

MONTHLY NEWSLETTER

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

HALIFAX CENTRE

FEBRUARY 1962

The March 1961 issue of GALAXY had the following notice for members of the Halifax Centre. "Be sure to watch your newspaper for program "University of the Air" starting April 3, 1961. Dr. Peter M. Millman of the National Research Council, Ottawa, Canada, will broadcast on the C.B.C. Trans-Canada network a series of eight half-hour lectures on astronomy."

These lectures were given in the evening starting at 11:30 pm which was a bit late for the Junior members and even some of the Senior ones. Now these lectures have been published by the Canadian Broadcasting Corporation and can be purchased, in a paper cover edition, for \$1.00 from the C.B.C. Publication Branch, Box 500, Toronto 1, Ontario.

This is an excellent publication and worthy of being placed on the book shelf of any amateur astronomer.

THE EDITOR

COMET AND NOVA SECTION: The first report from this section appeared in the January issue of GALAXY. Accompanying this issue of GALAXY is further information which has been received from the National Co-ordinator, Mr Jim Low. At some future date definite search areas will be assigned to interested observers.

The following is a continuation of the article on COMETS which appeared in the January issue of GALAXY.

THE STRUCTURE OF A COMET

A comet usually consists of: a. a head, called Coma, near the centre of which is b. a nucleus, usually quite small but much brighter than the rest of the head, and c. a tail that gives the appearance of streaming from the coma. The tail is always much dimmer than the head, although there is no sharply defined boundary separating them.

Individual comets show great variations from the norm-some may be without tail, or nucleus, or both.

a. The Head. Most comets have globular heads, varying greatly in size. The diameter may be less than 10,000 miles or may exceed 200,000 miles.

Nor is the size of the head constant. The dimensions are usually larger just after perihelion, with a secondary maximum just before reaching the nearest point to the sun. Thus the diameter of Halley's Comet, when it was about 300 million miles from the sun, was a mere 14,000 miles, increasing to 220,000 miles before reaching perihelion, decreasing to 120,000 miles at perihelion. It increased again to 320,000 after perihelion and finally decreased to 30,000 miles as it moved farther from the sun.

The head is very likely composed of solid stones of a great variety of sizes, beginning with very thin dust. Some stones are probably composed of iron and nickel; others are similar in composition to terrestrial stone.

b. The Nucleus is the central bright spot of the head, fairly small, rarely exceeding a diameter of 10,000 miles. (The common figure is between 500 and 1,000 miles.) The nucleus differs from the rest of the head only in density: its matter is much more concentrated than elsewhere in the coma.

c. The Tail of the comet is transient in nature, bearing a great similarity to chimney-smoke, first appearing as the comet approaches perihelion and disappearing after the comet has completed its U-turn about the sun and is moving away. The gases composing the tail probably result from the tremendous heat to which the solid particles of the coma are exposed upon approaching the sun. The volatilizing of the surfaces of these solids produces that large elongated cloud of gas known as the "tail" of the comet. A spectroscopic analysis indicates the presence of iron, nickel, carbon, nitrogen, as well as several substances in gaseous form.

While a length of a hundred million miles is fairly common, the tail of the Great Comet 1843 I was estimated to have been more than

500,000,000 miles long. This large spread is due to the fact that radiation pressure caused by sunlight greatly overcomes the gravitational pull of the coma on these gases.

Radiation pressure as the term implies, is pressure due to radiation. Its value on terrestrial objects is insignificantly small - the pressure due to solar radiation on a square mile of the earth's surface is slightly less than two pounds. Its effect on the gases volatilized inside the coma, as well as on the fine dust particles, is great. Radiation pressure easily overcomes the gravitational pull acting on these particles, and is thus able to eject them from the coma to great distances. The propelling force due to this pressure follows the particles along their route. Their speed upon leaving the head is approximately 0.5 miles per second; farther along the tail, velocities of 50 miles per second are quite common.

Another result of the pressure due to the sun's radiation is that the tails always point away from the sun, trailing the comet as it approaches the sun and proceeding it when the latter recedes.

AURORA SECTION: The following has been taken from U.S. Visual Observations Newsletter # 53, Ithaca, New York, January 1962.

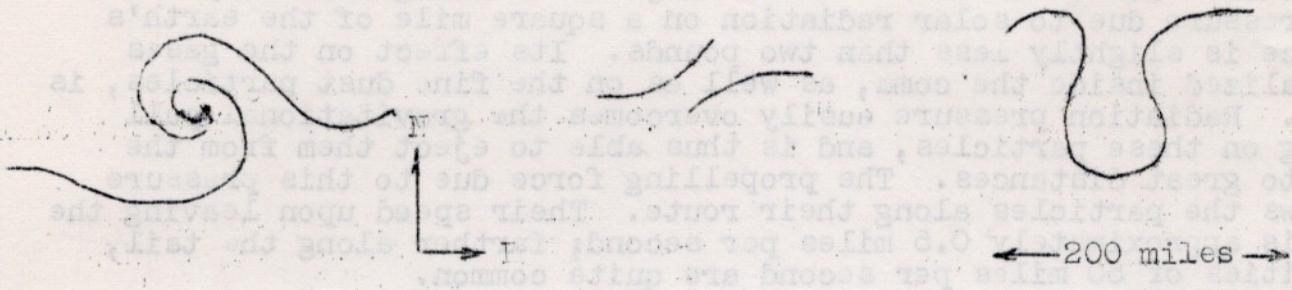
"There have not been many auroras lately, and the ones which there have been have not been very large.

We are beginning to make some detailed studies of individual auroras from the reports you have sent in and the All-Sky Camera films. We have been working on the theory of the development of curves and arcs, and have found three types of forms which can be explained by theory. Actually, we can not work out the correct theory, and have to use a bargain basement theory which we can handle. There are three especially interesting types of forms which we are searching for in the reports to study in detail. They are illustrated below and consist of a spiral form, a slanted break, and an omega form. The forms are drawn as they would be seen above the earth, not from the ground. North and east are shown. The spiral form is caused by, we think, electrons being drawn towards the centre of the spiral by an excess of protons, and being deflected as they move by the earth's magnetic field. In the northern hemisphere, this spiral should turn in a counter clockwise direction as seen from the outside of the earth.

The slant form is caused when there are too few protons, and the electrons are repelled away from the centre of the figure and a break appears in the arc.

The omega form, named after the Greek letter Omega, is caused by a combination of both. By setting the right side of the slant to the left side of the spiral, the omega form develops. Everyone we have seen has been with the loop to the south, after midnight, and moving towards the east. This form is the most common of the three in the United States and does not last long. It moves at about three football fields a second and generally goes out of sight in about ten minutes. Even in this length of time, however, it may completely flatten out into an ordinary arc again.

If you see any of these forms, we would appreciate it if you told us as much as possible about it. This means that you will be out in the cold for fifteen minutes, whereas we will probably be warm in bed. But we are with you in spirit."



No reports on sighting aurora in the Halifax area have been received since the January issue of GALAXY.

BOY SCOUTS STUDYING FOR STARMAN BADGE: A group of Boy Scouts is presently receiving instruction from Mr Bert Allen, of the Halifax Centre, prior to trying their test for the STARMAN BADGE.

PLANETARY SECTION: Bulletin No. 1 from this Section appeared in the November issue of GALAXY. Attached to this issue of GALAXY is Bulletin No. 2. For further information concerning the activities of this Section please contact Mr Bert Allen, 419 Windsor Street, Halifax, Nova Scotia.

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

COMET AND NOVA SEARCH SECTION

The programme of the Comet and Nova Section is two-fold - to search for comets and novae, and then to observe them.

All that is needed to take part in the search programme is a pair of binoculars. Observations may be made in about five minutes each clear evening, so not much time is required. The sky is divided into areas approximately ten degrees square, and an observer should take two areas in more or less opposite parts of the sky so that one of his areas will always be visible. If he feels he has time, an observer may take more than two areas. No two observers in any one Centre should have the same area, for there are about 400 areas well placed for observation in Canada - more than enough to go around.

Once he has received his area, the observer should make charts of them, showing stars down to at least sixth magnitude. This may be done with the aid of a good star atlas such as Norton's Star Atlas. Each clear night then, the observer should identify each star in his area, and if nothing unusual is seen a negative report should be made on the form supplied to him.

If he wishes, the observer may make more detailed observations with a telescope of any size by sweeping different parts of the sky each night. In this case, the observer picks out a certain area of the sky he wishes to observe during one night, and carefully checks each object with a good star atlas. If nothing unusual is seen, the negative report form should be filled out. This form is self-explanatory.

Members now making nova search observations for the A.A.V.S.O. should continue to send their observations there but are asked to make copies for this Comet and Novae Programme.

Centres interested in taking part in this programme are asked to appoint a chairman to take care of such activities at that Centre, and this chairman should contact.

Jim Low
National Co-Cordinator,
Comet and Novae Section,
411 Brixton Avenue,
St. Lambert, P.Q.

ROYAL ASTRONOMICAL SOCIETY OF CANADA

PLANETARY SECTION

Bulletin No 2

February 7, 1962.

PROGRESS REPORT To date I have received replies to my first Bulletin from seven of the Centres of the R.A.S.C. I will here list the names of my contacts:

<u>Centre</u>	<u>Contact</u>	<u>Address</u>
Halifax	B. W. Allen	419 Windsor St., Halifax, N.S.
Hamilton	Edward Ostrosser	70 Sussex Ave., Hamilton, Ont.
Kingston	G. M. Steed	13 Chestnut St., Kingston, Ont.
Montreal	Geoffrey Gaherty, Jr	636 Sydenham Ave., Montreal 6, Que.
Niagara Falls	Grayson C. Gardner	488 Philip St., Niagara Falls, Ont.
Ottawa	Dr W. L. Orr	1952 Fairbanks St., Ottawa 1, Ont.
Québec	Rene Doucet	650 Blvd des Prairies, Cap de la Madeleine, Co. Champlain, Que.

Observations have already been received from Hamilton, Québec, and Montreal, and I have been promised some drawings by the Ottawa Centre. The other Centres, while not engaged in systematic planetary work at the present time, have expressed interest in participating in the Section's program as it develops.

Regarding the responsibilities of the contacts, they are expected to pass on the information in this and future Bulletins to members of their Centre particularly interested in planetary problems and if possible to the general membership as well (i.e. at meetings of the Centre or via the Centre's newsletter where such exists). The exact means is left to the good judgement of the individual, although I will be glad to do anything within my power to help. (In this respect I can supply a limited number of extra copies of these Bulletins.) The contact will also be responsible for keeping me posted on local activities. The details of this will be worked out in practice.

JUPITER I will shortly begin preparing a report on 1961 observations of Jupiter as mentioned in Bulletin No 1. I would appreciate it if any further observations were sent to me as quickly as possible for inclusion in this report. From the considerable amount of material on hand it should be possible to obtain some very interesting results from one of the most active apparitions in recent years.

OBSERVING PROGRAM Initially there will be a deliberate concentration on observations of the planet Jupiter. Some of the reasons for this are:

- (a) It is observable over a large part of the year and in particular will be well placed for most of 1962.
- (b) Any good telescope of 3 inches aperture or greater will show detail worth recording.
- (c) There is a wide variety of observation programs to suit practically every taste.
- (d) The experience gained will make observations of other planets much more profitable.

Detailed instructions and suitable report forms will be available in a few months. In the meantime I will briefly describe some of the types of observation possible.

Drawings. With practice almost anyone can learn to draw well enough to record the appearance of astronomical objects. The idea is to copy the telescopic image accurately, not to strive for "pretty" effects. The value of a drawing can be greatly increased by the addition of semi-quantitative data such as estimates of conspicuousness, intensity, and colour as described below.

Conspicuousness Estimates. This involves estimating the relative ease with which the belts or zones can be seen. The telescope's eyepiece is racked out of focus to present a featureless disk. As it is refocused the order in which the belts (or zones) reappear gives a good measure of their conspicuousness.

Intensity Estimates. The relative intensities of the belts and zones can be estimated using a 0-10 scale. The information revealed by these observations is quite different from that obtained from conspicuousness listings; here the actual shade of the feature is estimated rather than its overall impression.

Colour Estimates. These are necessarily subjective but nonetheless of use if great care is taken to eliminate spurious effects. A reflector is almost obligatory for this sort of work.

Central Meridian Transits. The observer times to the nearest minute the transits of bright and dark markings across the central meridian of Jupiter's disk (estimated by eye). Although the accuracy of a given timing may be low, a sufficient number of timings of the same feature on various occasions during a month or more yields a rotation period of accuracy at least equal to the best spectroscopic work. Almost all our knowledge of Jupiter's atmospheric currents over the last 70 years is based on amateur observations of this type. Except for the most prominent markings a 6-inch or larger is required.

Photography. Good photographs provide a useful check on visual observations and also can be measured to derive the latitudes of the belts. Due to the limitations of the photographic process, a 6-inch is probably the minimum for successful results.

Satellite Phenomena. Observations have shown that the phenomena of Jupiter's satellites predicted in the Handbook are frequently in error by several minutes. The exact nature of these variations from theory has yet to be determined; timings to the nearest 0.1 minute of occultations, eclipses, and transits can therefore be of value.

Lest the sheer quantity of programs frighten those who have done little along these lines, I certainly do not expect everyone to participate in all fields! My own method of getting started was to make drawings (a lot of them pretty horrid) at every opportunity until I could honestly feel that I was making a fair representation of what my telescope could show. The serious planetary observer must have the ability to consider his work objectively; unless he continually seeks to maintain the highest standards, his observations will be of value to no one.

In spite of the emphasis I have placed on Jupiter, I do of course welcome any observations of the other planets. As the Section's program gains momentum it will be expanded to include these, and this in turn will lead to the appointment of Assistant Co-ordinators.

It is my hope that this Bulletin will stimulate further interest in planetary work. Your comments and suggestions will shape the ultimate form which our program will take.

Geoffrey Gaherty, Jr, National Co-ordinator,
Planetary Section, Standing Committee
on Observational Activities.
636 Sydenham Avenue, Montreal 6, Que.