[From The American Journal of Science, Vol. XXXIV, November, 1912]

PRELIMINARY NOTE ON THE SHOWER OF METEORIC STONES AT AZTEC, NEAR HOLBROOK, NAVAJO COUNTY, ARIZONA.

By W. M. Foote.

Art. XXXIX.—*Preliminary Note on the Shower of Meteoric Stones near Holbrook, Navajo County, Arizona, July 19th, 1912, including a Reference to the Perseid Swarm of Meteors visible from July 11th to August 22d*; by Warren M. Foote.

History.

It was doubtless the literary exaggerations of the 18th century and similar causes which prevented early geologists and astronomers from investigating the reports of falling sky-stones. But in the fatherland of yellow journalism we sometimes find a journalistic restraint, under conditions that are worthy of remark, and which prove the labor of the news-gatherer to be of value to science. In the last week of July, the following account appeared in several Arizona papers:

Friday evening about six-thirty a meteor, or some other body of a like nature, passed over Holbrook going almost due east at a rate of speed that would make a swift-moving express train seem as though it were standing dead still. The noise it created was very loud and lasted for at least a half a minute and sounded somewhat like distant thunder or the booming of a cannon in the distance. It left a large cloud of smoke in its trail and several of our citizens heard it explode a couple of times. A few saw it and nearly everyone heard the noise it made. Reports from Winslow are that several people saw the body pass over the town, and the noise was heard at St. Joseph, Woodruff, Pinedale, and Concho. That either all or part of the body fell near the section house at Aztec, six miles east of here, there seems to be little doubt.

* * * *

A few small pieces were brought in here. One piece larger than an orange fell into a tree in a yard at Aztec cutting the limb off slick and clean and falling to the ground, and when picked up was almost red-hot. Other particles of the body fell in the same vicinity and an eye-witness states that for about a mile to the east he could see little puffs of dust arising from the sand, evidently where fragments struck.

* * * *

About two dozen people went to Aztec to pick up pieces of the meteor Sunday afternoon and the field is now pretty well cleaned up. The largest found weighed over 14 pounds, while several of about 5 pounds were picked up, and numerous small pieces. They are very brittle, heavy, and appear to have many small particles of iron in them.

As the writer of the present article lacked the time for making the two-thousand mile journey from Philadelphia, the additional and confirmatory data were secured by correspondence with witnesses of the fall and with finders of the stones. Following are the main facts of the fall and find, as gathered.

Between 6.20 and 6.40 P. M. on July 19th, 1912, a large meteor was heard traveling in an easterly direction and passing over Winslow, Holbrook, and Aztec, points along the Santa Fe Railroad, which here parallels the Rio Puerco River. It made a very loud noise, lasting for half a minute to one minute.* This noise has been variously likened by witnesses, to the rumbling of a rapidly driven farm wagon on a rough road, to escaping steam, to distant or long continued thunder

FIG. 1.

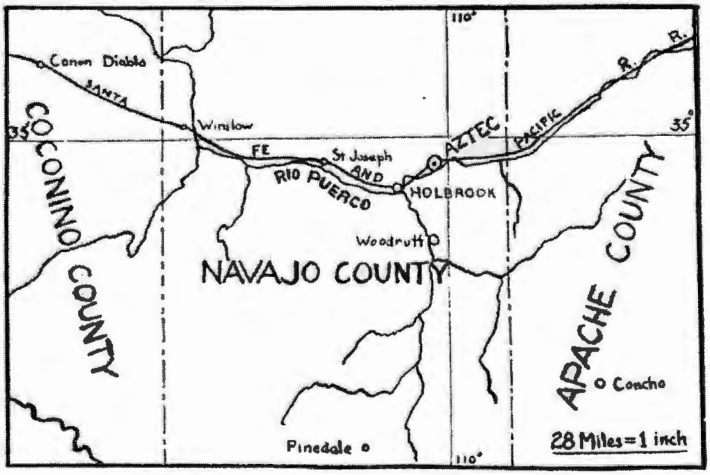
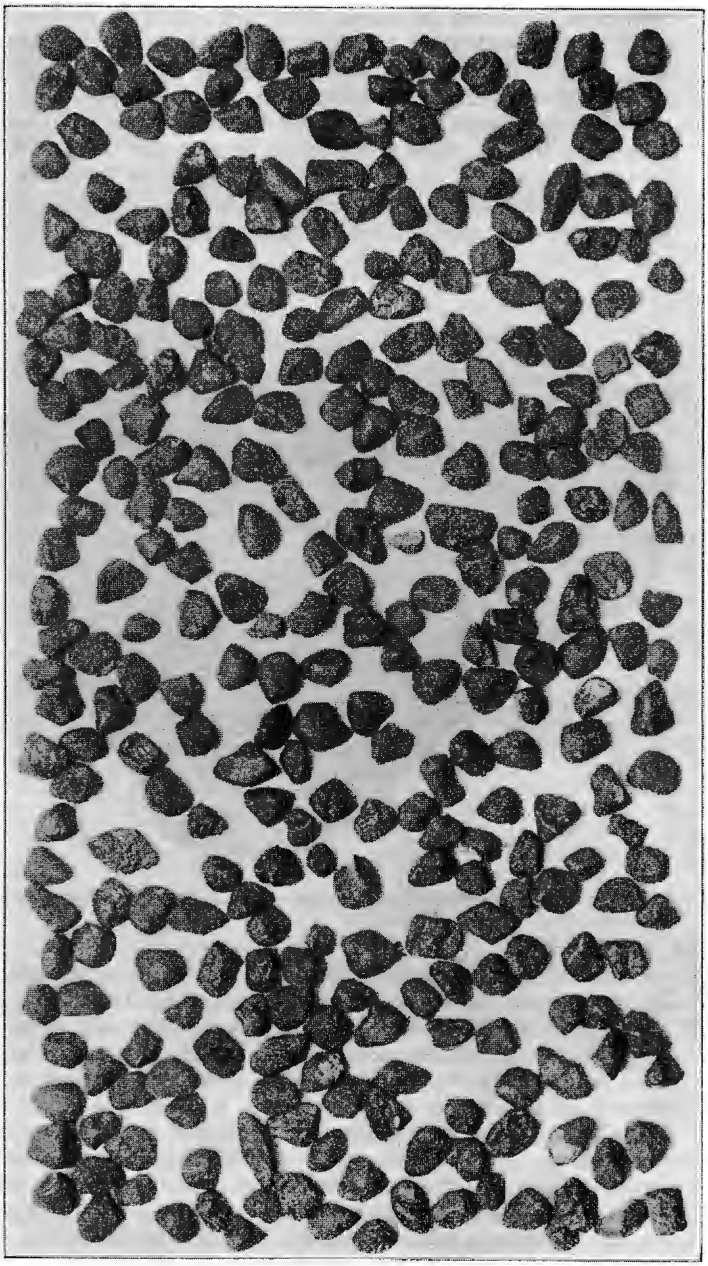


FIG. 1. Location of Fall. Aztec, near Holbrook, Navajo County, Arizona. 34° 57′ N., 110° 2′ W.

or the booming of a cannon. It was heard at Concho, St. Joseph and Woodruff and at Pinedale, some forty miles away. One large explosion was quickly followed by several small ones in rapid succession. Charles Von Aachen and his son then saw numerous stones fall at Aztec, raising many puffs of dust for a mile or more over the dry sand of the desert, like those produced by bullets or the first drops of rain in a heavy shower. They did not see the stones in the air. Some fell near a building, and one is said to have severed the branch of a tree. The meteor was not seen during its flight, as it was too early in the evening for its luminosity to be visible. Its speed could not be estimated, but it was "terrific" according to one account. Its

*One observer states that the loud reports were followed by lesser rumblings for four or five minutes. These were the usual echoes.



Photographs by Bond Bros., Philadelphia.

Fig. 2. "Holbrook peas." 360 complete boloids. Full size, about 4 to 8^{mm} long. 0·1 to 0·3 grams or 1·5 to 5 grains. Total weight, 70 grams.

path was indicated to many by a train of thin smoky vapor which spread out after the meteor passed. One observer estimated that the explosion occurred one or two miles above the earth. The weather at the time was slightly cloudy.

The stones were scattered over an ellipsoidal area roughly estimated by two finders to be about one-half mile wide and three miles long. As frequently recorded in meteoric falls, the longest diameter of this ellipsoid was in line with the trajectory of the meteor, being east and west. Most of the

FIG. 3.

FIG. 3. Characteristic pyramidal brustseite, with two rear corners broken and later fused. × 1· diameters.

smaller fragments lay on the top of the loose sandy soil; the larger pieces were about half buried, some to a depth of six inches, apparently having fallen slantingly from the west. The large and small stones, according to all answers received, were said to be indiscriminately spread over the ground, without regard to size.* In previous stone showers the small stones have been found first in the line of flight, then the medium, and finally the largest. The violent disruptions near Holbrook might account for the lack of such separation of the sizes, provided an explosion occurred near the end of the flight. Just such a late disruption was evidenced by the nearly

*See further, note on p. 456.

fresh fracture of many fragments. Visitors from nearby towns soon gathered the larger stones. Von Achen, who saw them fall, reported that they were too hot to pick up. Two accounts state that they became lighter in color after cooling. Except for about ten kilos sent away, all were acquired by the Foote Mineral Company of Philadelphia.

There is an Aztec post-office in Yuma Co., Arizona, but no post-office or telegraph station at Aztec, Navajo Co. Hence

FIG. 4.

FIG. 4. Specimen three-quarters buried in wet soil, resulting in rust and exudation of molysite. Checked surface exposed. Oblique angle of flight indicated by soil line. ×1· diameters.

the name of *Holbrook*, six miles distant, is used to designate the fall.

Macroscopic Features.

Externally the stones present all the commoner characteristics of aërolites. The primary crust, begun on the entrance of the meteor into our atmosphere with its high planetary velocity, and prior to the first explosion, is almost universally present. It coats broadly rounded surfaces and is generally dull black, being about $0{\cdot}3^{mm}$ thick. A checking or crackling of this crust, due to unequal expansion, is often noticeable, as shown in fig. 4. The secondary crust, formed on the fractured surfaces produced by this first disruption, is somewhat shiny and thinner than the older crust. Moreover, the fractures it covers are hackly and irregular, and it even fails to hide occasional protruding chondrules, indicating that the superficial dissipation by combustion had not proceeded far enough to round off the sharper corners and smaller prominences.

What may be termed a tertiary crust was begun subsequently to the second explosion when nearing the ground at reduced velocity. The genesis of this is most interestingly shown in various stages. A slight discoloration, especially a tarnishing of the metallic minerals, is sometimes seen. A mottled smoking of the surface and an incomplete incrustation of small patches is quite common and grades into a thin filmy crust (see fig. 5).

FIG. 5.

FIG. 5. Primary crust at left. Tertiary crust beginning as a smoky alteration. × 0·85 diameters.

On many of the smaller stones this tertiary crust is fully developed at the edges of the primary crust, being in fact a labiate overflow of the latter. The newly fractured area often shows the various degrees of fusion as its center is approached, where in some cases only a smoky alteration may be seen. Rarely the primary, secondary, and tertiary incrustations are exhibited in the same fragment.

Several dozen individuals showed the characteristic radial flowage lines of viscous stone from the front, or brustseite, to the back. This flow is due to the backward rush of air over the molten surface. It was noted in some pieces of not over

1^{cm} diameter. The most deeply and unusually marked brustseite found was on a large stone of 2,400 grams, shown in figures 6 and 7. The wholly unique character of this piece suggests that it was the front end of the original large mass, or one of several large masses, which entered the earth's atmosphere. Here the lines of flow are merged and sometimes originate in deep pits, or piezoglyphs, probably caused by a

FIG. 6.

FIG. 6. Brustseite with deeply marked radial fusion flow (reconstructed). ×0·64 diameters. See also Fig. 7.

differential fusing or fracturing of the surface from heat and very rarely by the burning out of nodules. Unfortunately the finder of this mass treated it with scant respect, and it reached Philadelphia in three fragments scattered among thousands of other stones. The edges were much bruised from rough handling, so that the reconstructed corner and cracks, shown plainly in the engraving, are comparatively large. The back of the stone (fig. 7) illustrates well the relatively quiet fusion of all of the similarly marked masses. In these the overflow of the molten silicates behind the rear edges is shown sometimes in a fringe-like scoriaceous "wash" or thicker crust. Otherwise

FIG. 7.

FIG. 7. Back of mass shown in fig. 6 (reconstructed). × 0·64 diameters.

the back plainly appears as an area of lesser fusional disturbance than the front.

Several of these specimens are superficially identical with that of Gopalpur, described by Tschermak, as having a rounded front covered with a finely striped and radiately channeled crust, with elongated pit-like depressions, becoming shallower as they recede from the radiant point. Gopalpur's front crust overlaps the back in a well-defined and sometimes fringed border, becoming verrucose and enclosing unaltered grains of the meteorite. One 450-gram Holbrook fragment with deeply furrowed brustseite similarly shows 1 to 2^{mm} fragments of unaltered stone enclosed in the back crust, the semi-fused area being 1 to 3^{mm} thick.

A few well-marked brustseite stones (fig. 3) show fractures near the base; none at the head of the stone. This would indicate that the pressure of the air stream on the rear edge is a factor in disruption, as well as the expansion due to heat. In some instances the radial fusion flow is shown on the secondary crust of fragments, notably in figs. 8 and 9. Here the stone was apparently reversed in its flight

Fig. 8.

Fig. 9.

Fig. 8. Front of stone, showing radial fusion flow on primary crust.
Fig. 9. Back of same stone, showing flow on secondary crust after reversal of position in flight. × 0·9 diameters.

after an early explosion, and a well-marked radial flow was left upon the new brustseite.

In the examination of a large number of stones, the thick and minutely blebby character of the otherwise even crust on one face would indicate the back of the stone, whereas the fusion flow on the reverse, or front, might be but faintly marked, or even absent. The front is often brownish, the back being usually deep black.

In rare cases the pits clearly result from the burning or fracturing out of pyrrhotite nodules, as illustrated in fig. 10. At the lower end of the pit is a piece of the freshly fractured pyrrhotite. In the bottom of the pit is the smoothly altered slaggy remnant of the original nodule, similar to the unaltered one shown in fig. 13. Some of these inclusions are sharply rectangular and possess a distinct parting. Qualitative tests show the mineral to be essentially sulphide of iron. It may therefore be provisionally classed as pyrrhotite.

No tendency toward any one fragmental form is observable except that the stones with well-marked fusion flow are generally of a roughly pyramidal or conical shape, the apex corresponding with the radiant point of the fusion lines; the base is the back of the individual in flight.

According to a local account, the rust noticed on a few stones was caused by rain between the falling and finding of the specimens. On these is observable the usual liquid exudation of molysite (ferric chloride, $FeCl_3$), the alteration of lawrencite (ferrous

FIG. 10.

FIG. 10. Piezoglyph formed by burning out of pyrrhotite nodule. × 0·77 diameters.

chloride $FeCl_2$). The remainder of the thousands of individuals examined seemed to be entirely stable and bear no signs of disintegration. On many pieces are traces of the sandy reddish soil on which they fell. Two or three per cent showed a "soil line" (fig. 12) indicating clearly the depth of burial. A very few showed traces of the soil on all sides. This is, of course, not a reliable indication of the average depth of burial, since the amount of cleaning done by the finders cannot be determined. The direction of this soil line, shown in fig. 4, would indicate that the angle of fall with the earth's surface was about thirty to forty degrees. From the slight penetration of the soil observed, the last stage of the flight was evidently not incomparable with the velocity of an ordinary falling body, as has been accurately calculated by investigators of previous falls.

The relatively low temperature at the moment of reaching

FIG. 11.

FIG. 11. Flat brustseite. × 0·73 diameters. See fig. 12.

FIG. 12.

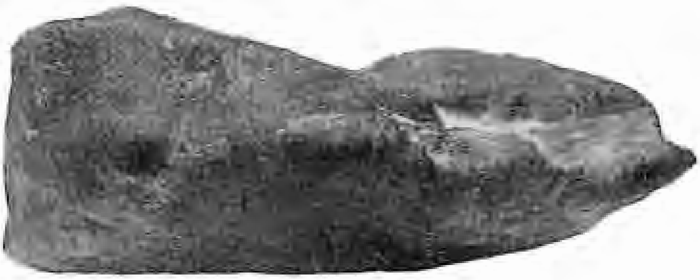


FIG. 12. Flat brustseite (down). Side view showing confirmatory soil line and scoriaceous overflow on back (up). × 0·76 diameters.

the earth's surface is suggested by one specimen with uncharred vegetable fiber adhering closely to the rough crust. The impact apparently pressed the fibers firmly into the minute interstices of the crust.

Examination of a fractured surface shows a light ashy gray color and the granulated texture imperfectly reproduced in fig. 13. Irregular chondrules, visible to the naked eye, are common, and here and there others become prominent by their spherical form breaking half free from the matrix. In some instances these hemispheres are quite perfect and of four or five millimeters diameter, the largest one, illustrated in fig. 14, reaching 11 millimeters. It has lost much of its definiteness in photographing.

Under a lens, the chondrules breaking with the matrix are seen to be numerously distributed throughout the mass. A

Fig. 13.

Fig. 13. Fractured surface with pyrrhotite nodule. × 1· diameters.

large number of the chondrules are gray in color, others are whitish. Not infrequently a broken chondrule shows radiofoliate structure, sometimes with the radiant point at one edge.

Microscopic Examination.

This was made by Mr. W. Harold Tomlinson, whose report follows :—

The new meteorite is an aërolite containing a very little native iron. There are three opaque minerals forming together perhaps 4 per cent of the volume. Native iron and pyrrhotite

Examination of a fractured surface shows a light ashy gray color and the granulated texture imperfectly reproduced in fig. 13. Irregular chondrules, visible to the naked eye, are common, and here and there others become prominent by their spherical form breaking half free from the matrix. In some instances these hemispheres are quite perfect and of four or five millimeters diameter, the largest one, illustrated in fig. 14, reaching 11 millimeters. It has lost much of its definiteness in photographing.

Under a lens, the chondrules breaking with the matrix are seen to be numerously distributed throughout the mass. A

Fig. 13.

Fig. 13. Fractured surface with pyrrhotite nodule. × 1· diameters.

large number of the chondrules are gray in color, others are whitish. Not infrequently a broken chondrule shows radio-foliate structure, sometimes with the radiant point at one edge.

Microscopic Examination.

This was made by Mr. W. Harold Tomlinson, whose report follows:—

The new meteorite is an aërolite containing a very little native iron. There are three opaque minerals forming together perhaps 4 per cent of the volume. Native iron and pyrrhotite occur in irregular but usually rounded patches and grains, in about equal amounts. The pyrrhotite occasionally shows crystalline faces. Magnetite in small jet black or slightly bluish black grains occurs to less extent than the other metallic minerals.

FIG. 15.

FIG. 15. Imperfect polish showing distribution of nickel-iron. At large end a chondrule encircled by minute iron grains. × 1·7 diameters.

The principal constituent of the stone is enstatite, which forms probably 50–60 per cent by volume. It occurs in prisms from $1^{mm} \times \cdot 25^{mm}$ in size down to minute allotriomorphic grains. It also occurs often in chondrules with radiating structure (fig. 17), and in one section a chondrule was found with tangential structure, i. e. the fibers formed a regular polygon. Enstatite appears to have been one of the first minerals to separate and to have continued its separation until the magma cooled. In mass the enstatite has often a slightly greenish color. It is colorless in section.

Olivine and monoclinic pyroxene (diallage) make up the balance of the stone. Olivine occurs usually in crystals and crystal grains set in a grayish glass. A group of olivine set in glass will be divided from the rest of the stone often by sharp demarcation as though it were an inclusion of another stone.

Olivine also occurs frequently in less perfect crystals associated with the enstatite, but segregation is rather characteristic of it in this stone.

The diallage in mass is a brownish color. In section it has in some places a very slight pinkish tinge, but is usually colorless. It occurs in grains with few crystal boundaries and in large crystals. One large crystal measured approximately $2{\cdot}5 \times 2^{mm}$. It also occurs twinned or intergrown with the enstatite and in some of the chondrules it is twinned with the enstatite. There are some longish prisms with fibrous structure and small extinction angle that are also monoclinic pyroxene.

FIG. 16.

FIG. 16. Sharp octahedrons of spinel in quartz. × 30 diameters. Lower nicol in place.

The most interesting feature observed was a patch of spinels set in quartz. Of ten sections examined, these minerals were found in only one. They shade in color from clear and rather light ruby-red to ruby-brown. The darker are shining black by reflected light, and are probably chromite. On the light side of the patch the crystals are red by reflected light, and are therefore a ruby- or chrome-spinel (fig. 16). They occur in sharp octahedrons and are the most perfectly crystallized mineral in the stone. They are identified by color, crystal form, reflection, and position. The crystals are set in semi-crystalline quartz and the patch is edged with quartz that is slightly coarser. The granules of quartz are irregular in shape, often interlocking, and show wavy extinction. No figure was obtained beyond an indistinct dot which had no effect on a quartz wedge. The quartz is sufficiently identified, however, by its low refraction, double-refraction showing colors up to white, and by the characteristic habit of the grains.

These patches of spinel and quartz are analogous to the patches of olivine and glass previously described. The two minerals should probably be regarded as secondary minerals formed by a reaction (perhaps influenced by Cr_2O_3) between the olivine and anorthite or a glass near to anorthite in composition.

Chromite was found in three sections. It occurs associated with the metallic minerals. It is black by reflected light and dull red by transmitted light. Both patches and crystals were found.

FIG. 17.

FIG. 17. Chondrule of enstatite surrounded by native iron and pyrrhotite. × 16 diameters. Nicols crossed.

Nickel-Iron Content.

Mr. George C. Davis made the few chemical determinations of the aërolite which limited time permitted. The specific gravity was found to be 3·22. One hundred grams, freed from crust, were finely powdered and treated repeatedly with the electro-magnet. The metallic portion was washed with alcohol to remove the silicates, but the separation was incomplete and the silicates finally constituted about 25 per cent of the magnetic concentrates. The material for analysis was taken from twelve individuals.

Weight magnetic portion,	actual	4·90
Weight non-magnetic portion,	actual	95·
Weight magnetic portion,	corrected	3·675

The corrected weights give the following percentage for the aërolite:

Nickel-iron	3·68
Silica	96·32
	100·00

Analysis magnetic concentrates.

Silica	14·12
Iron	60·64
Nickel	11·84

Corrected for 25 per cent non-magnetic minerals present.

Iron	80·86
Nickel	15·79

Astronomical Relationship.

Astronomers have long debated the question as to whether the fall of the Mazapil (Mexico) iron* on Nov. 27th, 1885, proved it to be actually a member of the swarm of Leonids or November meteors seen numerously on the same night, or whether the occurrences were purely coincidental.

The well-known August or Perseid meteors are seen from July 11th to August 22d (Denning), and reach a maximum on August 10th to 13th, while the lesser Aquarids reach their maximum on July 28th. Their nearness suggested an inquiry as to a possible relationship between these star showers and the Holbrook meteorites.

Apprized of the circumstances of the Holbrook fall, Prof. Eric Doolittle, Director of the Flower Observatory, University of Pennsylvania, wrote as follows:—

October 5, 1912.

I was greatly interested in your account of the extraordinary fall of meteoric material in Arizona on the evening of July 19th, last, and I take great pleasure in giving you what information I can regarding the known meteoric showers which may be expected at about this date.

The nearest bright shower in point of time is undoubtedly that known as the Aquarid shower, which reaches its maximum on July

* See this Journal, xxxiii, 221, 1885.

28,—but nine days later than the fall observed. Yet I hardly think it possible that the material actually collected can belong to this meteoric stream, for the reason that the region of the sky from which the Aquarids are seen to come had not yet risen above the eastern horizon nor would this region begin to rise until about one hour later. And as at this time the constellation Aquarius would be seen in an almost due easterly direction, it seems not possible that a member of this stream could be seen coming from the west, as the Holbrook meteorite did.

The next brilliant shower in point of time is the well-known Perseid shower, more commonly known as the shower of August shooting stars. Although this shower was most brilliant from August 10th–13th of the present year, the individual particles are so greatly scattered that straggling members may be seen for nearly a month before this date. The point among the stars from which the meteors of this stream are seen to come is constantly changing during this time, owing to our displacement in space caused by the motion of the earth. According to Mr. W. F. Denning,—the highest present authority upon this subject,—the occasional meteors from this shower witnessed on July 19th should apparently come from a point just without the borders of Perseus and within those of the constellation Cassiopeia. At the time under consideration this point of the heavens would be almost exactly in the north horizon, or at most but a degree or two to the west of north. The greater part of the particles which reached us from this stream at this time should therefore be expected to approach our country from the north, and to at least begin their motion through our air in a path very nearly parallel to the ground. However a single, isolated member of the swarm might easily have had the direction of its motion greatly changed, either by the gravitational pull of the other members or by collision with them, so that a single such mass might be seen to enter our atmosphere from an unexpected direction.*

It is therefore in my judgment not impossible that this most interesting fall might have come from the Perseid swarm, and therefore be an actual part of or an attendant to Tuttle's Comet of 1862; but I do not think that from the data at hand we can now establish this connection.

There are several other less striking showers due at about this time; notably, a second Perseid shower of faint, swiftly moving stars whose radiant is 14 degrees farther toward the south than that of the first, and also a shower coming from the constellation

* That the observers' accounts of momentary phenomena often conflict, is but natural. One witness wrote on October 18th, that on hearing the reports, he saw only a very large cloud of sand or smoke move from east to southwest, and after striking a black cloud, the first sand or smoke cloud traveled back to the east. While probably of little value, the account is recorded here because this large finder was the only one to fully indicate an ellipsoid with longest diameter east and west, in answering as to the area of the fall.

of Cygnus, which actually reaches its maximum on this very date,—July 19. But as Cygnus at the time indicated was in the northeastern part of the sky, it seems that this shower must be excluded from consideration for the same reason that the Aquarid shower was dismissed. . . . —*Eric Doolittle.*

Quantitative Comparison.

A most careful search by over one hundred persons was made under that stimulus which is usually found to be instantly effective. This search continued for two months. The discoveries of new stones rapidly rose and as rapidly dwindled to nothing. Following is an estimate of the entire fall. Among the 29 larger ones, three or four had an end broken off, presumably by the finder; perhaps 5 per cent of the stones, counted as complete, had one face merely smoked, the balance were completely incrusted.

Items 1, 2, 3, and 4 were received at Philadelphia.

(1)	29 individuals over 1000 grams: 6665, 4264, 3470, 3122, 2940, 2605, 2520, 2500, 2480, 2463, 2442, 2318, 2270, 2250, 2050, 1893, 1860, 1816, 1780, 1558, 1464, 1400, 1330, 1272, 1190, 1148, 1120, 1100, 1020. Total,	64,310	grams
(2)	6000 individuals of 1 gram to 1000 grams each	136,000	"
(3)	8000 individuals under 1 gram each	4,000	"
(4)	Fragments broken after finding (estimated)	4,000	"
(5)	Many individuals of less than 1000 grams each, distributed as samples to institutions in July and carried off as curios by visitors	10,000	"
	14,029 + stones. Estimated total weight of fall (481½ lbs. avd.)	218,310	"

A record of the more notable stone showers of the 19th century was prepared for comparison. It will be observed that such showers are recorded but rarely, and that in point of number of stones, the Holbrook fall is one of the greatest in modern times. Another distinction it carries is the minute size of thousands of its individuals. The smallest shown in fig. 2 average 10,000 to the kilogram, or about 4,536 to a pound avoirdupois: a single one weighs less than 0·1 gram or 1½ grains, being smaller than the smallest of the Hessle stones, which were only found because they fell on the ice.

These scarred and diminutive "Holbrook peas" confirm the accepted opinion that far larger cosmic stones are usually quite consumed in the atmospheric passage.

Principal Stone Showers of the 19th Century.

The following data are gathered from Wülfing's "Meteoriten":

Date of Fall	Locality	Recorded Number of Stones	Recorded Weight of Fall in Grams
April 26, 1803	L'Aigle, France	2000–3000	36,843
Dec. 14, 1807	Weston, Connecticut	Many	18,267
May 22, 1808	Stannern, Austria	200–300	38,408
May 1, 1860	New Concord, Ohio	Over 30	97,811
June 9, 1866	Knyahinya, Hungary	Over 1000	423,120
Jan. 30, 1868	Pultusk, Poland	About 100,000	200,932
Jan. 1, 1869	Hessle, Sweden	Many	22,895
Feb. 12, 1875	Homestead, Iowa	Many	124,492
Feb. 3, 1882	Möcs, Hungary	Over 100,000	155,632
May 2, 1890	Forest, Iowa	Many	122,037
July 19, 1912	Holbrook, Arizona	Over 14,000	218,310

No other aërolites are recorded from Arizona, the nearest meteoric fall being the siderite of Canyon Diablo, some sixty miles distant.

Philadelphia, October 7, 1912.

NOTE, *Oct. 24th.*—Of the numerous witnesses to whom a list of nineteen questions was submitted, but few replied to the following: In the area covered by the fall, were the large and small stones mixed indiscriminately or were they sorted somewhat according to size? The first answered that the stones were mixed. But in a supplementary statement, Mr. Von Aachen writes on Oct. 18th that he found the small and large stones *separated*. Further evidence is manifestly needed before the actual facts are established concerning a sorting of the shower.