward to hearing from you! You may send your response either by electronic mail to chapman@maggie.drea.dnd.ca or by normal mail to:

R.A.S.C. 1993 G.A. Paper Sessions
c/o David Chapman
8 Lakeview Avenue
Dartmouth, Nova Scotia
Canada
B3A 3S7 ✪

Moonshadow, Moonshadow

Patrick Kelly
Halifax Centre

Each year, I have waited impatiently for the November mail to bring me that little brown envelope which heralds the arrival of the next year's handbook. The reason for this anticipation is a desire to analyse the phenomena of Jupiter's satellites for the upcoming observing year. Now for most of you, your initial thoughts may be, "Why all the rush when there is usually at least one event every night?" Ah, but you see, I am not interested in just any old event. What I am seeking is one that I am sure has been seen by few, if any, Jupiter watchers: the disk of the planet graced by two shadows at the same time!

Each year, I scan through the columns of information and determine all of the times at which this happens. The total number of events is typically between one and two dozen. However, when you allow for the actual time of event, there are additional complications. For example, Jupiter has to be above the horizon and the Sun, preferably, below it! When these are taken into account, the number that are visible from Halifax is quite a bit smaller. In addition to these "normal" events, there is also the rare chance for the "holy grail" of shadow watchers. Rarely, Io's shadow will appear on the disk of Jupiter behind that of another moon and actually catch up to it, overtake it and leave the other limb first!

Unfortunately, events have always conspired to prevent me from seeing one of these: too early in the morning, teaching a night class, weather, etc. I then decided to see whether conditions would allow someone else to see one of these events, since I wasn't having particularly good luck at it. So, for the last several years, I have subjected the members of the Halifax Centre to yearly articles detailing the times of these events and exhorting them to see if they have any luck. No response. Early last year there was even a "holy grail" event visible in the early morning. I went to great effort to point out that since I had yet to see a photograph of any event involving two shadows in all of the years that I have subscribed to *Sky & Telescope*, a photographic record of this event was sure to be a fast track to publication, fame and glory.

The next day I contacted the various astrophotographers in the centre to see if they had any luck. You should have heard the excuses: "It was too cold!" (A wind combined with -20° may be considered cold if you live in Bermuda, but you are supposed to be a Canadian!). "It was too early in the morning." (You never heard of alarm clocks!). And "It was cloudy from where I was." (Don't you have some sort of hydrogen oxide filter to take care of that?)

So, now I am providing the information so that an even larger group of people will have a chance to capture one of these events for posterity. Because of Jupiter's relatively small size, I would expect that those members who have CCD cameras are going to be able to provide some competition for the astrophotographers in the membership. To make life a bit more interesting, I have even also put together a list of the times when two of Jupiter's moons can be seen transiting the planet at the same time. Observing these events should really prove to be a challenge!

The two tables describe the circumstances of each event for the rest of the year. Table 1 covers shadow events, while Table 2 covers transit events. The lack of events after July is caused by the fact that Jupiter goes behind the Sun from August until November and there are no such events in December. **NOTE THAT WHEN CONVERTED FROM UNIVERSAL TIME TO LOCAL TIME, MANY OF THESE EVENTS WILL FALL ON THE EVENING OF THE PREVIOUS DATE!**

The first column gives the date of the event. The second column gives the moon whose shadow (or disk) is already visible on Jupiter before the second one arrives. The next two columns give the name of the moon and the time of the ingress of its shadow (or disk) onto Jupiter. Remember that these events are not instantaneous and that the times given are for the midpoint of the actual event. The following two columns give the name of the moon whose shadow (or disk) egresses from Jupiter's disk, along with the time of this occurrence. This ends the period of two shadows (or disks). (Note that for a "holy grail" event, the ingressing moon and egressing moon would be the same. Unfortunately, there are none of these events for the rest of this year).

The last column indicates which areas in Canada can expect to observe each event. Representative cities have been chosen from each time zone, using the following symbols: S=St. John's; H=Halifax; O=Ottawa; W=Winnipeg; C=Calgary and V=Vancouver. Other observers should be able to interpolate the visibility for their location. Cities followed by an asterisk indicate that the entire event is visible in a dark sky. (I had started the other way around, but all of the cities except two ended up having asterisks!) Details for each event follow.

Shadow Events

May 24: From Calgary, Jupiter will be only 10° above the horizon while the Sun will be 16° below the horizon.

June 11: From St. John's and Halifax, the start of the event occurs when the Sun is 13° and 11° below the horizon, respectively, while the Sun is still up from Ottawa. The end of the event is visible in a dark sky from St. John's and Halifax while the Sun will be 16° below the horizon from Ottawa.

June 18: From St. John's and Halifax, the event begins when Jupiter is 6° and 14° above the horizon respectively, with Jupiter setting. From Ottawa, the event begins with Jupiter 21° above the horizon, but the Sun 18° below. The event ends in a dark sky but with Jupiter only 2° above the horizon. For the three western cities, the beginning of the event is not visible, although Jupiter will be well placed near the end of the event with the Sun being 15° below the horizon from Winnipeg, 10° below from Calgary and only 8° below from Vancouver.

June 25: From Winnipeg, the event begins with Jupiter only 4° above the horizon and setting. From Calgary, the event begins with Jupiter 14° above the horizon and the Sun 12° below the horizon. Near the end of the event, Jupiter has dropped to 4° above the horizon, with the Sun moving down to 15° below. From Vancouver, the event begins with Jupiter 21° above the horizon and the Sun only 11° below the horizon. Near the end of the event, Jupiter has dropped to 10° above the horizon, with the Sun moving down to 16° below.

Transit Events

June 11: The start of the event will not be visible and at the end of the event the Sun will be 8° below the horizon as viewed from Halifax and only 6° below as viewed from St. John's.

June 18: From St. John's and Halifax, the event begins with the Sun 16° and 15° below the horizon respectively. The event ends in a dark sky. From Ottawa, the Sun is 10° below the horizon at the beginning and 16° below at the conclusion.

June 25: From Halifax, Jupiter is 4° above the horizon at the start and setting. From Ottawa, Jupiter sets before the event is over. From Winnipeg, the event begins with the Sun 9° below the horizon. At the end, the Sun has set to 16° below the horizon, but Jupiter is now only 7° above the horizon. From Calgary and Vancouver, the beginning of the event takes place during daylight. The event ends with the Sun 12° below the horizon from Calgary and 11° from Vancouver.

July 2: From Calgary and Vancouver, the start of the event occurs when the Sun is 13° and 12° below the horizon respectively. Although the sky darkens as the event progresses, Jupiter sets before the event is over from both locations.

July 4: From St. John's, Halifax and Ottawa, the Sun is 14°, 12° and 6° below the horizon at the start of the event. At the end, these numbers change to 17°, 17° and 12° respectively.

July 20: The entire event lasts less than ten minutes. From St. John's, the Sun is 12° below the horizon, while from Halifax it is 8°.

If there is sufficient interest in this type of material, I will try to present it each year, although probably in a more condensed format. Good hunting and I hope to see an image of one of these events in an upcoming *Sky & Telescope* or the 1994 National Calendar! ✪

Date (UT)	"Original Moon"	Ingress Moon	Ingress Time (UT)	Egress Moon	Egress Time(UT)	Visibility
May 24	Europa	Io	8:36	Europa	8:43	C,V*
June 11	Europa	Io	1:23	Europa	3:16	S,H,O
June 18	Io	Europa	3:27	Io	5:28	S,H*,O,W,C,V
June 25	Io	Europa	6:05	Io	7:22	W,C,V

Table 1 - Shadow Events

Date (UT)	"Original Moon"	Ingress Moon	Ingress Time (UT)	Egress Moon	Egress Time(UT)	Visibility
June 11	Europa	Io	0:10	Europa	0:49	S,H
June 18	Europa	Io	2:03	Europa	3:23	S,H,O
June 25	Europa	Io	3:57	Europa	5:59	H,O,W,C,V
July 2	Io	Europa	6:06	Io	8:03	C,V
July 4	Io	Ganymede	1:33	Io	2:32	S,H,O
July 20	Io	Europa	0:47	Io	0:54	S,H

Table 2 - Transit Events

Across the R.A.S.C.

Edmonton

The Edmonton Centre hit paydirt – in a big way! Through arrangements with the Alberta Gaming Commission, volunteers from qualifying organizations can help run a casino, keeping any profits for approved public-oriented projects. As a result of the casino, which was held in April of this year, the Edmonton Centre received $48,000! Wheel of fortune or what!

The first purchase made from this windfall was a NeXT computer desktop publishing system for the centre's STARDUST editor. For computer geeks, it has 24 Mb of RAM, a 250 Mb hard drive along with a 400 dpi PostScript laser printer, flatbed scanner and the very latest desktop publishing software for the NeXT.

Interesting ideas for use of these funds are still being reviewed. Full participation by all centre members has been strongly encouraged. These proposals range from astronomy equipment, such as a large refractor and a CCD camera, to education oriented projects like scholarships and astronomy workshops.

Victoria

The September meeting of the Victoria Centre featured a video-tape from N.A.S.A. Select TV on the Mars Observer. The tape was provided by council member Frank Ogonoski. The Mars Observer was to be launched September 16th, 1992 and to orbit Mars and be operational by December 1993. The speaker at our October meeting was Dr. Henrik Vedel recently from Denmark but now at the University of Victoria. Dr. Vedel's informative talk was on the nature and formation of galaxies. In November the centre's annual general meeting and banquet took place. With excellent food and an excellent speaker the evening was extremely successful and enjoyable. The after banquet speaker was Dr. Timothy Davidge formerly Canadian Resident Astronomer at the Canada-France-Hawaii Telescope. He is presently Canadian Project Astronomer for the Gemini 8 metre telescopes. Dr. Davidge's account of one day in the life of an astronomer at the Canada-France-Hawaii Telescope was very entertaining and amusing. In December, the centre had a special treat. Linzhuang Gao of the Beijing Astronomical Observatory spoke to us about astronomy in ancient China and how the Cultural Revolution affected astronomy in that country. One was amazed to learn that 1100 years before Halley the Chinese astronomers predicted the return of the comet. ✪

National Council Highlights

The National Council met on February 6th in Toronto. The meeting started on a sad note as Peter Broughton reported that one of the society's most renowned members, Dr. Helen Sawyer Hogg, had passed away at the end of January. A full description of Dr. Hogg's career and association with the society will appear in a future issue of the *Journal*.

The report of the finance committee, including the 1993 budget, consumed the greatest amount of time. Numerous cost saving recommendations were approved in a variety of areas. For details and the rationale behind them, consult the minutes, once they are available. The changes to council travel included: limiting travel reimbursement to advanced booking charter (ABC) fares, instead of regular economy fares; setting up arrangements with a travel agent to determine the best ABC fares and distributing this information to council members; eliminating the current entitlement of officers for hotel accommodation; and increasing the minimum return driving distance for reimbursement from 100 km to 600 km.

In regards to the review of membership categories and fees, it was decided to eliminate the senior membership category and raise the life membership fee from 20x the annual regular fee to 25x that fee. The council also approved a recommendation to increase the regular membership fee for 1994 to $36 from $32. Note that the changes mentioned in this paragraph (and elsewhere that refer to changes in the constitution) require the approval of the membership at annual meeting in Halifax.

To help reduce the turnover in membership, a new special committee, the membership and promotion committee, was formed. Its mandate is to recommend and implement measures to maintain and increase the society's membership; promote public awareness of the society; and recommend measures to enhance and make more effective the services provided to members. The committee will be chaired by Grant Dixon of the Hamilton Centre.

The constitution committee prepared a model proxy form to allow for individuals voting by proxy to more easily, and clearly, prescribe how they wanted their vote handled. The form was adopted for use at future G.A.'s. The committee

(continued on page 8)

Worlds in Collision?

Alister Ling
Edmonton Centre
reprinted from *Stardust*

By now many of you will have heard of the possibility of an encounter between Earth and Comet Swift-Tuttle. This announcement was apparently made by Brian Marsden, the fellow in charge of the International Astronomical Circulars and one of the top people in asteroid and comet orbit computations.

It has been known for some time now that the famous Perseid meteor shower in August is the result of Earth passing through the dust and pebbles left behind from Swift-Tuttle's tail. Since the dust shares pretty much the same orbit as the comet, it is certainly possible that one day we will sweep up the parent body. So let us check out the odds.

The meteor stream and Earth cross at a relative speed of 60 km/s. In "normal" units, that is 216 000 km/h! We can easily imagine that a direct hit would be devastating. Now, Earth's diameter is 12 742 km, but its effective diameter is a bit bigger since gravity would pull the comet in if it was otherwise going to barely miss.In rough terms, we will call it 15 000 km. At the comet's velocity, this distance is travelled in a bit more than four minutes. As a worst case scenario, I'll consider it to be five minutes.

So, what are the odds of Earth and Swift-Tuttle occupying the same space at the same time? At the low end of the estimate, it is the chance of two bodies being in a five minute segment of their orbit, which works out to 1 in 1 400 000 000 000. At the high end, there is only a two week uncertainty in Swift-Tuttle's arrival time at the intersection point which gives us odds of 1 in 4 000. However, that is assuming that the orbits actually cross. We see two peaks in the Perseid shower, not one.

So, sit back and imagine what a close encounter would look like on a clear mid-August night at 3:00 A.M. with Perseus high in the sky. Once the comet becomes visible to the naked eye, its tail would be visible, since by fortunate coincidence it would be pointing sideways relative to Earth's line of motion. Over the course of a few days the head of the comet would move, slowly at first, and then appear to hang motionless against the starry sky, since it would be coming right at us on the last night. The meteor shower leading up to the encounter would be nothing short of spectacular, since there would be loads of particles leading the comet in its orbit. As Swift-Tuttle literally zooms past, the eye should be met with the Star Trek effect of jumping into warp drive, only much better. We will likely get a preview with the arrival of the Leonid meteor storm slated for November 1999.

I was relieved to hear that Brian Marsden said that at the moment there is a *two week* margin of error in the return date. Now, if N.A.S.A. can send space probes to the planets with near precision, why would there be a two week uncertainty here? Part of the difficulty is that it is actually hard to pin down exactly where the nucleus of the comet lies within its shroud of dust and gas. Furthermore, we do not know *exactly* where the outer planets are, so there are errors in accounting for their gravitational effects. The most important difficulty is that the comet has several jets of gas and dust that act like manoeuvering rockets, and we can only begin to guess at their strengths, locations, consistencies and the times at which they start and stop.

As long as we avoid a direct hit, passage through the coma should not hurt the Earth's biosphere much more than a strong volcanic eruption. The reassuring point is that the odds are on our side. ✪

Charting a Course... - II

(continued from page 1)

Those who *stay* actively involved in the hobby remain because a) their *essential needs* are addressed, and b) their *learning process* can be assisted. Satisfaction in these areas makes the hobby pleasurable for the participants and stimulates the desire for more learning. Hence, these are the two areas which are most useful when examining the role of the R.A.S.C. Since we are aiming to look at the amateur's most basic needs, we will begin by considering the amateur astronomer who does not belong to a club. After that, the enriched experiences of the amateur who does belong to a group will be investigated.

The Amateur's Essential Needs

I have observed that in order for recreational astronomy to be rewarding, successful, and exciting, an amateur has basic needs in the following areas. If one is deficient in any of these areas, the hobby becomes frustrating and the amateur moves on to other interests.

KNOWLEDGE: Being well versed in certain concepts and facts, which provide foundation for further growth.

INFORMATION: Having an influx of news and relevant sources of information for the purposes of further learning and the stimulation of new ideas.

EQUIPMENT: Having the equipment and skills to explore the universe, making ones' own discoveries, and gathering further information.

MOTIVATION: Having sources of continuing encouragement, inspiration and reward.

ATTITUDE: Taking an active role in the ongoing process of learning.

The Amateur's Learning Cycle

Many amateurs do not consciously approach their hobby in a highly structured and formal manner. Nevertheless, there are general steps that can be categorized and the process can be modelled in the form of a "learning cycle". Once the amateur's essential needs have been met, a representative learning experience often unfolds in the following manner (see the left side of Figure 1, found on page 7). This process, or portions thereof, is repeated throughout the person's involvement in the hobby.

This "learning cycle" seems to model *most* situations, such as: outlining the location of a constellation for the first time; finding a Messier object; observing the eclipse of a Jovian satellite; photographing a comet; researching the life of Eddington; monitoring a variable star; or understanding what causes the northern lights. I invite you to consider your own experiences and see if they fit in with this model.

If one takes a snapshot of an amateur at any point in time, they are probably dealing with many different topics and interests, and are probably at one of the five stages in each case.

Not all topics will be explored to the completion of the cycle. If one picks up *Sky and Telescope* to read, or listens to a speaker at a meeting, most of the reading/listening results in no progress beyond the first few steps. The amateur filters out areas which are not motivating or feasible. Amateur astronomers usually take a 'smorgasbord approach' to selecting activities throughout one's involvement in the hobby. Those who find the hobby dynamic have at their disposal the largest number of options.

It is important to note that an amateur astronomer can complete this cycle *alone*, without belonging to any organization. One can find the essential materials, complete the learning processes, and enjoy the hobby without the R.A.S.C. I have several friends and know of many others who are proof of this.

The Amateur's Essential Needs in a Club Setting

In order for an amateur astronomer to join an astronomy club, they must see that the club can provide their "essential needs" more readily and to a larger degree than they could fending for themselves. In order to *stay* in that club, they must also have their "learning process" supported through *all* stages of growth, and, be assured that they are valued and respected by

their peers. Let us go through a checklist using the list of essential needs of the amateur astronomer to see where a club can benefit the amateur the most.

KNOWLEDGE and **INFORMATION**: Sources of basic knowledge and information are readily available from books and magazines. These abound in libraries and bookstores, so the R.A.S.C. should not spend too much time or money in creating and publishing basic sources of astronomical information. They do not constitute a great selling point for membership in the R.A.S.C. However, by expanding the number of available references and making it easier and cheaper for the amateur astronomer to get hold of these items, such as through a club library, the R.A.S.C. can make itself more appealing.

EQUIPMENT: Acquiring equipment and cultivating skills can be accomplished by some amateurs on their own. However, financial concerns may limit the equipment available, and skills development is not always thorough or efficient when one works alone. I have observed that a growing percentage of novices entering the hobby (and the R.A.S.C.) during the last ten years, require an increasing amount of guidance in order to avoid being overwhelmed in a hobby filled with a growing amount of jargon, technology, and an intimidating variety of expensive equipment to choose from. It is a benefit to be surrounded by a group of helpful, experienced amateurs with some degree of expertise. Hence, a local astronomy club can contribute *significantly* by addressing these areas of need.

MOTIVATION and **ATTITUDE**: These needs are best developed in a club where the amateur may work with and assist others with similar interests, receive encouragement, and share their personal discoveries with their peers.

There are real reasons why one is better off joining a club, given that the benefits balance the costs. Ultimately, one joins an astronomy club for more knowledge, to have more "toys" to play with, to share ideas with like-minded amateurs, and finally to build self-esteem and confidence in a challenging hobby. A club can help the amateur meet all of their essential needs.

The Amateur's Learning Cycle in a Club Setting

Given that the amateur astronomer can enjoy the hobby on their own, and given that there are ways in which they can benefit from working with a group of like-minded individuals, it is necessary to explore the amateur's learning cycle in a club setting. Note that the right side of Figure 1 shows the areas where additional possibilities exist because of membership in a club. Notice that there are certain items that repeat themselves among the stages - these are critical to the health of any organization.

If one accepts these "learning cycle" models as satisfactory, our society's place in the scheme of things follows quickly. Our job is to provide support and assistance at each of the stages in the cycle. Items which do not impact on any of these stages are questionable in their value. If few of these areas are perceived to be supported and actively promoted by the local centre and the national council, then the individual member will see no advantage in belonging or contributing to the R.A.S.C.

[In the June issue - Part 3: The Society Today] ✪

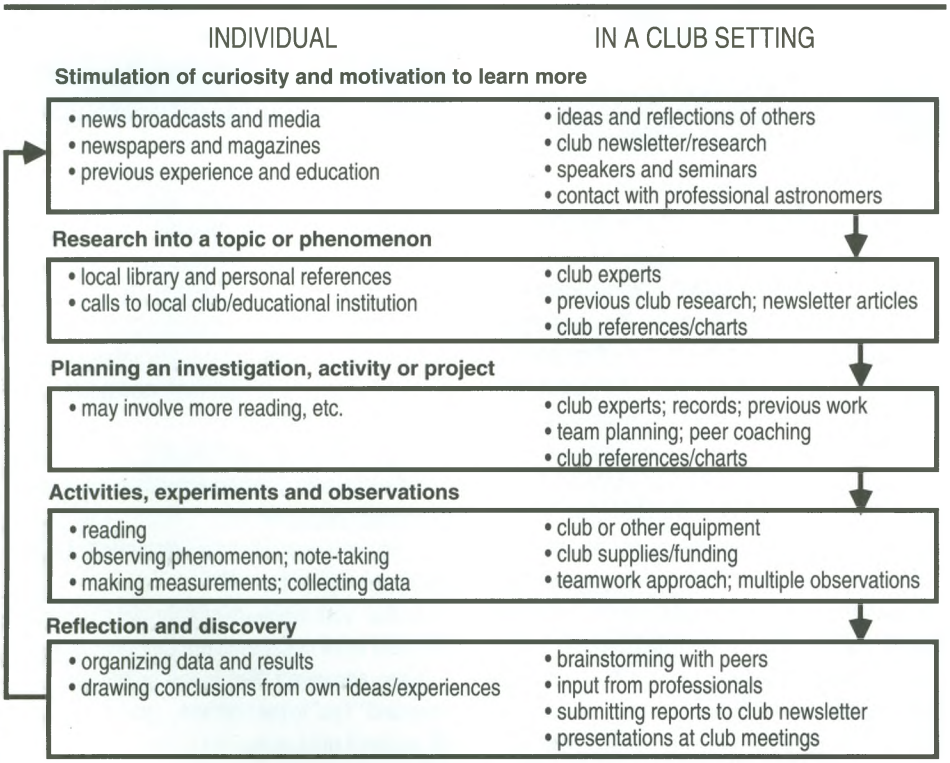

Figure 1

The Joys(?) of Astrophotography

Clive Gibbons
Hamilton Centre
reprinted from *Orbit*

I have just finished leafing through my dusty, tattered astrophoto albums. They are filled with dozens of lunar, planetary and deep sky prints. Then there are the shoeboxes and projector trays full of colour slides - hundreds of photos covering ten years worth of effort to capture the heavens on film. Now I look at them all and can honestly say that only a tiny percentage are pleasing to me and absolutely none can rival the best that I have seen elsewhere.

Was it a total waste of time and money? Well, a lot of money was spent to purchase the necessary telescope and accessories to try and take the best possible photos. There were all the hundreds of rolls of film that went through the camera, much of which ended up in the trash soon after processing. One cannot forget the untold number of hours spent setting up, polar aligning, tediously guiding on faint stars, all the while grumbling about clouds, dew, skyfog, reciprocity failure, numbed or painful body parts, stinging insects, car headlights, poor polar alignment, gusty winds, drive errors, dying batteries, airplane lights, nature's call, that strange noise in the bushes behind you, and, if the evening was successful, morning twilight!

What made it all bearable and kind of fun was the participation of others, who were caught up in the same crazy game and provided a measure of companionship, support and friendly competition. But, alas, after a number of years of improving skills and refining techniques, the fun began to fade. It became a chore, photographing the same object over and over again in a quest for perfection that was impossible to achieve. Our site was not at an altitude of 3 000 metres, under desert skies and twenty degrees further south in latitude. We could do good work with what we had and staying where we were, and better work by driving 150 kilometres further north, but never, ever, could we realize our full potential. That was the ultimate frustration to me; one that was reinforced whenever I looked at photos in *Sky & Telescope* or *Astronomy* magazines.

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Tales From Beyond the Event Horizon

Mark Kaye
Toronto Centre

From the first time I sat down at a terminal with a 103 baud acoustic modem, I was awed by the power of telecommunications. To me, it seemed like a logical extension of the computer, the ability to use it from any place and to make the transfer of data easy. Thankfully, the speeds with which modems talk to one another has improved drastically, with 14 400 bits per second (bps) or more, being readily available to today's computer user.

The first device I wanted to get for our, then new, personal computer (PC) was a modem. 2 400 bps was considered to be the state of the art and all that was possible over regular phone lines. Modems were expensive pieces of equipment and finding a dealer who even knew what one was, let alone stocked one, was troublesome. Modems seemed to have a reputation that conjured up images of hackers breaking into strategic command computers or making illegal long distance phone calls without paying. So, it took me a while to finally get around to installing a modem in our old XT.

I can still remember how overwhelmed I felt the first time I signed on to a bulletin board service (BBS) and caught a glimpse of all of the information available to me. I immediately latched onto astronomical conferences, a place where people from all over the world were talking about what they were seeing in the heavens. There was no turning back.

After starting our own BBS, I was amazed to find how little interest there was in "BBSing". Bringing the topic up at R.A.S.C. centre meetings only brought blank stares. It was as if I was talking astrology! At the time, I was editing the centre newsletter and I got better response from other BBS users than I did from our local centre.

I must say that I was very happy when a new member who owned and used BBSs joined the club. Kevin Kell really helped break the ice. Gradually it seemed like more and more of the club members were purchasing modems for their computers and taking part in astronomical conferences. Soon, we had a thriving local R.A.S.C. echo for members to talk about astronomy and what was happening within the local centre. It was Kevin's idea to start a Canada-wide R.A.S.C. echo to help members of the society telecommunicate.

In the past few months, we have begun establishing this Canada-wide echo. When we finally upgraded our modem to v.32bis, (14 400 bps) the cost of moving mail around the country came within easy reach. For only 27 cents, I can send over 30 000 characters of text from Toronto to, say, Edmonton. I eventually got in touch with Sid Lee in Calgary and Dan Cote in Québec City and we started the R.A.S.C. echo. So far, the centres involved are Calgary, Kingston, Québec, and Regina.

We are trying to expand into other centres as well. If you use a modem and are interested in being a part this conference, then I would like to hear from you. What I would like to see is at least one BBS in every centre hooked into the echo. There is already a country wide system in place using Internet, but this system is only available to academia. Our hope is to try and make this service available to the rest of the amateur community who use computers. We are using our computer as the central mail hub and making calls to other centres. A system of regional hubs could be established so that mail costs are kept low. Centres could poll for mail as often as they wish (or can afford) and a large part of the cost will be handled by me shipping mail to these regional hubs. Still, at the present rate of mail traffic, our costs are very reasonable. It is great to hear about what people in other parts of the country are seeing.

You can get in touch with me in several ways. Mail can be sent to Mark Kaye via Fidonet at 1:249/109. Regular mail can be sent to RR#1 Inverary, Ontario, K0H 1X0 or you can call The Observatory BBS at (613) 353-6495, (8 bit, no parity, 1 stop bit, v.32bis or v.42bis) any time. I hope to hear from you. ✪

National Council Highlights

(continued from page 3)

also recommended the approval of the Windsor Centre by-laws, which was done.

The nominating committee report nominated Dr. Randall Brooks of Ottawa for the position of national secretary. The committee also recommended appointing Sandra Ferguson of Saskatoon as the new Astronomy Day coordinator, Robert May of Toronto to complete the term of chair of the property committee and Reverend Robert Evans of Australia as a new honorary member, subject to his acceptance.

The computer use committee reported that, hopefully by the end of the year, centres will be able to submit membership lists on disk. This should significantly streamline the managing of membership information. On a similar nature, a proposed change to the constitution was approved which will not allow for back issues of the *Journal* and **BULLETIN** for memberships processed after January 31st.

As a result of the report of the light pollution committee, the council approved a certificate of merit which will allow centres to officially recognize firms that install environmentally friendly lighting systems.

The extension of the membership survey deadline resulted in a total of 447 surveys (≈15%) being returned. The raw data for all of these has been entered into the computer, and a detailed report is expected at the general assembly.

Sales of the 1993 national calendar have gone well. As a result a total profit of at least $750 is expected, which will be split evenly between the Vancouver Centre and the national society. Approval was given for a 1994 calendar, which should be ready in mid-August. An initial printing of 1 000 will be made. However, if additional orders from bookstores, planetaria, science centres, etc. are received in advance, this number may be increased.

Funding was also approved for a new edition of the Beginner's Observing Guide. The new version, which will have significant changes, will contain observational data for the three year period from 1994 to 1996. To better reflect the costs of production and distribution, the new edition will be more expensive, but will still be under $10.

Lastly, a special project grant was made to the Windsor Centre to allow them to purchase a slide projector for use at centre meetings. The centre had raised $500 towards the projector themselves, and received a grant for the remaining $436. ✪

The Joys(?) of Astrophotography

(continued from page 7)

For some people, astrophotography is a personal challenge; to do the best you can and be proud of the results. Such a goal is commendable and can provide a lifetime of enjoyment. If, however, you look at a beautiful photo by Tony Hallas or Jack Newton and say to yourself, "I can do that!", it is time to "get real" and answer the following questions.

1. Do you live where they do?
2. Do you have their equipment or the fortune necessary to buy it?
3. Do you know what they do or do you have the capability to learn it?
4. Are you single-mindedly determined to succeed at all costs until the day you die?

If you answered "No" to the first three questions and "Yes" to the last one, you might as well kill yourself right now... It will save a lifetime of suffering! ✪