METEOR NEWS

Observations relating to meteors and meteorites are cordially invited.

THE DRESDEN METEORITE

By W. G. Colgrove

(with Plate XII)

ON the evening of July 11 at 8.45 a few of us were standing on the upper campus of the University of Western Ontario at London watching the first stars appear when suddenly a great flare from the north-east lighted up the lawns and trees all around us. It was the passing of an unusually bright meteor which immediately exploded high in the air and somewhat behind us and then, shooting a little to the north overhead, whizzed toward the south-west leaving a trail of bluish-green light about 5 degrees wide and extending from north of Vega to near Spica. No sooner had it reached a point apparently half way across the campus than it burst again and was followed by a similar band of orange-red light of equal dimensions. Finally it burst a third time and disappeared over the tree-tops on a distant hill. During its entire course the meteor itself shone as an intensely brilliant object apparently about the size of a baseball six feet away and surrounded by a spherical yellowish glow as large as a football and shot through with short streamers of different colours. At each explosion a large puff of ashy smoke about ten degrees across arose and remained for nearly an hour in the air. The main feature lasted only about four seconds, but it was the grandest moving sky-picture I have seen since the great comet of 1882.

As soon as word came that it had fallen near Dresden and had been sold for $4.00, Dr. H. R. Kingston, Head of the Department of Mathematics and Astronomy, authorized a committee of investigation composed of Dr. E. G. Pleva, professor of geography, and the writer to make a tour of examination for the collection of evidence. The next day we arrived in Dresden where we found the meteorite in the printing office of Mr. Ross, surrounded by a questioning crowd,

PLATE XII

(Photographs by Charles Ross, Dresden News)

THE DRESDEN METEORITE

A—Mr. Solomon excavating the meteorite.
B—The meteorite immediately after recovery.
C and D—The main mass before and after washing.

and it required only a brief examination to satisfy us that it was genuine, but we spent an hour in further conversation while Mr. Ross called Dr. Smith from Sarnia. We were examining the precious stone when the telephone rang and I was called by some newspaper man in Toronto who said that a fragment had been analysed there and proved to be a hoax. But we were not to be disturbed and quickly motored over to the point of fall to learn what we could from the farmers along the way and the Solomons on whose place it fell.

One week after our first visit we motored again to Dresden with Professor G. H. Reavely of the Department of Geology. Our quest this time was to locate as many as possible of the fragments that had been blown off or broken from the larger body. After a full day's work we returned to London with the largest known fragment, a gift from Mr. Morley McKay of Dresden. The broken surfaces of the main meteor are not of any great extent although some touch and overlap and it was difficult to estimate their approximate size by projecting imaginary lines from their edges to their imaginary outer points so that the total loss could not have been more than one half the size of the large portion. Its approximate original weight was probably about 120 pounds. It is needless to say how proud we are to have at least one good fragment of the most noteworthy meteorite that has been known to fall in Western Ontario.

The Astronomical Department has not attempted a detailed chemical analysis and prefers to leave that to the geologists. Professor Reavely is preparing an extensive report to be published later.

The probable path of the meteor through our atmosphere could not have been very high if we accept as true the many reports received regarding the fall and the fragments that were seen coming to earth. Taking these and other evidence together, I have made a model which, while incomplete, shows very well the probable directions, height, angle, explosions and falls which occurred. The meteor, after entering our atmosphere, sped on for scores and perhaps hundreds of miles before its original mass became heated sufficiently to flare and burst. By that time it was over the Bruce Peninsula where its first recorded explosion sent a fragment into Georgian Bay very close to a yacht whose owner notified us. The next burst occurred not far from Listowel and dropped a second fragment into Lake Huron about fifty feet from shore. A third explosion, somewhere between St. Marys and Stratford and almost overhead, threw a piece not far from an eyewitness who wrote to tell us where we might find it; this is the first burst observed by the writer. The fourth, a spectacular explosion, appeared to be right over our university, and from it fell a large mass of boiled rock or scoria which landed on a farm near Park Hill. Of this Professor Reavely obtained from Mr. Stewart Hopper several excellent specimens, which, when broken, have the characteristic odour. No falls have been reported from the fifth crash, the last observed from the campus, which occurred as it passed over the treetops and probably somewhere near Delaware; a sixth was reported from over Wardsville, but without flying fragments. The seventh or final explosion was the loudest and longest one reported and from it, projected almost vertically five feet into the clay, came the large rock followed by perhaps a dozen or more fragments, most of which were small and were picked up by the farmers in the nearby beet fields, one piece having reached as far west as Tupperville.

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COMMITTEE'S REPORT ON DRESDEN METEORITE

By E. G. Pleva and W. G. Colgrove

1. *"Toronto Star" Fragment*: Before leaving London, we stopped at the C.N.R. telegraph office to see a fragment which Mr. Carty, a "Star" reporter, claimed came from the "meteorite".

Description of the Fragment: The black crust (a more or less perfect glass formed by fusion of the various constituents from heat generated during passage of the stone through the atmosphere) was about 1 mm. thick. The interior was gray in colour, and the fragment broke with a crystalline fracture. When tested with a strong hand magnet, the fragment exhibited unmistakable evidences of magnetic properties. The electrical engineer of the London C.N.R. telegraph station later tested the fragment for resistance. He reported a resistance of 100,000 ohms between points on the fractured surface. There was no reaction between points on the fused surface. A small black, threadlike veinlet was noted in the fragment. This was due, in all likelihood, to the fracturing of the stone prior to its entrance into our atmosphere. The vein filling is of nearly coal black colour. From the "crust" and the gray colour of the interior, the "meteorite" from which the fragment was derived would be classed as belonging to the *stony* type. However, the strong magnetic properties, the apparent great weight, and the conspicuous crystal points indicated a stony meteorite high in nickel and iron. It is likely that a complete analysis would place the meteorite in the intermediate group, the stony iron or siderolite group.

2. *"The Meteorite"*: We found the "meteorite" had been placed in the custody of Mr. Charles Ross, editor of the Dresden News, who was exhibiting it in the window of the newspaper office.

a. *Description of the Meteorite*: The stone weighs eighty-eight pounds and approximates the dimensions of a field watermelon 14 inches long and 9 inches in diameter. The surface is crusted with the characteristic black imperfect glass coating of the stony meteorites. Some fragments were lost in the recovery of the stone and others were chipped off by "interested" parties. About 60% of the surface crusting remains, and about 95% of the meteorite by weight is still in the one piece despite the attacks by souvenir hunters.

When the meteorite was placed on exhibition on Wednesday, July 12, the fractured surfaces were bright gray, but 24 hours later the surfaces had a distinct oxidized or "rusty" appearance. This may be due to the presence of native iron, *oldhamite* (sulphide of calcium) and *schreibersite* (phosphide of iron and nickel). These minerals are unknown (or at least rare as in the case of native iron) in the earth's crust since they do not exist long in the presence of oxygen and moisture. This may account for the apparently rapid weathering.

b. *Description of the Fall Site*: The meteor fell in a beet field on the farm of Dan Solomon, a few miles out of Dresden. Mrs. Solomon saw the meteor fall into the field. Mr. Solomon dug the stone out the next morning and sold it for $4.00. The news story is essentially correct.

The fall of the meteorite was accompanied by noises variously described as resembling fire of guns and thunder.

It was impossible to find any evidence of the so-called white ash formed by the passage of "stone" through the clay. According to reports, the meteorite was found at a depth of seven feet.

While this depth seems quite extreme for an 88-pound stone, the evidence for depths is extremely contradictory. The absence of more "splatter" over a great area was surprising, but all evidence of "splatter" may have been obliterated by the feet of sightseers and a morning shower. Also surprising was the fact that the clay did not seem more compacted at the bottom of the hole. However, the hole had filled with ground water and the clay may have softened sufficiently to permit the prodding of the crow bar.

c. *The Owner*: Dr. Luke Smith, the owner of the meteorite, took the stone from Dresden to his home in Chatham, July 13.

University of Western Ontario.
July 13, 1939.

RESULTS OF THE STUDY OF 66 ORBITS OF METEORITES

(A preliminary note)

By I. S. ASTAPOWITSCH

In 1938 I completed at the Astronomical Institute of the Moscow University the investigation of orbits of 66 meteorites out of a total of 584, fallen up to January 1, 1938 (according to P. M. Millman's statistics) and kept in the museums of the world. Orbits of the following meteorites have been obtained:

(1) Novgorod Velikij (lost), (2) Novaya Erga (lost), (3) Hradschina, (4) Barbotan, (5) L'Aigle, (6) Weston, (7) Stannern, (8) Toulouse, (9) Erxleben, (10) Agen, (11) Wessely, (12) Blansko, (13) Little Piney, (14) Cereseto, (15) Braunau, (16) Gütersloh, (17) Mezö-Madarasz, (18) Quenggouk, (19) New Concord, (20) Iowa City, (21) Pillistfer, (22) Orgueil, (23) Knyahinya, (24) Pultusk, (25) Motta di Conti, (26) Slavetic, (27)

Hessle, (28) Krähenberg, (29) Lancé, (30) Orvinio, (31) Khairpur, (32) Homestead, (33) Stalldalen, (34) Rochester, (35) Tieschitz, (36) Mócs, (37) Tysnes, (38) Ochansk, (39) Jelica, (40) Forest City, (41) Björbole, (42) Leonovka, (43) Tomakovka, (44) Podkamennaya Tunguska, (45) St.-Michel, (46) Holbrook, (47) Appley Bridge, (48) Treysa, (49) Boguslavka, (50) Kaschin, (51) Saratov, (52) Simmern, (53) Nately (lost), (54) Padvarninkaj, (55) Chmelevka, (56) Paragould, (57) Staroje Boriskino, (58) Karoonda, (59) Archie, (60) Prambakirchen, (61) Wilkomir, (62) Pasamonte, (63) Athens, (64) Sioux County, (65) Pervomajskij, (66) Crescent.

Five of them are iron meteorites (Nos. 3, 23, 48, 49, 53). Nos. 7, 54, 57, 62, 64 and also Jonzac and Juvinas are eukrites, 2 are carbonaceous meteorites (Nos. 22 and 29), No. 44 is unknown. Forty-nine orbits proved to be either coinciding *inter se,* or with orbits of great showers of slow meteors and fireballs, elliptic as well as hyperbolic. Of the latter except for 2 previously known (cosmical showers of Scorpiids and Taurids), a series of cosmic showers were found (Virginids, Cancrids, Eridanids, Cygni-Lacertids, etc.); several meteorites also belong to them. Six of the elliptical orbits of meteorites coincided with certainty with the orbits of the comets 1092, 1702, 1797, 1851 I, 1874 II and 1790 III, the meteor radiants being well known for all of these, except 1702. To the Carolina Herschel Comet 1790 III belong the meteorites Nos. 5, 14, 16, 17, 26, 33, 38 and 40, besides the family of comets connected with it and the four meteor showers (CCXLVII, CCXLVIII, CCXXXII, CCXXXVI, according to Denning). They proved to be of the same composition (all of them brecciated chondrites). The orbits of all these bodies (3 comets, 4 showers and 8 meteorites) pass near the same point in space, situated in the direction $\lambda = 216°$, $\beta = +3°$ at a distance of 1 astronomical unit from the sun. All cometary meteorites proved to be stone meteorites, chondrites of bronzite and hypersthene, i.e., of the composition $(Mg, Fe)_2\ Si_2\ O_6$, whence I predicted the probable presence in the spectra of cometary meteorites in the first place of emission lines of iron, magnesium and silicon, and in the spectra of the comet nuclei near the sun of Fe, Mg, and O. In November, 1938, Dr. S. V. Orlov, Professor of the Moscow University, informed me that he identified on the basis of visual observations the lines of Fe, Mg, and O in the spectra of comets which approached the sun closely; as is known from Dr. P. M. Millman's works, Fe was found in the spectra of the Leonid and Perseid meteors. T. V. Vodopianova, on her side, extended the family of the comet 1790 III to several new comets with orbits crossing the above mentioned point. Nine orbits of meteorites are without doubt elliptic, 31 are hyperbolic, the rest (26) come close to parabolic or are uncertain. Seven eukrites proved to have come from quite different directions, some of them have been subjected to a second metamorphose or re-heating outside the solar system. All 5 iron meteorites also penetrated the solar system along hyperbolae, having nothing in common (both hexahedrites and octahedrites). Two carbonaceous meteorites (Nos. 22 and 29) are also foreign to the solar system. To the gigantic cosmical shower of Scorpiids (fireballs, meteors and telescopic meteors) belong 5 meteorites (Nos. 4, 11, 12, 24 and 42), all of them being identical (grey veined chondrites); they fell from the year 1790 to 1900, and in the case of appurtenance to the shower Nos. 1 and 7—in the course of 5 centuries (from 1421 to 1933). On the whole, the meteorites of the solar system display a curious uniformity. Their brightness coefficients (albedo) on fracture have the values 0.2-0.3 and approach those of the asteroids, the cosmical material being much more heterogeneous. This gives independent confirmation for the difference of physical properties, and also of heights and spectra between "solar" and "stellar" meteors. To account for the origin of the meteorites we must admit the presence of several sources, whether once in existence or still existing in a number of different regions of the galaxy. The catastrophically fast cooling characteristic for many meteorites may be connected with the ejection into cosmic space of differentiated fused masses probably at the times of great cataclysms with such bodies as for instance the dark companions of stars. The formation of new comets in the solar system, continuing also in our day, is caused by the effect of the destruction of a small section of the surface of one of the small bodies of the solar system (of the numerous but as yet undiscovered small asteroids—or, what is the same—of large meteorites of the Hermes 1937 VB type), in its collision with a "typical" small meteorite. The emission of the gases (CH_4, N_2, CO, CO_2, etc.) contained in each meteorite, and in normal condition exceeding in volume the volume of the meteorite containing them, is evidently akin to the production of cometary gases. On the whole, the ordinary so-called comets are products of insignificant disintegrations caused from time to time by collisions of meteorites and asteroids, the eccentric orbits of the latter not suffering any conspicuous changes. Jeans' theory of dissipation applied to comets is not inconsistent with the figures denoting the age of ordinary comets (hundreds of years) which gradually return to their pre-collision meteorite state. The number of these asteroids as well as the number of meteorites contained simultaneously in the solar system is much higher than was hitherto supposed.

In general, there also exist some other sources of meteorites in various parts of our galaxy.

Moscow University.
July 9th, 1939.

NOTE ON THE DRESDEN METEORITE

The recorded Canadian meteorite falls have been few in number (i.e., De Cewsville 1887, Beaver Creek 1893, and Shelburne 1904), so that the fall of the Dresden Meteorite is of particular interest. The scientific value of the occurrence is further enhanced by the fact that it took place early on a summer evening when a large number of people were outdoors and witnessed the phenomenon. Because of this fact the knowledge of the air-path should be fairly complete. Rev. W. G. Colgrove, the enthusiastic president of the London Centre of our Society, and Professor Pleva of the department of geography at the University of Western Ontario, have described above the chief details of the fall. The writer recently spent the greater part of a week travelling through southern Ontario in the neighbourhood of London and Dresden for the purpose of interviewing eye-witnesses and collecting as much scientific information as possible about the fall and, in collaboration with Professor Reavely of the Department of Geology at the University of Western Ontario, publication of a detailed scientific account has been planned for a future issue of the JOURNAL. The writer would like to have all eye-witness accounts of the great fireball of July 11, no matter how lacking in detail they may be. All notes concerning sounds heard are of particular interest.

It is also very important to have a record of all authentic pieces of the meteorite which have been found. It is sincerely hoped that members of the Society will do what they can to insure a complete scientific record of this interesting event.

Preliminary Report on the Perseid Campaign

On the whole the weather for the five nights scheduled for Perseid observation was above the average. The most unfortunate occurrence from the standpoint of the meteor observer was a remarkably brilliant auroral display on the night of Aug. 11-12. This display covered most of the sky from dusk till dawn and made both visual and photographic observations of meteors very difficult. In spite of this fact, however, a preliminary survey indicates that the Perseid programme was highly successful. All stations have not yet reported but it is known that one spectrum and 12 direct photographs were secured at the Dunlap Observatory, all these being taken with the rotating shutter, and that well over 20 direct photographs were secured at co-operating stations. At least 9 meteors were photographed at two or more stations. These results are all the more gratifying since the shower was not marked by the appearance of any meteors of great brightness or long enduring trains. The success of the programme is in large measure due to the number of interested amateurs who assisted with the photography, and clearly demonstrates the value of amateur co-operation in this field. Approximately 2,500 visual observations have been received from 21 stations. A complete account of the programme will appear in a future issue of the Journal.

P. M. M.