R E G U L U S

THE NEWSLETTER OF THE

ROYAL ASTRONOMICAL SOCIETY OF CANADA - KINGSTON CENTRE

AUGUST AND SEPTEMBER, 1982

AN EASILY OBSERVED COMET

One of the most interesting events of recent months for amateur skywatchers has been the appearance of a bright comet which can be easily observed. This "celestial visitor" may be seen in the north-western sky after sunset and has already developed a tail a couple of degrees in length.

This summer's brightest interloper, Comet Austin, was discovered in the far southern sky on June 18th by New Zealand amateur Rodney Austin. It was at tenth magnitude in the constellation Telescopium at the time of discovery and since then has been steadily brightening and moving northward. Its orbit is greatly in contrast with that of Comet Bowell, the last one which was mentioned in these pages: whereas Comet Bowell moved almost precisely in the plane of the earth's orbit (varying, in fact, from the plane of the earth's orbit by an angle of less than two degrees), Comet Austin has been moving almost perpendicular to the plane of the earth's orbit, in fact, moving at an angle of 85° with respect to the ecliptic. Even though it has moved north in the sky very steadily and at such an angle since its discover, Comet Austin has not quickly come into view for observers at our latitude simply because of the geometry of its position relative to the sun and the earth. Even after its appearance above our north-western horizon, its apparent position is too close to the sun for us to appreciate its brightness in a way that would have been possible if it appeared in a completely different part of the sky.

Using the information given below it should be possible to sketch the orbit of Comet Austin on a good star atlas and thence to find it with binoculars and a telescope. Thanks for this ephemeris go to Dr. J. U. Gunter, an amateur astronomer from Durham, North Carolina and publisher of Tonight's Asteroids.

The first colun gives the date--every second day for late August and every fifth day for September. The time is 0 hours U.T. The next two columns give Right Ascension and Declination for Epoch 1950. The fourth column (D.E.A.U.) give the disatance of the comet from the earth in Astronomical Units. (I.A.U. = 149 million kilometers.) The fifth column (D.E.A.U.) gives the distance of the comet from the sun in Astronomical Units. The sixth column (Mag.) gives the predicted visual magnitude. The last column (ALT.) gives the approximate altitude of the comet above the horizon when the sun is 12° below the horizon or near the end of twilight.

Ephemeris for Comet Austin

		R.A.	Dec.	D.E.A.U.	D.S.A.U.	Mag.	Alt.
Aug.	25	11h 32.4	+44° 41'	0.605	0.549	+5.0	23.1
	27	11 47.2	44 53	0.662	0.651	5.2	24.7
	29	11 59.0	44 50	0.720	0.655	5.5	25.8
	31	12 08.6	44 37	0.779	0.662	5.7	26.4
Sept.	3	12 19.4	44 05	0.866	0.679	6.0	26.8
	8	12 31.7	42 55	1.007	0.717	6.6	26.4
	13	12 39.3	41 38	1.138	0.767	7.1	25.2
	18	12 44.4	40 21	1.259	0.825	7.7	23.6
	23	12 48.1	39 08	1.368	0.890	8.2	21.7
	28	12 51.0	39 00	1.466	0.959	8.5	19.7

Best of luck in locating the Comet Austin (1982g)

The Ancient Meteorite Crater At Holleford

Abstract

The following paper on the Holleford Crater is based on one of the same title which I gave as part of the London Centre Exchange on July 16, 1982. It seeks to review the research which was done and the resultant conclusions which were drawn in the 1950's concerning the circular depression at the village of Holleford. The research established beyond any reasonable doubt that the crater is of meteoric origin and is one of the very oldest of the known craters.

A bibliography at the end of the paper will show that is is based on various articles of the 1950's including Publications of the Dominion Observatory. The Imperial system of measurements, rather than the metric, will be used, execpt at the beginning of the paper becuase the former system was used exclusively in the source materials. Because of its length, this paper will be published in three parts, with the remaining two parts appearing in the next two issues of Regulus.

Location and Discovery

Kingston Centre members are pleased to have in our "back yard" a very interesting meteorite crater and one which I feel, for several reasons, should be better known than it is. Many of us, if asked to list some meteorite craters, would probably list a crater in Arizona which has become very famous and perhaps not realize that in our own province we have craters thousands of times older and just as fascinating to study and explore. I have been able to explore some of the research done on the Holleford Crater and, though I am not a geologist, I am pleased to share some of the information.

..3

Holleford Crater is called after the tiny village located partly within its boundaries. It is a circular depression about 30 metres deep and about 2 kilometers in diameter. It is at latitude 44°47' north,longitude 76°38' west, about 27 kilometers North-North-East of Kingston. From the village of Hartington (pop. 109) on Highway 38, it is about 5 kilometers to the East-North-East. There is easy access (which is not so for many craters) since two roads cross the rim of the crater, one of them descending almost to the floor of the crater.

Although people have lived and farmed in the crater for over a hundred years, its discovery as a meteorite impact site dates only to the mid-1950's. The research that led to its discovery was the result of the discovery of two other meteorite impact sites. (The Dominion Observatory was under the Department of Mines and Technical Surveys which has since become the Department of Energy, Mines and Resources.)

In July 1950, the New Quebec Crater (known by Air Force pilots since at least 1943) and photographed by them was (also known as the Ungava or Chubb Crater) studied and identified as a meteorite impact site and some of the results were published in Sky and Telescope magazine of November, 1951.

In 1951 a circular feature near the village of Brant, Ont. was observed on aerial photographs of Algonquin Park. Subsequent studies made it seem reasonable to regard it as a very ancient meteorite crater.

Those two events suggested the desirability of conducting a systematic search of aerial photographs of the Canadian Shield in an effort to find similar circular depresssions. The search was finally begun by the Dominion Observatory in June, 1955, and that summer 200,000 aerial photographs were examined--mainly of shield areas of Ontario and Quebec. (The Frontenac Axis is the name of the Canadian Shield area in eastern Ontario.) An R.C.A.F. photograph of the Holleford area with an exposure time of 1/200 sec. taken from an aircraft flying at 8420 feet above sea level shows a very definite circular formation.

Examination with the stereoscope showed the inner slopes to be much steeper than the outer ones--a definite characteristic of explosion craters--rather than volcanic craters. It seemed clear on examining the site that a great deal of sediment had been deposited in the crater and that the rim had been considerably eroded. Research of 1955 was reported in an article by Drs. Beal, Ferguson, and Landou of the Dominion Observatory in an article on page 296 of Sky and Telescope, May, 1956.

Geological and geophysical studies were begun in 1955 and the Drilling Program was begun in 1956.

The Surface Geology

The first of these studies, that of the surface geology, was undertaken by Dr. Frasey of the Geological Survey of Canada.

Precambrian rock (granite and metamorphic rocks) were found to the west, north, and east of the crater. (They are crystalene limestone with quartzite, pink granite associated with limestone.)

Ordovician Rocks were found south of the crater and in a narrow band west of it, in some places lying directly over the Precambrian rocks. They cover the entire depression. Since the overlying limestone beds were intact except for their dip toward the centre, Frasey concluded that any impact forming the depression must have been Precambrian in time. He suggested geophysical studies or diamond drilling to ascertain the depth of the Precambrian depression and a comparison of it to known meteorite craters.

The Geophysical Evidence

The second phase of the studies included an examination of all the Geophysical Evidence. This included three areas:

(a) Magnetic Observations,
(b) Seismic Studies, and
(c) Gravity Studies.

..4

Magnetic Observations

The Geological Survey of Canada studied an aeromagnetic map of the region to locate any possible magnetic anomalies. (Made from an aeromagnetic detector in an aircraft flying at 500 ft.)

No anomalies were detected in the map of the crater. However, theory indicates that most of any iron or stoney meteorite which could have formed the crater would have been blown out of it.

Seismic Studies

A seismic study was done by J. H. Hodgson and P. L. Willmore of the Seismological Division. Their studies indicated the probable existence of "low velocity" material under the surface limestone within the crater--an idea consistent with the theory that it was a meteorite impact site.

3 shots fired inside the crater were recorded by seismographs outside the crater. Two of the seismic detonations fired near the centre of the crater showed a delay time of about 1/10 of a second in being recorded on the seismometers (located 3,000 and 12,000 feet away) from what was usual for the passage of the waves through material in the area. Since the velocity of shock waves in various earth materials varies through a vary definite range (from, for example, 2,000 feet per second in sand to 18,000 feet per second in granite) and is well known for the various materials, it seemed certain that the waves were passing through an area of less dense or fragmented rock. The detonation fired near the rim showed very little delay from its predicted time in reaching the seismometer indicating that the wave passed through very little "low velocity" material.

The Seismic studies were completely consistent with the theory of a meteorite impact crater, with there being apparently a considerable amount of fragmented rock below the middle of the crater and much lass near the rim.

To be continued in the next issue of Regulus.

Correspondence From Our Observer In Maryland

It was a pleasure to again receive a very interesting letter from Gus Johnson. This letter, received August 17th, mentions his being unable to visit us in Kingston this summer. (Maybe next year!) However, he is as active an amateur as ever, as is shown by part of his letter reprinted below.

RD 2 Box 67
Swanton, MD 21561
August 7, 1982

Dear Mr. Enright:

I have been slow to write awaiting enough of interest to occur skyward and/or otherwise. Observing improved much over May in June, but was still far from what I would prefer and July was even better. A rare night of clarity occurred on July 21-22 wherein I was able to see a little below magnitude 14 in SGR with my 8-in. Also, since I like to try hard double stars, there were at least two nights of good seeing wherein I exercised my 4¼" and 6-in. reflectors, but not both on the same nights. I got a good elongation of Zeta BOO (1.1") with the 4¼" at 127x which also showed all four stars of Nu SCO but wouldn't resolve the closer component of Xi sco or Delta CYG. On the other night I had my 6-in, out and among other objects, was able to detect the closer star of Xi SCO and Delta CYG was really easy at 196x, almost so at 148x. One star that I had never resolved (or elongated before) was Eta CrB, which did elongate in the correct P.A. with 196x.

..5

My Barlow lens does not seem to give as clear a view as when an eyepiece is used alone; so recently I ordered a Crown (Meade) 4mm Research Grade Ortho, so I can get more than 127x our of the 4¼" with just an eyepiece. Delta CYG may be reachable then (a formerly owned 4-in. Unitron had no trouble with Delta at 188x). Many years ago I owned a 4mm. Brandon and got excellent resolution of the moon with it when I lived in Pittsburgh, but after moving to the lake in Maryland I found the generally poor seeing did not justify it; so when I sold a telescope I let it go with it, but now I have a flock of smaller telescopes that could occasionally benefit from a high power eyepiece.

I almost forgot; one double star that still resists me is Zeta HER. A Unitron advertisement of years ago had a testimonial of an owner who claimed to have resolved Zeta with a 3-in. but still I fail. A friend in Pittsburgh also claims to have done it with a 4-in. reflector with about 124x! I am a bit doubtful. If part(s) of the optical train are far from perfect they can introduce optical effects that can give the impression of resolution, especially with close unequal doubles.

In late June another friend of the Pittsburgh astronomers asked if I would come to help him find some of the deep sky objects in his newly completed 12½-in. f/6 reflector, which he was taking to a small state park in south-west Pennsylvania, that I had not even heard of: Ryerson Station. It proved to be a pleasant little park, with scenery much like at my home town of Vandergrift, Pa. (40 mi. NE of Pittsburgh). The night had a fairly dark sky and it was really fine to be viewing with a 12½-in. again. It had a Coulter mirror, but not one of the new thin ones that are used in their Dobsonians, some of which give fair images and some don't. This one gave good images.

On July 31st there was a public star party at South Park, a few miles from Pittsburgh and the Pgh. astronomers were asked to bring telescopes and help out. It was rather like a suburban mini-Stellafane. There were perhaps a dozen telescopes from my foot-long 1.6-in. to a brand new 10-in. I also had my long 2.4-in. there. The sky was a bit murky, hazy and had a gibbous moon, but quite a lot of interesting observing was still done. It was much fun wandering from Telescope to telescope before setting up my own. The most elegant was a 4-in. weight-driven Unitron, but its owner didn't seem interested in going after challenging objects, like Antares (which my 6-in. seemed to resolve recently). The 10-in. was one of that new series of low priced telescopes that Crown is selling, apparently of Meade manufacture. It gave very good images and I was impressed, but the whole telescope sits very low and could benefit from two cement blocks under each tripod leg.

Clear Skies, Gus.

For Your Compendium of Esoteric Facts

Did you know that Phobos, the innermost of the two satellites of Mars, has a very strange orbit? At a distance from Mars that is amazingly close, Phobos travels around the planet once every 7 hours and 39 minutes. Since the rotation period of Mars is very similar to that of the earth (with its solar day being 24 hours 39 minutes and 36 seconds), Phobos very quickly overtakes any point on the Martian surface. This means that for a supposed inhabitant of Mars standing near the equator, Phobos would rise, cross the sky from west to east, and set twice each day.

Did you know, also, that if there were Martians who lived near their polar ice caps and never travelled away from their polar region, they would never know

..6

that Phohos existed; yet it is their nearest neighbour in space? The reason is that above 70° N. latitude and below 70° S. latitude this inner moon never rises above the horizon. Very few satellites in our solar system are so amazingly close to the equator of their planets.

Reports And Other Items

1. The very long lunar eclipse of July 5th-6th was well observed in this area, at least until after the beginning of the total phase. During totality intermittent cloudiness hindered observations, but there was enough clear sky to observe one of the darkest eclipses seen by many observers. A dark orangish tint was seen, in the southern part of the moon especially.
2. An intense Coronal Aurora flooded the entire sky on the night of July 13th-14th. My log records it as being probably second only to that of April 11th and 12th, 1981 for intensity of Coronal activity and activity throughout the entire sky.
3. The star Mira (0 Ceti) one of the most interesting and famous of the variables has recently been extremely bright at approximately 2.5 magnitude. Those who have not yet seen it should stay up a little later in order to do so. It is a very interesting variable.
4. Your editor completed his Messier List at about 3:30 a.m. on July 29th and hopes to someday complete the Herschel List. However, with over two thousand objects, it looks considerably more challenging.
5. Perseid observing was clouded out on August 12th but a good many of those famous meteors were seen on nights preceding and following the date of their maximum.
6. Here are some of the celestial events that are worth planning to observe in the near future:
   1) Don't forget Comet Austin. See the article on page 1.
   2) Mars continues to move rapidly through the evening sky. Having passed Saturn and Jupiter, it now is moving closer to Uranus and Neptune. Try to observe these two planets as Mars approaches them. Mars passes 1° 27' south of Uranus on Sept. 22nd and 2.6° south of Neptune on Oct. 25th.
   3) On September 21st and 22nd the young moon makes interesting configurations in the southwestern evening sky as it slips past Jupiter and Mars.
   4) A number of minor meteor showers through September and October may make those longer evening skies even more interesting.
7. At our meeting of July 23rd, David Stokes gave a fine presentation of his research into Arabic Star Names. We look forward to hearing from David Levy at our meeting of August 27th and September 10th. After those two meetings the dates are: Sept. 24th, Oct. 15th, Oct. 29th, Nov. 12th, Nov. 26th (Annual Meeting), and Dec. 10th. Please plan to attend. The place is Room 222, Ellis Hall, on University Avenue and the time is 8:00 p.m.
8. Here again is our centre's address: (Remember your editor would be delighted to receive material for these pages.)

R.A.S.C. - Kingston Centre,

Box 141 - Station A,

KINGSTON, Ontario K7M 6R1

CLEAR SKIES!

GOOD OBSERVING!

Leo Enright