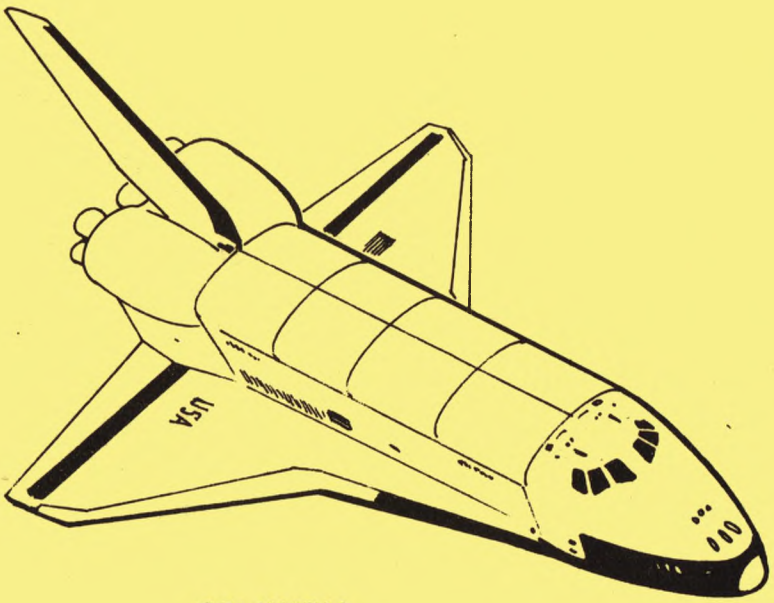
NOVA NOTES



COLUMBIA

BI-MONTHLY JOURNAL OF THE HALIFAX CENTRE

SEP-OCT 1982 VOL.13, No 4 5

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NOTICE OF MEETING

Date: Friday, 17 Sepetember, 8:00 PM

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

Speaker & Topic: Member's Night
Anyone wishing to present a talk or demonstration of astronomical interest please let any one of the executive know in advance so that it may be put on the program.

COW ROUND-UP--1982

The 6th annual Camping Observing Weekend (COW) of the Halifax Centre was held in New Albany at the invitation of Dr. William Holden, our Honorary President. Members began arriving on Friday evening (16th July) setting up camp around Dr. Holden's observatory and at his cottage on nearby Trout Lake. Those pessimists from Halifax who only saw cloud and fog at home missed a reasonably clear evening of observing in New Albany. Several of us stayed up until 3:00 am interspersing observing with socializing in Dr. Holden's kitchen. We even found a few new Messier objects, observed a display of aurora and caught a glimpse of a few fleeting meteors. Unfortunately that was to be the extent of our observing.

→

Saturday saw the usual communal meals which proceeded almost continuously from 7 am to 7 pm--one was never wanting for a bite to eat. Saturday was not a day for observing, there being some low flying cloud. However, it was ideal for water activities and a variety of craft were on hand to suit the pleasure of members--a noisy, bumpy motor boat (sorry Mike), a couple of quiet, soothing canoes and even a tipsy wind surfer splashing over or into (depending on the navigator) the waves. And, of course, the water was warm and inviting for the swimmers in the crowd.

In the evening we were treated to a travel log and movies of an expedition that none of us will ever have a chance to duplicate. Dr. Holden showed his movies of the expedition he headed in 1937/8 for the American Museum of Natural History to British Guyana. The expedition consisted of several scientists whose primary purpose was to collect specimens for the Museum's collections. The scientists were assisted by native porters, boat builders and boatsmen--up to 40 at a time--who joined and dropped off at various points along the expedition's path up the Essequibo River, across the tributaries of the Amazon and down that great river to the Atlantic. The films were absolutely fascinating and I hope we may be able to persuade Dr. Holden to show them at a centre meeting this fall. The 30 or so people who saw them the first time will be back, I'm sure to see them again.

Sunday was occupied by more swimming, boating, eating and socializing. But no observing of celestial objects again due to low flying cloud. The consenses was that this year's COW was the best and most successful ever. All who visited Dr. Holden and his dog, Mac, want to thank him for being such a gracious host.

R. C. Brooks
Secretary

INTERNATIONAL UNION OF AMATEUR ASTRONOMERS

During recent years the greater sophistication of professional instrumentation and the ability to study astronomical objects from above the confines of the Earth's astmosphere have somewhat reduced the scope of the serious amateur astronomer who wishes to undertake a programme of scientifically useful work. In some areas of study there has been a change of emphasis, in others a need for increased specialization; but the amateur can still play a vital role and this is recognized by professional astronomers.

It had long been felt that the value of amateur observations would be enhanced if there existed an international organization to correlate them and when, in 1966, a joint proposal to this effect from Patrick Moore (Great Britain) and Ulf R. Johansson (Sweden) appeared in Sky and Telescope, it brought a large and immediate favourable response. Tentative steps towards the formation of such an organization were taken during August 1967, when a number of amateurs happened to be in Prague, Czechoslovakia, attending the Thirteenth General Assembly of the International Astronomical Union. An informal meeting was held, at the suggestion of Dr. L. Perek, General Secretary of the I.A.U., which resulted in the setting up of a provisional committee with Mr. Moore as chairman. In 1968 the committee accepted an invitation from the Italian Astronomical Society and the Bologna Astronomical Association to hold an inaugural congress in Bologna, on April 19-21, 1969. And thus, on April 19, 1969, the International Union of Amateur Astronomers became a reality, with the acclamation of representatives from sixteen nations.

The main role of the I.U.A.A., to co-ordinate the activities of amateur astronomers throughout the world, is undertaken by Commissions, which, like those of the I.A.U., facilitate the international exchange of information by publishing, in the Union's quarterly newsletter, Communications,

summaries of recent developments supplemented by extensive bibliographies. The Union in no way impinges upon the autonomy of national organizations, nor encroaches upon the valuable work they undertake, since it does not attempt to collect or evaluate observational data, but rather provides references to where such data may be obtained. It is anticipated that the Union will enable a better liason to be achieved between amateur and professional astronomers, and that, as a consequence of this it will be able, if requested, to suggest to national organizations ways in which their observing programmes could be amended so as to ensure maximum scientific usefulness.

The I.U.A.A. is an amateur body and as such gives a new dimension to amateur astronomy; however, with neither the official backing nor the financial resources of its professional counterpart, the I.A.U., its success or failure depends largely upon the degree of support it receives from national organizations, local societies and individuals. There are two categories of Union membership, Corporate and Individual, for which the current rates are 24.50£ Sterling and 8£ Sterling respectively.

Members are entitled to attend the Union's General Assembly, held as a rule every three years, and to receive its publications, namely the Proceedings of the General Assembly, and the quarterly newsletter, Communications. Membership forms are available from the Union Official whose name and address are given below, who will also be pleased to answer any specific enquiries about the Union.

Through the I.U.A.A. amateur astronomers now have the chance to benefit from international collaboration: it is up to them to make the best use of this opportunity.

Mr. C. Kilbride
Executive Secretary, I.U.A.A.
60 Laurel Pk., Laurel Lodge
Castleknock, Co. Dublin
IRELAND

SUMMER'S METEOR SHOWER ROUND-UP

Well, it was a disappointing summer for many meteor observers, so let us start with July's Delta Aquarid meteors.

I first started recording these meteors on the 10/11 of July, which is quite early for them. On the night of maxima 29/30 and 30/31, only a few were to be seen. Observing began at 0100 and lasted until 0300 UT. The ZHR (Zenith Hourly Rate for those not familiar with the term) was 5.5 per hour on the two nights, however the moon's light was not very helpful at all. The other shower, the Capricornids produced only one meteor - the ZHR was 2 per hour.

The only Perseids recorded were on the nights of the 6/7, 7/8, 10/11, 11/12, 23/24, 26/27 and 27/28 of August. The ZHR's were respectively 2, 2, 2, 2, 2, 4&1.7 and 4 per hour. As the Perseid maximum moved closer we all know what happened on those nights, don't we. At least Dr. Tindall et al. saw a few on the 11/12 August. So far no other reports have come as yet from members of the Canadian Meteor Network which I formed. Perhaps they were fortunate enough to see more than we did.

The number of Delta Aquarids for July was 7 seen, the number of Perseids for July was 10 seen and the number of Capricornids for July was 1 seen.

Well, we look forward to the Orionids, Leonids, Geminids and the Ursids for the remainder of this year. It should be clear for one of them, we hope.

Michael Boschat

COMETS (Part 1)

The word comet is probably derived from the Greek 'aster kometes', meaning long-haired star. For centuries comets have fascinated many people, struck terror in the hearts of others and have been considered omens of disaster, death, birth or good fortune. Today however, we consider them to be interesting objects to observe and study as they may hold some clues to the initial composition and formation mechanism of the solar system.

We believe comets were formed at the same time as the solar system, from the same cloud of interstellar matter. They surround the solar system in a spherical shell, known as Oort's Cloud, about 50,000 A.U.'s (0.791 ly's) from the sun. Estimates of the number of comets in this cloud range from 10^7 to 10^{10} members.

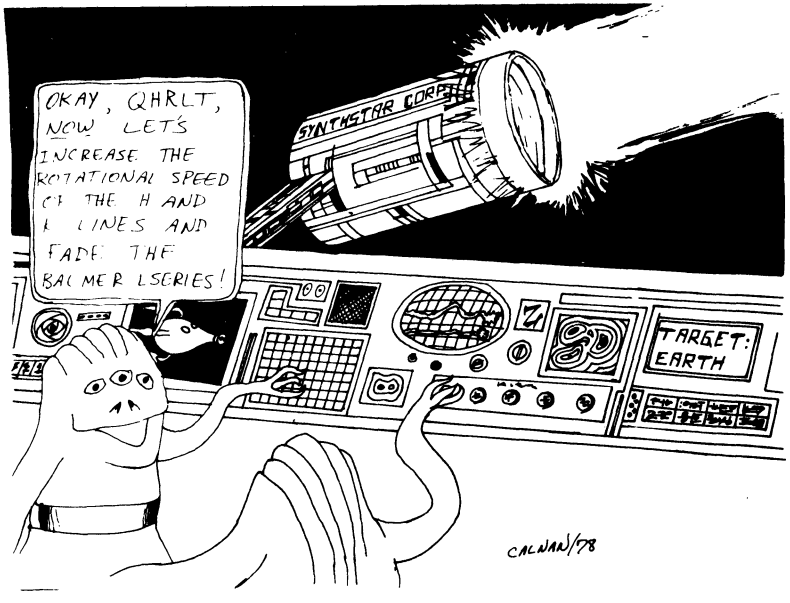
The comets are moving so slowly ($\sim$0.1km/sec) at this distance and are bound so weakly to the sun that their orbits are easily affected by the gravitational perturbations of nearly passing stars. The comets are either sent out into interstellar space or sent into the solar system on elliptical or near parabolic paths. When the comet enters the solar system the planets, especially Jupiter, can further alter the orbit and send the comet back out of the solar system on a parabolic or hyperbolic path, or trap it in a short period elliptical orbit around the sun.

Comets are thought to be like "dirty snowballs", a ball of frozen gases, mainly water, ammonia, methane, carbon monoxide and carbon dioxide, with dust particles mixed in to form a nucleus with a radius of a few hundred

meters up to 10 km, and a mass of 100 million to 10 trillion metric tons. When the comet is far from the sun it is inactive, but as it approaches the sun the outer layers begin to heat up and later begin to sublimate when the comet is about 3 A.U.'s from the sun. As the outer layers sublimate, dust particles are freed and these together with the gases surround the nucleus to form the coma. The coma can extend up to 10^5 to 10^6 km from the nucleus and material is swept back by the solar wind and radiation pressure to form the tails of a comet.

Several comets are also surrounded by a giant cloud of hydrogen which can reach up to 10 million km in diameter, which is larger than the sun! Astronomers are still debating on the origin of this hydrogen cloud.

(to be continued/next issue) J.S.Wells



TOTAL ECLIPSE REPORT (LUNAR)

Well, the July, 1982 was one of the best eclipses that I have ever observed. I watched it from 0300 to 0715 UT using my 87mm Maksutov and during the course of observations I made crater timings as suggest by 'SKY & TELESCOPE'.

I noticed that the umbra was very black and that the west limb could not be seen at 67x. also, along the umbra I noticed a light brown area. Once the umbra covered 3/4th. of the lunar surface I could detect a faint red near the west limb.

One curious effect that I noticed was that after timing the crater Tycho, a faint light streak became visible. Could it have been one of the rays or was I just getting tired?

Well, finally totality arrived and it was an excellent display. One could view an entirely different aspect of it with 40x and 67x than with the naked eye. Even using the telescope details were still hard to make out and I could only see the lunar maria with difficulty. Although with the naked eye, the moon was very dark, almost a dark red and I was not able to make out any details at all. So in that respect, this lunar eclipse was a 1 on a scale from 1 to 5.

However, this eclipse was well worth staying up for and I hope you all did. If not, then you will not see another one like this until the year 2021. Don't worry though, there is a lesser eclipse coming this winter.

Michael Boschat

FOCUSING ON CONSTELLATIONS

HERCULES

Hercules, one of the most famous mythological heroes, was the son of Jupiter and Alcmene. His teacher was the centaur (Half-Man-Half-Horse), Cheiron. Hercules was ordered to perform twelve difficult tasks. The stories of the "Labours of Hercules" make interesting reading, but are too long to recount here.

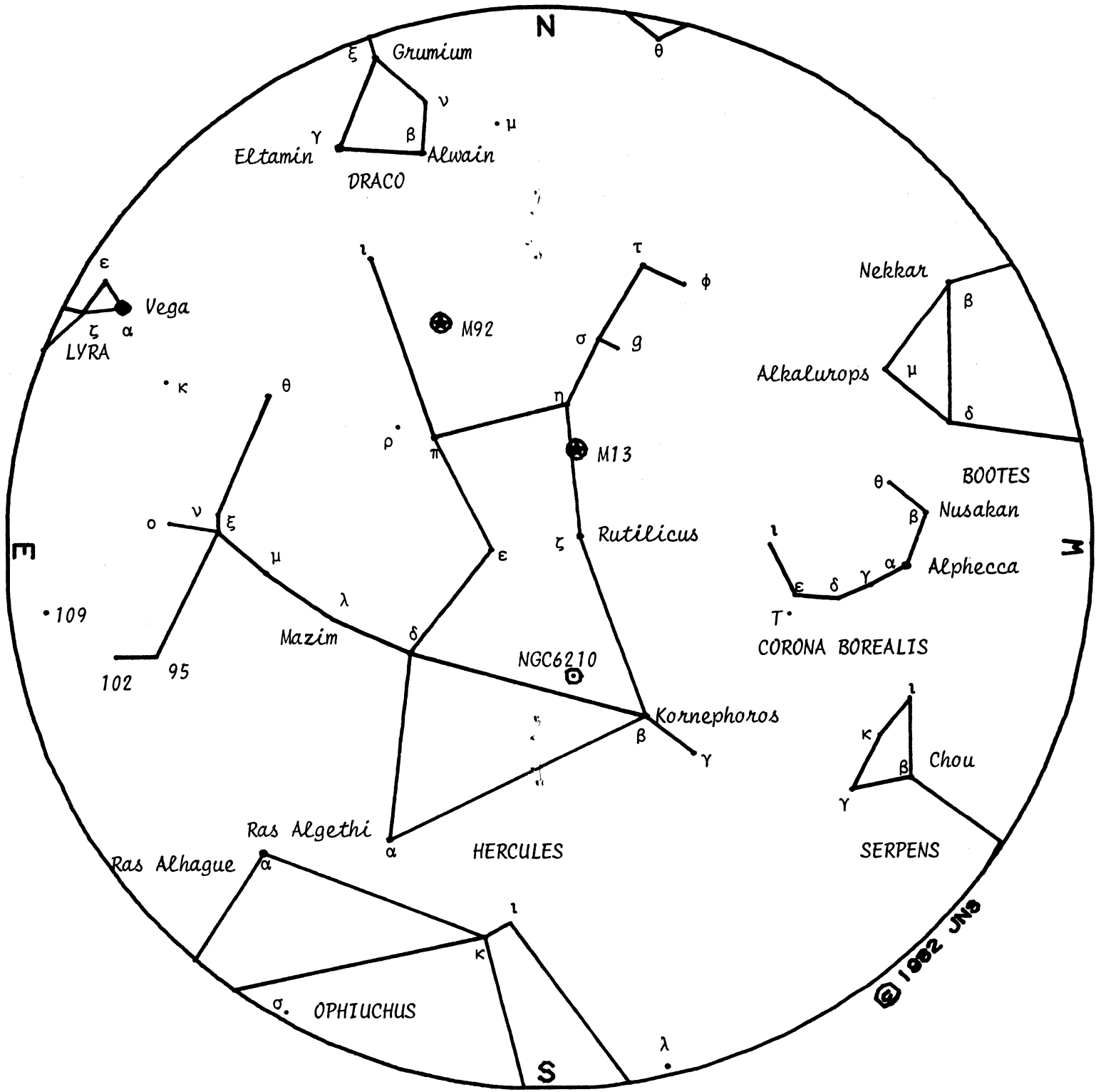
There are no prominent stars in Hercules. The brightest two, Kornephoros and Rutilicus, are only magnitude 2.8. Alpha Her is a red M-type variable star, ranging irregularly between magnitude 3.1 and 3.9. A small telescope reveals that this star has a 5th magnitude yellow companion. Rho Her is easily resolved into a white pair, and 95 Her is a wide pair that has been variously described throughout history as: green-orange; bluish-white and reddish; white and white; and identically pale yellow. Try your own colour test on 95 Her.

Also found in Hercules are the two Messier globular clusters M13 and M92. M13 is the finest globular cluster in the northern sky, and is one of the most spectacular objects to see in a small telescope. A sharp-eyed observer can see it with the naked eye on a very dark, clear night. Only 9 degrees to the north-east lies M92. This globular cluster is also bright and is very easily found with binoculars. Only half of a degree north-east of M13 is a spiral galaxy, NGC6207 which requires a moderate sized telescope to find, but if found is striking when paired in the same field with M13.

NGC6210 is a planetary nebula with a bright inner ring and a faint outer ring. The central star is hard to see, being magnitude 12½.

Even though Hercules is a faint constellation, it occupies a large region of the sky, and is a very worthwhile constellation through which to browse.

Norman Scrimger.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Ras Alhague
HERCULES
OPHIUCHUS
Nekkar
Alkalurops
BOOTES
Nusakan
Alphecca
CORONA BOREALIS
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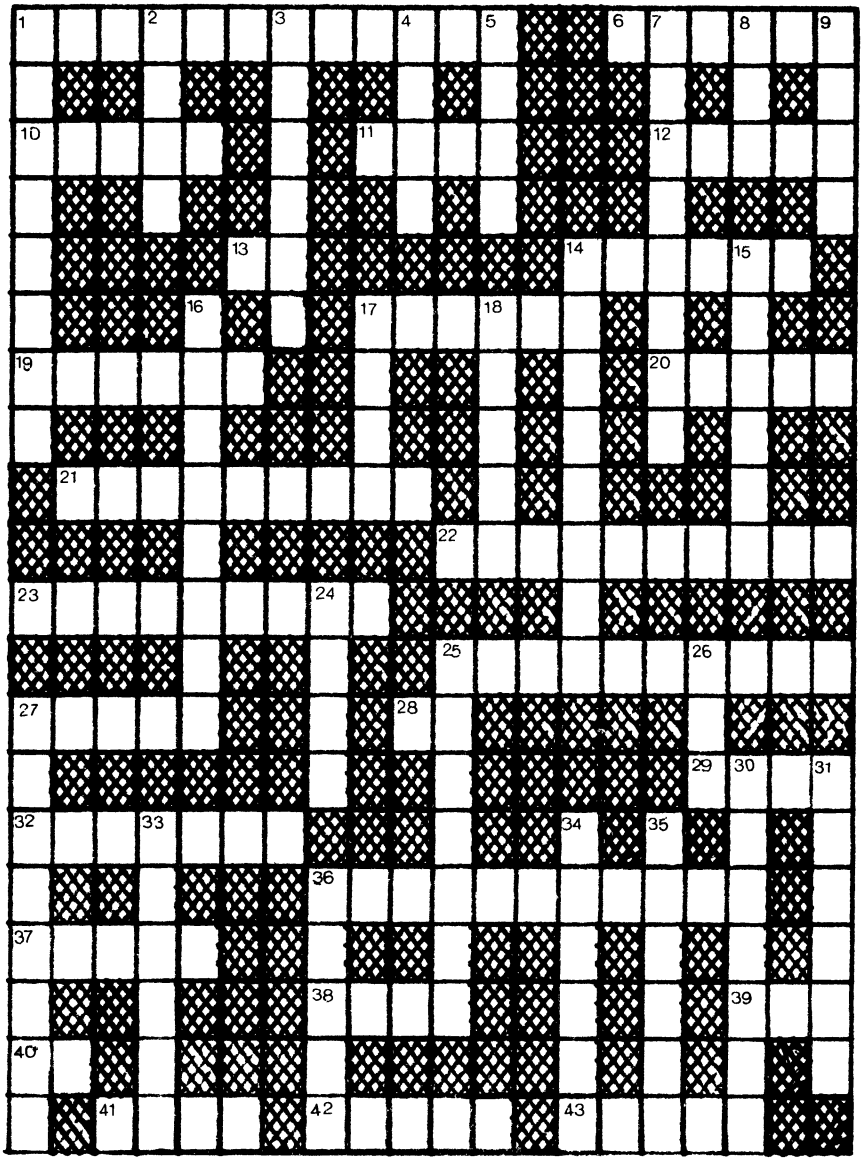
PUZZLE CORNER

"Terms in Astronomy"

Laurie Burgoyne and Norman Scrimger



ASTRO CROSS WORDS

TERMS IN ASTRONOMY

The answers for this issue's puzzle are all derived from terms used in astronomy. Some are more obscure than others. The solution to this puzzle will appear in the next issue of NOVA NOTES. Answers to the last puzzle - Members of the Solar System - can be found in this issue. We invite all PUZZLE CORNER solvers to submit their comments and suggestions regarding these ASTRO CROSS WORDS. Thanks.

ACROSS

1) Locus of dwarf stars on the Hertzsprung-Russell diagram.
6) Distance unit used by astronomers.
10) Having to do with the moon.
11) Sea.
12) Prefix referring to the sun.
13) Abbreviation of a local coordinate of azimuth.
14) Pulsating Radio Source.
17) Gas cloud.
19) Far point of an earth orbit.
20) All planets travel in one of these.
21) Distance unit related to radiation.
22) Light travels 11.8 inches in this length of time.
23) Indicates the brightness of celestial objects.
25) A measure of the speed of a telescope.
27) Cycle of eclipses.
28) Abbreviation for the coordinate of celestial longitude.
29) Every body has this physical property.
32) Shift that causes light to change frequency.
36) The coordinate of celestial latitude.
37) Radio Detection and Ranging.
38) The near or far point of an orbit.
39) The falling behind of any event.
40) Used to delineate time before the sun crosses the local meridian.
41) It becomes this when the sun sets.

ACROSS (con't)

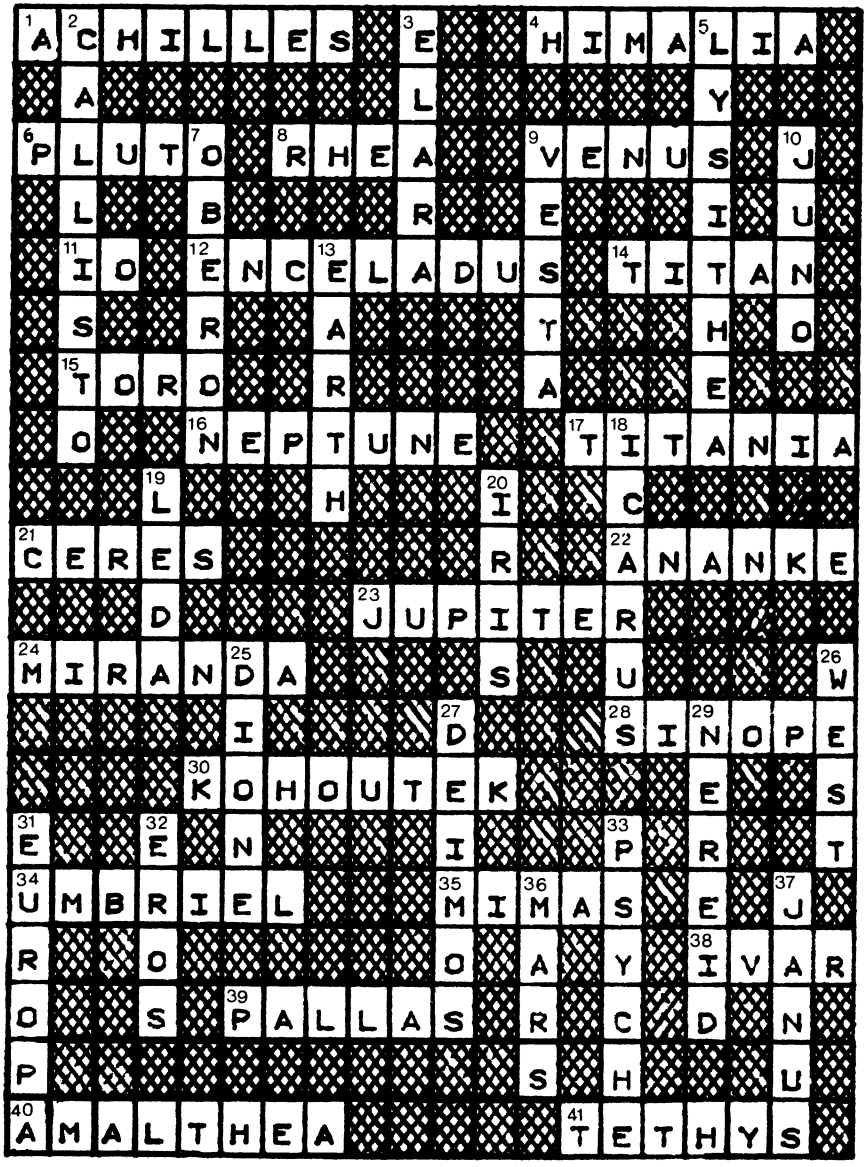
42) An outburst on the sun or a star.
43) Having to do with the sun.

DOWN

1) The diffuse band of light spanning the sky.
2) Tides diminished by competition between the sun and moon.
3) Quasi-stellar radio source.
4) This side of the moon always faces the earth.
5) Only equipment used in making unaided observations of the heavens.
7) Point of an orbit farthest from the sun.
8) Name given to the sun.
9) Stars of temperature only 3000 K are said to be this.
14) Shape of a good reflecting mirror.
15) Measures the amount of light reflected by a celestial object.
16) Variable stars used as yardsticks for the extragalactic distance scale.
17) An exploding star.
18) The inner part of a shadow.
24) Measurement of force in the cgs system.
25) Bright regions best seen near the limb of the sun.
26) All spiral galaxies have at least one.
27) Having to do with the stars.
30) A solar eclipse when the moon is far from the earth.
31) The alignment of the sun, earth, and moon.
33) Ionized gas.
34) Microwave Amplification of Stimulated Emission Radiation.
35) A Theorem relating kinetic and potential energy.
36) A star the size of the sun or smaller.

ANSWER TO LAST ISSUES ASTRO CROSSWORD PUZZLE

"Members of the Solar System"



ONBOARD STS-3

During the Space Shuttle Columbia's third flight, the crew - Jack R. Lousma, commander, and C. Gordon Fullerton, pilot - had a full schedule of scientific experiments and orbiter tests to perform. The Space transportation System's mission (STS-3) was another verification of the Shuttle's capability to do the job it was designed to do, haul heavy payloads into and out of Earth orbit with a reusable vehicle.

There were thermal tests of the orbiter, the first Office of Space Science experiments package (OSS-1), a Getaway Special canister, and a Shuttle Student Involvement Project (SSIP) experiment. Still photography recorded many of the activities, motion pictures were taken of others, and television relayed daily reports.

Insects in Flight Motion Study: During the 38th. orbit astronaut Lousma attached a container that housed colonies of Velvetbean Caterpillar Moths, Honeybee Drones, and houseflies to one of Columbia's mid-deck walls. The experiment, designed by Todd Nelson, a high school senior from Minnesota, was a study of the different insects' adaptation to the low-gravity of Earth orbit. He chose the insects for the difference between their mass and wing surface areas and their ready availability. Lousma's initial descriptions noted that the bees were tumbling, the flies walking on the surface of the container, and the moths flying.

OSS-1: This group of experiments included eight mounted on a pallet in the orbiter's cargo bay and one stowed in the crew cabin. An hour and a half into the flight the orbiter's payload bay doors were opened; two and a half hours later the OSS-1 package was activated.

It provided a wealth of information for the scientists - on the orbiter's environment in space, how its presence changes the environment, studies of the Sun, and, in a miniature terrarium, the effect of weightlessness on lignin, the woody substance in plants.

The Plasma Diagnostic Package (PDP) was designed to study the interaction of the Columbia with its environment in space, how the orbiter affects the electromagnetic fields as it moves through the ionosphere and the electrical fields that the spacecraft itself generates.

The PDP was also the first real test for the Canadian-built Remote Manipulator System, the robot arm. The tv camera on the "wrist" of the mechanical arm failed, but the crew were able to guide it visually through its maneuvers to grapple the instrument package, lift it, and move it freely out of the cargo bay.

Another experiment, the Shuttle-Spacelab Induced Atmosphere Experiment (SSIA) measured the optical properties of the orbiter's "atmosphere". Scientists need to know how outgassing of propellants and water dumps might affect the viewing of their instruments.

Most of Columbia's surface is covered with nonconducting materials where electrical charges might build up, which could give experiments false electrical readings. The Vehicle Charging and Potential Experiment (VCAP) looked at how these charges accumulate and cause changes in the orbiter's electrical potential (voltage relative to the surrounding ionosphere).

A Microabrasion Foil Experiment was designed to trap any micrometeoroids that might strike foil-covered sensor panels in the cargo bay. Back on Earth scientists are measuring the size and shape of craters made on the foil and any captured particles. Also in the cargo bay was a Contamination Monitor Package to monitor the buildup of volatile materials inside the cargo bay during launch, orbital operations, and landing; the data is being correlated with Shuttle and Payload Operations and with the OSS-1 instruments' performance. Another important cargo bay experiment was the Thermal Canister Experiment (TCE) designed to see if the technology of heat pipes can control temperatures effectively for experiments exposed to the space environment.

OSS-1 included two solar experiments One, the Solar Flare X-Ray Polarimeter Experiment (SFXP) may increase our understanding of the physical processes that drive solar flares. Using three separate observation stations for cross-referenced results, SFXP studied the polarization of x-rays emitted during a solar flare, and looked for direct evidence for the theory that electron beaming occurs in flares. The second, a Solar Ultraviolet Spectral Irradiance Monitor (SUSIM) aimed to improve the accuracy of measurements of far-ultraviolet radiation streaming from the sun. Because experiments facing the Sun can get "sunburned" from the intense illumination striking a possible layer of contaminant film, SUSIM contained two observing stations - one for making constant observations and the other for occasinally checking to see if the first was blinded.

The ninth OSS experiment, a miniature greenhouse called the Plant Growth Unit, was in the crew cabin. The quantity and rate of

lignin formation (the woody substance that allows plants to grow upward and give them their shapes) was tested with slash pine, mung bean, and oat plants. Six 25cm plant growth chambers carried 96 plants. The unit was automatic, requiring the crew only to relay temperature data to scientists at the Johnson Space Center (JSC) so conditions with the control group of plants on Earth would be similar. The results of this first study will help determine the choice of plants to fly under similar conditions aboard the Spacelab in 1984.

Electrophoresis Equipment Verification Test (EEVT). Another test flown in the crew cabin, the EEVT evaluated the process of separating cells in fluids by using an electric charge. Human kidney and blood cells were used in the test and the results will help determine the feasibility of purifying biological materials in the low gravity environment of space.

Heflex Bioengineering Test (HBT). This test was a repeat of one flown on STS-2 in November 1981. Because the STS-2 mission was cut short, the first test was incomplete. The Heflex (Helianthus Annuus Flight Experiment) was a package of sealed containers of dwarf sunflower seedlings in soils of varying moisture content to establish a relationship between the soil moisture and seedling growth in weightlessness.

Getaway Special. A test canister was flown to verify its suitability as a container for Getaway Specials, low-cost scientific and research experiments. The self-contained payloads are developed by educational organizations, industry, and individuals and will be scheduled for flight on a space-available basis.

Monodisperse Latex Reactor (MLR). A materials-processing experiment that could benefit medical research, the monodisperse (identical size) latex reactor was designed to see if latex speres larger than two microns could be produced in low gravity, The experiment will be carried on the four shuttle flights.

The Orbiter. The Columbia itself was the subject of thermal experiments: for 28 hours the tail was pointed toward the sun; for 80 hours, the payload bay toward the Sun while the orbiter held an inertial attitude. The bulk of the data gathered by the OSS-1 payload was during the inertial payload-bay-toward-sun attitude.

The Flight. The experiments were part of a busy flight that began just an hour behind schedule. Columbia was launched at 11 a.m. EST on March 22, and again the rocket engines and myriad of systems that are the complicated STS performed flawlessly. Some protective heat tiles were lost during launch, but none critical for entry. Space sickness, a balky toilet, control and radio static that interfered with sleep, and a malfunctioning thermostat marred the early days of the flight. But with most of the problems corrected by the third day, the crew concluded their mission with tasks completed and high praise for their spaceship.

Landing was scheduled for March 29 on Rogers Dry Lake at the Dryden Flight Research Facility in California. However, heavy rains in mid-March made the lake bed a questionable landing site for that date. Northrup Strip at the White Sands Missile Range in New Mexico was substituted, and two special trains with 38 railroad cars transported the necessary supplies and equipment. On March 29 high winds caused a severe sandstorm preventing the landing and the flight was extended another day.

It was eight days, four minutes, and 49 seconds after lift-off that Columbia landed. Longest of the Shuttle test missions - 129 orbits, over five million kilometers traveled - STS-3 was a succes and the Space Shuttle another flight closer to becoming operational.

Courtesy NASA Educational Notes

NEWS NOTES

Centaurus A

The rather peculiar looking galaxy Centaurus A (NGC 5128) has perplexed astronomers for several decades. If you recall, this galaxy has a bright spherical shaped group of stars crossed by dark obscuring lanes. It is also recognized as a bright radio source. Explainations have evoked a collision between a large spherical galaxy and a spiral galaxy or disruptive forces within the galaxy itself. But recent French observations suggest that the dark material is the spiral arm disc of the galaxy itself. However, its evolution has yet to reach the stage where star formation is taking place in the disc arms.

The team of astronomers determined the rate of rotation of the central bulge and of the disc components. This allows the mass of the galaxy to be determined. The bright spherical component has a mass of 10^{11} solar masses (about the same as the Milky Way Galaxy) but the surprising result is that the dark disc has a mass of 8.2×10^{11} solar masses. The team concluded that this unusually massive disc is still in the process of settling down and that the process of star formation has been retarded and in fact has not yet started in earnest. Thus Centaurus A probably looks much like our galaxy some 10 billion years ago. If this explaination is correct, astronomers will be looking at NGC 5128 in a new context and with renewed interest. Unfortunately most of us won't have that chance--it's too far south for Bluenose observers.

R. Brooks

Sept./Oct. NOVA NOTES Vol 13 No 5

NOVA NOTES ARE PUBLISHED BI-MONTHLY BY THE HALIFAX CENTRE, R.A.S.C. IN JAN, MAR, MAY, JULY, SEP, AND NOV. ARTICLES FOR THE NEXT ISSUE MUST REACH THE EDITOR BY 15th. OCTOBER, 82 ARTICLES ON ANY ASPECT OF ASTRONOMY WILL BE CONSIDERED FOR PUBLICATION. EDITOR: Peter Steffin, 8 Auburn Dr., DARTMOUTH, N.S. B2W 3S6 / 434-4541

NOVA NOTES IS PRINTED BY N.S. MUSEUM