PROJECT 10073 RECORD

1. DATE - TIME GROUP	2. LOCATION
4 January 1965	Bethel, Vermont
3. SOURCE Civilian	**10. CONCLUSION** Other (TRACER BULLETS)
4. NUMBER OF OBJECTS Three	
5. LENGTH OF OBSERVATION 3 Seconds Each	**11. BRIEF SUMMARY AND ANALYSIS** SEE CASE FILE
6. TYPE OF OBSERVATION Ground-Visual	
7. COURSE E to W	
8. PHOTOS ☐ Yes ☒ No	
9. PHYSICAL EVIDENCE ☐ Yes ☒ No	

FORM
FTD SEP 63 0-329 (TDE) Previous editions of this form may be used.

DEARBORN OBSERVATORY
NORTHWESTERN UNIVERSITY
EVANSTON, ILLINOIS 60201

A report on the Bethel, Vermont, sighting of 4 January 1965.

This case was investigated by Dr. J. Allen Hynek who visited Bethel, Vermont, and Birlington, Vermont, to interview Doctor [redacted], and [redacted]. After an essentially all day investigation, the conclusion of the interviewer is that, with a high degree of probability, the sighting was that of tracer bullets fired over the highway from a wooded elevation immediately adjacent to the road and rising from it. Statements of the two Randolph men, [redacted] and Mr[redacted] which seem to have the most weight, were that "the trajectories and general appearance of the luminous balls were exactly like those of tracer bullets he had seen many times during World War II."

In addition to this statement, it is well-known that there are lads in the neighborhood who are given to playing pranks. It is relatively easy to obtain such tracer shells in the open market; and that there were no laws in Vermont projibiting the use of same. It is quite understandable that even mature observers traveling along the highway would be taken by surprise by such an unexpected and unusual observation. In view of the statements of the witnesses interviewed it seems highly likely to the interviewer that the sighting was indeed the result of the firing of tracer bullets across the highway.

Hynek

FTD (TDEW)
Wright-Patterson AFB, Ohio 45433
29 July 1965

Dr J Allen Hynek
Harvard College Observatory
60 Garden Street
Cambridge, Massachusetts

Dear Allen,

This is to confirm discussions during your recent visit regarding the Bethel, Vermont observation by Dr [redacted] and NICAP data relating to his observation. Mr [redacted], forwarded limited data for evaluation. Of particular interest is the data given [redacted] by additional witnesses as indicated in the Burlington Free Press news article. The reports for additional witnesses have not, as yet, been received by the Air Force. In order that a conclusion to this case may be made, permission from the contractor has been obtained for you to conduct an investigation at Bethel.

In case the original data on this sighting is at Dearborn, we are attaching correspondance pertinent to this report.

Sincerely,

HECTOR QUINTANILLA, Jr
Major, USAF
Chief, Aerial Phenomena Branch

[redacted]

15 April 1965

Mr. [redacted]
Wenham, Massachusetts

Dear Mr. [redacted]

The Air Force has asked my opinion of their evaluation of the Bethel-Randolph sighting of 4 January 1965. I regret that it has taken me this long to get to this particular case.

As so frequently happens, I need more information before coming to any conclusions. While there is a strong similarity of this sighting to that [redacted] of 1913, nothing definite can be said until we have some idea of the distance of these three objects. Dr. [redacted] indicated that in his opinion the objects passed between him and the distant hills. If so, this would set an upper limit to the distance, and would prove that the objects were close by. On the other hand, one can be mistaken in matters of this sort. I understand from [redacted] with whom I talked on the phone, that there were other reports of the sighting, both by some people in a car that was trailing his by some distance and by someone else who saw it more or less at right angles to his position. If this is the case, then it opens the possibility of a rough fix on the object, a bit of information obviously of great importance.

I should like to ask whether you have made this calculation and, secondly, whether I might have access to these additional reports. I rather imagine that the additional reports were not in at the time you submitted your material to the Air Force, as undoubtedly you have wished them to have as much information as possible.

I would agree on the basis of what limited information I have now that the sighting was not one of ordinary meteors, particularly the Quarantids. But in my opinion the bolide hypothesis is not entirely ruled out if the objects were at a great distance. Or in other words, I would agree that it was not a meteor if we can establish that the objects were indeed close at hand. However, I am so used to reports coming in here to the Observatory of a bright object that "landed in the next farm yard" only to discover that the person had seen a fireball that landed two hundred miles away. Thus, I feel it is extremely important to establish, if at all possible, the distance of these objects by an objective mthod.

I hope that you will favor me with copies of the additional reports of this sighting and any other additional information which may have come to light since your letters earlier this year. I understand that you are extremely active in this field, one which requires persistence and patience in spearating fact from interpretation of facts and winnowing out whenever possible the often considerable honest errors in the making of observations. May I wish you luck in your continued efforts.

Sincerely yours,

[redacted]

[redacted]

FTD (TDEW)
Wright-Patterson AFB, Ohio 45433
19 Feb 65

Dr J Allen Hynek
Dearborn Observatory
Northwestern University
Evanston, Illinois

Dear Allen,

Reference the attached information which is self explanatory. We request your evaluation on the observation and any ammunition for our reply to M[redacted] Since he is one of our most prolific pen pals a reply is in order without undue delay.

The information regarding the size of an object which would subtend an arc of a football at arms length, is desired.

Sincerely,

HECTOR QUINTANILLA, Jr
Major, USAF
Chief, Aerial Phenomena Branch

OFFICIAL FILE COPY

4 Jan 65

TDEW

Reported UFO

22 Jan 65

Hq USAF SAFOI PB
Wash D C 20330

1. We have received a reported sighting by [redacted] and a Vermont State Trooper from [redacted], Wenham, Massachusetts.

2. The Air Force evaluators regard this sighting as a probable observation of meteors. The attached sheet indicates that the Quandrantids meteor shower was occurring during this period. This is one of the more active meteor showers.

3. It is suggested that [redacted] Forward a report to [redacted] of the American Meteor Society, since he maintains a card file on observations of this nature.

FOR THE COMMANDER

ERIC T de JONCKHEERE
Colonel, USAF
Deputy for Technology
and Subsystems

1 Atch
a/s

OFFICIAL FILE COPY

[redacted]
Wenham, Massachusetts

May 1, 1965

Dr. J. Allen Hynek
Dearborn Observatory
Northwestern University
Evanston, Illinois 60201

Dear Dr. Hynek:

I am in receipt of your letter of 15 April 1965 requesting additional information concerning the Bethel-Randolph sighting on 4 January 1965. I regret to inform you that very little information other than that sent NICAP and AFSC(FTD) has been collected. That information which has been collected is enclosed in the form of letters and questionnaires related to our investigation. Unfortunately NICAP does not have a subcommittee in Vermont and our subcommittee usually operates only in Massachusetts where direct on-the-spot interviewing and investigation is convenient for us. In this investigation all communication with the witnesses was by mail. We have tried to obtain further information such as you asked for but have had no response. I am sure you are aware of this kind of problem.

This is one of the many UFO reports that are "border-line" cases. As you know an outline of facts tending to negate the Quadrantid meteor theory was compiled and included in our reports sent to NICAP and BLUEBOOK. We pointed out that these facts in themselves did not prove that the objects were not meteors but that the Air Force evaluation was at least questionable. It is interesting to note that our New England newsclip service did not pick up any other reports of this phenomena and that the Smithsonian Institute received no reports of a bolide on that date. [redacted] insists that the objects passed in-front-of hills not over four miles away and all witnesses had the impression that the objects were near. This suggests (especially if [redacted] is correct in his observation) that this sighting was "localized" and unusual to say the least. I will enclose the names and addresses of the witnesses. Perhaps you can invoke a response from them.

Enclosed is information concerning our subcommittee and a letter to you from Martin Shapiro who is on it and once worked with you at Harvard Observatory. Our adviser, Walt Webb once worked for you and has spoken highly of you. Re page 1 of the "UFO Investigator" concerning the sighting by the Federal Law Officer. On a recent business trip to Seattle I met the chairman of the NICAP subcommittee who investigated this report. He is Dr. Pilot (Ph.D Celestial Mechanics) who heads a Boeing Aerospace research team. All the best to you in your work with the USAF. I look forward to Jacques Vallee's "Anatomy of a Phenomenon".

Yours sincerely,

[redacted]

Dr. Hynek,
A copy of this questionnaire was sent to all known witnesses, including Dr Woodruff. Only a few responded
J. Fowler

MASSACHUSETTS INVESTIGATING SUBCOMMITTEE
OF
THE NATIONAL INVESTIGATIONS COMMITTEE ON AERIAL PHENOMENA

33 Ballard Street
Woburn, Massachusetts

20 April 1965

P.S. As you will see the witness's distance, etc. - Quite a ball of yarn to unravel. We just could do so much being a volunteer group with our prime responsibility. Hope you can do better

Dear Dr. Woodruff:

The USAF has asked our subcommittee for additional information concerning your sighting of three (3) unidentified flying objects on January 4, 1965. ~~In view of the fact that additional information on this sighting should also be made available to the Air Force there are total areas in which we need more information. Would you be so kind as to answer the few questions listed below and return this form to me promptly? I have enclosed an addressed stamped envelope for your convenience?~~

1. How long did you see each object? 5 seconds approx.

2. How long was the interval between each object? 10 seconds approx

3. Did the UFOs pass in front of anything? (such as hills, trees?) (houses, telephone pole?)

   a. What did they pass in front of? Yes. Hills.

   b. How far was what they passed in front of from you? Not over 4 miles.

4. How far do you think the UFOs were from you and upon what do you base your estimate? Not over one mile. They passed behind treetops not one mile distant.

5. It is essential that we have this additional information as soon as possible. We appreciate your interest in this matter. Thank you very much for your cooperation.

Yours sincerely,
Lago Spaggiari
Stanton T. Friedman
Richard B. Foster
Citizen

RBF/ar

Jan 13, [illegible]

Dear [illegible]

According to today's Burlington Free Press, I [illegible] that you were interested in hearing from anyone who [illegible] the same objects again appearing Jan 4.

Like you, I was reluctant to tell anyone about them [illegible] my wife [illegible] I read your report in the paper & since I also mentioned it to my two [illegible] some [illegible] in [illegible]

the address sufficient

I live in Randolph Ctr. and work in Woodstock and thus travel the route every day. About a mile north of Bethel at approximately 4.50, I noticed the first object. The two following appeared at even intervals of about [illegible] seconds apart. To me they appeared to be brilliant red and perfectly round. The size in comparison to the [illegible] seemed to be about that of a baseball. They seemed to have a short trail of sparks. From what I could recall from my Air Force days of the early 40s, I would est

[illegible]

figure ... a long white trail to the point of impact. They appeared to me to have a trajectory away from our father than westward, although they disappeared from my vision behind the ~~[illegible]~~ hillside. Again I tried to recall my Air Force days and estimated that they appeared to be about two to three hundred feet off the ground and traveling about three to four hundred mph. I realize that the size, speed and altitude may differ but I believe that I saw two round objects [illegible] the transfer with you.

It would certainly [illegible] interesting to know what we actually saw.

Sincerely,

[redacted]

PA

UFO Seen on Bethel-Randolph Road By Two Different Groups

Say Three Bright Objects Flew Across Path Last Week Monday

Tourists from Outer Space? Physical phenomena? Incendiary rifle bullets?

What were the three bright Things seen in the sky last week Monday around five o'clock in the afternoon? Midway between Randolph and Bethel?

The Things were seen by at least two separate groups of persons traveling from Bethel to Randolph and were reported separately.

First public report was made to the Burlington Free Press by Dr. Richard S. Woodruff, state pathologist, who was returning from a jury case in Brattleboro accompanied by a state trooper. Dr. Woodruff characterized himself as a "not overly imaginative person and neither is the state trooper." This was their report.

REPORT NO. 1

"As we were driving along (on the road between Bethel and Randolph, about 4:30 or 5 p. m. suddenly, just above the treetops to our left, an object came rapidly into sight. It carried an orange-ish - red light about the size of a football.

"The trooper said, 'My God, did you see that?'

"Just then a second came into view. It flew the same course as the first, to our right above the valley, then disappeared swiftly into the sky.

"Then came a third, exactly like the first two. one, two, three, just like that.

"The trooper and I were spellbound. The unidentified flying object, or UFO as they are known, appeared to be round but they were traveling so fast, we really couldn't say."

SEEN BY FOUR OTHERS

Dr. Woodruff's report seems to be corroborated by an entirely separate report from four Randolph men who were on their way home from work. They are Charles Holman, Chuck Hatch, Wayne Luce and Howard Frink.

Their story, as told by Holman, is as follows:

We were driving along the flat between Bethel and Randolph before you come to Finley bridge when all of a sudden an object crossed in front of us. It was reddish pink in color and seemed to be the size of a [illegible] ball. It crossed from west to east and was about 75 to 100 [illegible] off the ground. Before we [illegible] the corner to the bridge a second one shot across. We then went up the hill by the Rogers [illegible] and [illegible] top by Al[illegible]dene.

all these men live in Randolph, Vt. and can be reached by mail with that address

them at the time.

Dr. Woodruff called the Things "Unidentified Flying Objects" but Holman said he figured they were incendiary rifle bullets. Just how three bullets happened to be shooting across the highway within a half mile of each other is a mystery, however.

ANOTHER REPORT

Another sighting last spring was reported to the Herald by an individual driving through Northfield gulf late at night. The individual who was in the back seat and did not see the Thing said the two in the front seat had seen it at the same time. One said, "Look at that. What a peculiar pattern of lights. Looks like a flying saucer."

[illegible] two persons was such a shock that no one said anything for miles, the observer reported.

The mystery of UFO's or flying saucers or Things has been subject of much study in the past 15 years brought to the fore every once in a while by statements from prominent persons implying that official government organs know much more about them than they will admit. Scientists at Cape Kennedy reported UFO's trailing a Gemini space capsule shortly after launching in July but the sightings have never been confirmed by the Air Force. Probably one of the most prolific writers on UFO's has been Major Donald E. Keyhoe, U.S. Marine Corps, Retired. His first book, "Flying Saucers Are Real," created intense interest in 1950 and was followed in 1953 by "Flying Saucers from Outer Space," based on his conclusions that the UFO's are actually sent from and controlled by forces in outer space. The Air Force, which has conducted investigations for years of all sightings, has never officially denied this as a possibility, but has relied usually on its conclusion that UFO's are due to some strange natural phenomena completely unknown to scientists at present.

ANY MORE?

The Herald's UFO reporter would be glad to receive any other accounts of strange sightings in the White River Valley area.

Maybe, someone suggested, the objects seen last week were skiers from outer space looking for snow [illegible]

REPORT NO. 1

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Dr. Woodruff's report seems to be corroborated by an entirely separate report from four Randolph men who were on their way home from work. They are Charles Holman, Chuck Hatch, Wayne Luce and Howard Frink.

Their story, as told by Holman, is as follows:

We were driving along the flat between Bethel and Randolph before you come to Finley bridge when all of a sudden an object crossed in front of us. It was reddish pink in color and seemed to be the size of a tennis ball. It crossed from west to east and was about 75 to 100 feet off the ground. Before we made the corner to the bridge a second one shot across. We then went up the hill by the Rogers house and just at the top by Allen's barn we saw the third one. This one was only about as high as the windshield and only a car length in front of us.

Holman said it was about five o'clock, the same time as Dr. Woodruff had reported. He said he believed Woodruff must have been in one of two cars behind two persons was such a shock that no one said anything for miles, the observer reported.

The mystery of UFO or flying saucers or Things has been subject of much study in the past 15 years brought to the fore every once in a while by statements from prominent persons implying that official government organs know much more about them than they will admit. Scientists at Cape Kennedy reported UFO's trailing a Gemini space capsule shortly after launching in July but the sightings have never been confirmed by the Air Force. Probably one of the most prolific writers on UFO's has been Major Donald E. Keyhoe, U.S. Marine Corps, Retired. His first book, "Flying Saucers Are Real," created intense interest in 1950 and was followed in 1953 by "Flying Saucers from Outer Space," based on his conclusions that the UFO's are actually sent from and controlled by forces in outer space. The Air Force, which has conducted investigations for years of all sightings, has never officially denied this as a possibility, but has relied usually on its conclusion that UFO's are due to some strange natural phenomena completely unknown to scientists at present.

ANY MORE?

The Herald's UFO reporter would be glad to receive any other accounts of strange sightings in the White River Valley area.

Maybe, someone suggested, the objects seen last week were skiers from outer space looking for snow and leaving this valley in disgust!

Women like a strong, silent man because they think he is listening.

PETER VAL PRODA, CHAIRMAN
GERALD E. McLAUGHLIN
EMILE R. COUTURE

Additional Info

STATE OF VERMONT
VERMONT AERONAUTICS BOARD
MONTPELIER

EDWARD F. KNAPP, COMMISSIONER
RICHARD F. HURD, AERONAUTICS SUPERVISOR
DAVID W. CUMMINGS, AIRPORT ENGINEER

8 January 1965

Mr. Walter N. Webb
Chief Lecturer in Astronomy
Charles Hayden Planetarium
Boston Museum of Science
18 Shepard Street
Cambridge 38, Massachusetts

(Special Advisor to NICAP)

(note: Walt's preliminary conclusion was also probable meteors but additional information by Woodruff regarding the objects passing in front of a hill has made the meteor theory less feasible)

Dear Mr. Webb:

I was advised in a communication of May 25, 1964, from Mr. Richard Hall that reports of UFO should be forwarded to you for analysis. Accordingly, I am enclosing the attached clipping taken from the Burlington Free Press of January 8 which refers to a UFO sighting on 4 January at a point about three miles north of Bethel, Vermont, on Route 12 about 5:00 pm.

I have talked personally with Dr. Richard S. Woodruff, State Pathologist at Burlington, and Corporal Ronald Woodward of the State Police Identification Bureau here in Montpelier.

The sightings were made from a car which was being driven by Cpl. Woodward. Both men saw the UFO simultaneously as they did the two following UFO's. Dr. Woodruff's impressions were to the effect that the flight path was relatively horizontal from west to east across the highway as their car was proceeding north; Cpl. Woodward describes it as more of an arc rising from the ground on the west to an elevation of 25°-35° and returning to the ground east of the highway. Both agree that the object had no visible tail of flame; both agree that it was more or less round, and was more of a glow than a ball of fire. Dr. Woodruff describes the color as orange-red; Cpl. Woodward refers to it as "more on the red".

There was no noise at any time. The objects were in view only a few seconds each. ?

Spacing between the three sightings was several seconds each. ?
Cpl. Woodward placed the height of the object in appearance as 200-300' above the ground; Dr. Woodruff stated it was low, but did not estimate altitude.

The flight path of the three sightings appeared to be fixed inasmuch as the third sighting was through the top of the car windshield at which point the car appeared to be "almost underneath" the flight path.

Both agree that two cars passed them in the opposite direction within a few seconds of the of the sightings. Cpl. Woodward recalls having followed a car ahead of him for some distance, and noted that this car eventually left Route 12 in the Town of Randolph. This car contained four men but as of writing no other reports of sighting have been received. It might be possible to locate these men in Randolph if, as it appeared, they were en-route to work in a local mill.

In the event you wish to make further contact, the addresses of the observers is: Dr. Richard S. Woodruff, State Pathologist
University of Vermont, Burlington, Vermont

Cpl. Ronald Woodward, Assistant Superintendent
Vermont State Police Annex
Bailey Avenue Extension
Montpelier, Vermont

The only explanation occurring to me is the possibility of an Air Force tanker and refueling operation which may have been in progress, but this does not explain the rapid flight or the close spacing. During such refueling, the tankers on clear nights are lighted externally for easy identification. These operations usually originate at the Plattsburgh, New York, Air Force Base. I have not checked as to whether a refueling operation might have occurred in the area at that time.

Very truly yours,

Commissioner

EFK/ebh
Enc.
cc: Richard Hall
Dr. R. Woodruff
Cpl. Woodward

13 Friend Court
Wenham, Massachusetts

SUBJECT: UFO Report - 4 January 1965

CONTENTS: Signed NICAP UFO Questionnaire
UFO Sighting Summary Sheet
Map of Sighting Area
Sample Newsclip
Pertinent correspondence

DATE: 18 January 1965

FROM: Raymond E. Fowler
Chairman: NICAP Massachusetts Investigating Subcommittee

TO: NATIONAL INVESTIGATIONS COMMITTEE ON AERIAL PHENOMENA
Washington, D.C.
Attention: Richard Hall (Acting Director)

cc: USAF (AFSC-FTD)
W.N. Webb

The following is a detailed report concerning the sighting of three (3) UFOs between Bethel and Randolph, Vermont - Highway #12 on 4 January 1965 by Dr. Richard Woodruff and Vermont State Trooper R.J. Woodward at approximately 5:15 P.M. EST.

Respectfully Submitted

Raymond E. Fowler
NICAP Investigator

REF/ref

UFO SIGHTING SUMMARY SHEET

UFO REPORT - 1/4/65

Witness #1 - Dr. Richard S. Woodruff
Chief Medical Examiner
Office of State Pathologist
College of Medicine
University of Vermont
Burlington, Vermont 05401

Education: B.A.; M.D.; C.M.

Occupation: Forensic Pathologist

(Name may be used)

#2 - Corporal R.J. Woodward
BCI Division
Vermont Dept. Public Safety
Montpelier, Vermont

Occupation: State Police

(Name not to be used pending permission)

PLACE: Between Bethel and Randolph, Vermont on Highway # 12

DATE: 4 January 1965 TIME: 5:15 PM EST (approximate)

SIGHTING:

Dr. Woodruff, Vermont State Pathologist, a staff member of the University of Vermont College of Medicine, and respected scientist, was travelling back to Burlington with Vermont State Trooper R.J. Woodward after testifying before a grand jury in Brattleboro, Vermont. As they were driving along Highway # 12, suddenly, just above distant tree tops to their left, a sharply-defined object glowing an orange-red with an intensity somewhat less than an automobile headlight, came rapidly into sight and crossed the highway in front of them. Its apparent size was that of a football held at arm's length. It appeared to be round but its exact shape could not be ascertained because of its great speed. Trooper Woodward exclaimed - "My God, did you see that?" - No sooner had he spoken when a second similar object came into view followed shortly after by a third object. All followed the same flight course climbing slightly and moving West to East to their right and above the valley where they appeared to fade into the distance.

Duration of the sighting was 30 seconds. The objects were viewed through the automobile windshield. They appeared to be solid. No sound was heard. Speed was faster than a jet aircraft. Estimated distance of the objects from the observers - 1/2 to 1 mile. The weather was clear, stars were visible and there was no moon. Dr. Woodruff reported the incident to the Burlington Free Press and to Mr. Edward Knapp, Head of the Vermont State Aeronautics Board. Several Vermont and New Hampshire papers carried a full account of this sighting. In his statement to the press Dr. Woodruff said - "I have hesitated to call. I know everything I say will be open to misinterpretation. But remember, two of us saw the same thing at the same time.....I was not seeing things, and I am not too overly imaginative and neither is the trooper."

I received a signed NICAP UFO Questionnaire on January 15th. Dr. Woodruff has passed on a questionnaire to Trooper Woodward which I will forward to NICAP upon receipt.

Respectfully Submitted
[signature]
Investigator

13 Friend Court
Wenham, Massachusetts

12 January 1965

Richard S. Woodruff
College of Medicine,
University of Vermont
Burlington, Vermont

Dear Doctor Woodruff,

Let me introduce myself. I am Mr. Raymond Fowler, Chairman of the Massachusetts Investigating Subcommittee for the National Investigations Committee on Aerial Phenomena located at Washington, D.C. Our Subcommittee is comprised of eight men of various Technical backgrounds. Its function is to collect information on UFO Reports and send it to Washington for evaluation. If the UFO sighting(s) are local, we make an on-the-spot investigation and preliminary evaluation and send a detailed report to N.I.C.A.P.

One of our newsclip inputs sent us a newsclip from the Burlington Free Press concerning your sighting. You are to be commended for making your sighting known to the public. Many UFO reports are kept quiet. Our National organization's prime purpose is to keep the public informed about the UFO problem. Our Board of Governors and Panel of Special Advisers are made up of men representing many professional fields. For example, a recent appointment to N.I.C.A.P.'s Board is Dr. Charles P. Olivier, President of the American Meteor Society and renowned Astronomer. I mention these things only to demonstrate that our organization is engaged in serious UFO Research.

A reason for writing is to obtain more information about your UFO sighting. I assure you that your name will be kept confidential if you so desire although we would appreciate use of your name. I have enclosed two UFO Report forms for you, and if possible, the State Trooper to fill out if you would be so kind to forward it to him. Please answer as many questions as possible and return it to me for processing.

Enclosed is a stamped self-addressed envelope for your convenience. Thank you so much for your help in this matter. I hope to hear from you soon.

Yours Sincerely,

Raymond E. Fowler
Chairman: NICAP Mass. Subcommittee

REF/rcf

ROBERT B. AIKEN M.D., M.P.H.
COMMISSIONER

RICHARD S. WOODRUFF M.D., C.M.
CHIEF MEDICAL EXAMINER

STATE OF VERMONT
DEPARTMENT OF HEALTH
OFFICE OF STATE PATHOLOGIST
UNIVERSITY OF VERMONT COLLEGE OF MEDICINE
BURLINGTON

January 15, 1965

Mr. Raymond E. Fowler
Chairman: NICAP Mass. Subcommittee
3 Bellevend Court
Wenham, Massachusetts

Dear Mr. Fowler:

I am enclosing the completed form which you forwarded me and have sent to Captain Quintal in Montpelier for Corporal Woodward's use. I regret the information which I am able to supply is meager and therefore the objects we saw were observed such a short time in the darkness that I, for one, cannot be more definitive about them.

I am also enclosing a photocopy of that portion of the Vermont highway map showing the area concerned and have marked this with a red plastic square. In addition, I am also enclosing a photocopy of two news reports which came out in one of the local papers at the time.

Sincerely yours,

Richard S. Woodruff, M.D
State Pathologist

RSW
Enc

INVESTIGAT[illegible] COMM[illegible]TEE ON [illegible] PHENOMENA
1536 [illegible]nnecticut Avenue N[illegible]
NOrth [illegible]-9434 Washington [illegible], D. C.

REPORT ON UNIDENTIFIED FLYING OBJECT(S)

This f[illegible]de[illegible]ns asked by the United States Air Force and by other Armed Forces' investigating agencies, and additional questio[illegible]ch answe[illegible] needed for full evaluation by NICAP.
Afte[illegible]nformation has been fully studied, the conclusion of our evaluation[illegible] will be publishe[illegible] by NICA[illegible]ts regularly issued ma[illegible]ine or in another publication. Please try to answer as many questions as possible. Should you need additional room, please use another sheet of paper. Please print or typewrite. Your assistance is of great value and is genuinely apprec[illegible]. Thank you.

1. Name R[illegible]ODRUFF, M. D: C. M. Sta[illegible] Ver[illegible]
[illegible]MEDICAL EXAMINER
Addr[illegible] [illegible]CE OF STATE PATHOLOGIST
[illegible]LEGE OF MEDICINE
[illegible]IVERSITY OF VERMONT
[illegible]URLINGTON, VERMONT 05401
[illegible]ype[illegible] orensic [illegible]nclogi
Te[illegible]e Universit[illegible] 511
[illegible]68
Education B.A.;M.[illegible] M.
Special Training Patho[illegible]gy
Military Service 1918-1919;1943-19[illegible] incl.

2. Da[illegible] of Observarion Jan. [illegible]965 Time AM 1715 [illegible] ap ro[illegible] Time Zone Atlantic

3. Locality of Observation Be[illegible]ween Bethe[illegible] & Randolpp Vermont on highway 12.

4. How long did you see the object? Hou[illegible] Minutes 30 Seconds

5. Please describe weather conditions and the type o[illegible] i.e[illegible] bright daylight, nighttime, dusk, etc. nigh[illegible] ime

6. Position of the Sun or Moon in [illegible] to the object and to you[illegible] No moon

7. If seen at night, twilight, or dawn, were th[illegible]tars or moon vis[illegible]e? Sta[illegible] sible, [illegible]r.

8. Were there m[illegible]an one objec[illegible] Yes - please tell how many, and[illegible] a sketch o[illegible] you saw, indicati[illegible] direction of mo[illegible]nt, if any. - West East

9. Please describe [illegible]bject(s) [illegible] For instance, [illegible]d it (they) appear solid, or only as a source of light; was it revolving, etc? Please u[illegible]additional [illegible]eet of paper, if necessary. Lighted solid objects, not revolvi[illegible]g

10. Was the object(s) brighter than the background of the sky? Yes

11. [illegible] compare the brightness with the Sun, Moon, headlights, etc. Somewhat less tha[illegible] hea[illegible]hts.

12. The object(s) — (Please elaborate, if you [illegible] details.)

a.	Appear to star[illegible]t any time?	No
b.	Suddenly speed [illegible] and rush away at any time?	No
c.	Break up into par[illegible] explode?	No
d.	Give off smoke?	No
e.	Leave any visible tra[illegible]	No
f.	Drop anything?	No
g.	Change brightness?	[illegible]o
h.	Change[illegible]	[illegible]
i.	Change [illegible]	No

Did the object(s) at any time[illegible] in front of, or behind of, anything? If so, please elaborate giving distance, size, etc, if possib[illegible]
. Passed beh[illegible]d the tops of distant trees.
[illegible]here any wind? No If so, please give direction and speed.

13. Did you observe the object(s) through an optical instrument or othe[illegible]d, windshield, windowpane, s[illegible]n wi[illegible], screening, etc? Yes What? Windshield

16. Did the object(s) hav[illegible]any sound? No What kind? How [illegible]

17. Please tell if the ob[illegible]t(s) was (were) —

a.	Fuzz[illegible]or blurred.	[illegible]
b.	Like [illegible] bright star.	[illegible]o
c.	Sharply outlined.	[illegible]es

18. We object —

a. Self-luminous?
b. Dull finish?
c. Reflecting?
d. Transparent?

Assuming the light was contained with then answer is Yes

19. Did the object(s) rise or fall while in motion? Rose slightly

20. Tell the apparent size of the object(s) when compared with the following held at arm's length:

a.	Pinhead	e.	dollar	g.	Orange
b.	Pea	f.	dollar	h.	Grapefruit
c.	Dime		. dollar	i.	Football

Or, if easier, give apparent size in inches of a ruler held at arm's length.

21. How did you happen to notice the object(s)? They appeared directly in front of line of vision while traveling on the highway.

22. Where were you and what were you doing at the time? Returning via automobile as a passenger following appearance as Expert Witness at Grand Jury Hearing.

23. How did the object(s) disappear from view? Appeared to fade out into the distance

24. Compare the speed of the object(s) with a piston or jet aircraft at the same apparent altitude. Faster than jet

25. Were any conventional aircraft in the location at the time or immediately afterwards? If so, please elaborate. No

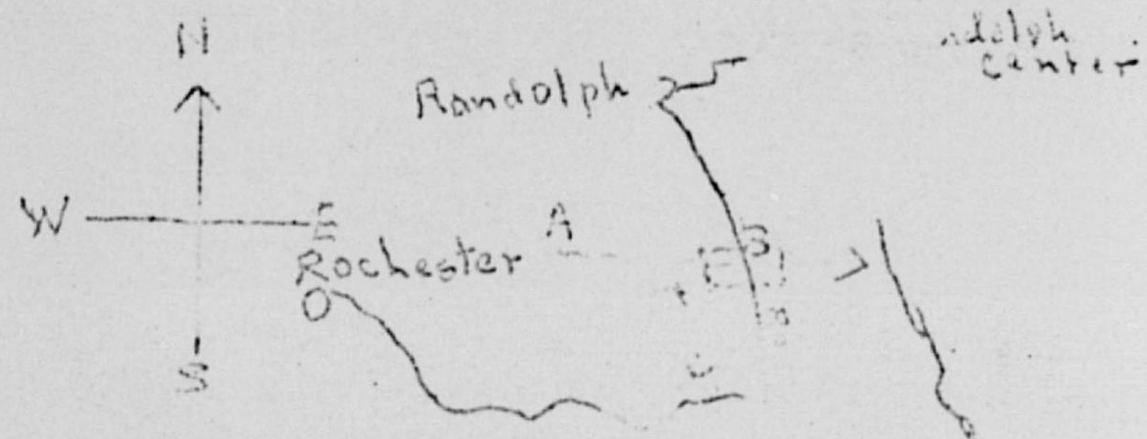
26. What is estimated distance of the object(s). ½ to 1 mile

27. What was the elevation of the object(s) in the sky? Please mark on this hemisphere sketch:

28. Names and addresses of other witnesses, if any. Sgt. R. T. Woodward, BCI Station Department of Public Safety Montpelier

Please attach a map of the locality of the observation showing your position; the path of the object(s) approach or disappeared from view; the direction of its course over the area; roads, towns, villages, railroads and other landmarks within a mile.

Direction of objects
Appr. at high
Direction of
on highway



Scale: 1 inch = 1 mile

30. Is there an airport, military, governmental, or research installation in the area? No

31. Have you seen other objects of an unidentified nature? If so, please describe these observations, using a separate sheet of paper. No

32. Please enclose photographs, motion pictures, news clippings, notes of radio or television programs (include time, station and date, if possible) regarding similar observations, or any other background material. We will return the material to you.

33. Were you interrogated by Air Force investigators? By any other federal, state, county, or local officials? If so, please state the name and rank or title of the interrogator, his office, and details as to where and when the questioning took place. Edward [illegible]app, Head of State Aeronautics Board

Were you asked or told not to reveal or discuss the incident? If so, were any reasons or official orders mentioned? Please elaborate carefully. No

I should like your permission to quote your name in connection with this report. This action will encourage responsible persons to report such observations to NICAP. However, if you prefer, we will keep your name confidential. Please note your choice by checking the proper statement below. In any case, please fill in all parts of the form for our records. Thank you for your cooperation.

You may use my name. Please keep my name confidential. ( )

35. Date of filling out this report: Sept. 15, 1965 Signature: Richard Dowdell

13 Friend Court
Wenham, Massachusetts

SUBJECT: Addendum: UFO Report - 4 January 1965

CONTENTS: Additional Signed NICAP UFO Questionnaire

DATE: 19 January 1965

FROM: Raymond E. Fowler
Chairman: NICAP Massachusetts Investigating Subcommittee

TO: NATIONAL INVESTIGATIONS COMMITTEE ON AERIAL PHENOMENA
Washington, D.C.

Attention: Richard Hall (Acting Director)

cc: USAF (AFSC-FTD)
W.N. Webb

Attached is additional data pertinent to the UFO Report transmitted to you by me on 18 January 1965. Re. The sighting of three (3) UFOs between Bethel and Randoloh, Vermont - Highway #12 on 4 January 1965 by Dr. Richard Woodruff and Vermont State Trooper Ronald J. Woodward at approximately 5:15 P.M. EST.

The additional data is recorded on a standard NICAP UFO Questionnaire which was filled out and signed by Trooper Woodward. He has asked that his name be kept confidential. Except for minor differences in time and distance estimates, his report is substantially the same as that of Dr. Woodruff's report. His supporting testimony is valuable especially in that he is a well qualified observor.

I would comment that some of the recent sightings in Washington, Virginia and Maryland are of similar objects to that reported in the above-mentioned sighting.

Respectfully submitted,

Raymond E. Fowler
NICAP Investigator

REF/ref

NICAP

NOrth 7-9434

NATIONAL INVESTIGATIONS COMMITTEE ON AERIAL PHENOMENA
1536 Connecticut Avenue N. W.
Washington 6, D. C.

REPORT ON UNIDENTIFIED FLYING OBJECT(S)

This form includes questions asked by the United States Air Force and by other Armed Forces' investigating agencies, and additional questions to which answers are needed for full evaluation by NICAP.

After all the information has been fully studied, the conclusion of our Evaluation Panel will be published by NICAP in its regularly issued magazine or in another publication. Please try to answer as many questions as possible. Should you need additional room, please use another sheet of paper. Please print or typewrite. Your assistance is of great value and is genuinely appreciated. Thank you.

1. Name Ronald J. Woodward — Place of Employment Vermont Dept. Public Safety

Address Dept. Public Safety, Vermont State Police, Montpelier, Vermont 05602 — Occupation Assistant Superintendent, Bureau of Identification

Telephone 223-5211 Ext. 58 — Education — Special Training Advanced Subjects-Police Science — Military Service Army

2. Date of Observation 4 January 1965 — Time AM 1700 PM EST Time Zone

3. Locality of Observation Vt. Route 12 Travelling North between Bethel and Randolph

4. How long did you see the object? Hours Minutes ? Seconds

5. Please describe weather conditions and the type of sky; i.e., bright daylight, nighttime, dusk, etc.

6. Position of the Sun or Moon in relation to the object and to you.

7. If seen at night, twilight, or dawn, were the stars or moon visible? no

8. Were there more than one object? 3 If so, please tell how many, and draw a sketch of what you saw, indicating direction of movement, if any. West to East

9. Please describe the object(s) in detail. For instance, did it (they) appear solid, or only as a source of light; was it revolving, etc? Please use additional sheets of paper, if necessary. Appeared round, bright red in color; not unlike "roman candle" type of fireworks except larger and travelling at greater rate of speed.

10. Was the object(s) brighter than the background of the sky? yes

11. If so, compare the brightness with the Sun, Moon, headlights, etc. resembled a very bright red automotive tail light.

12. Did the object(s) — (Please elaborate, if you can give details.)

a. Appear to stand still at any time? no
b. Suddenly speed up and rush away at any time? maintained even speed
c. Break up into parts or explode? no
d. Give off smoke? no
e. Leave any visible trail? no
f. Drop anything? no
g. Change brightness? no
h. Change shape? no
i. Change color? no

13. Did the object(s) at any time pass in front of, or behind of, anything? If so, please elaborate giving distance, size, etc, if possible. no

14. Was there any wind? If so, please give direction and speed.

15. Did you observe the object(s) through an optical instrument or other aid, windshield, windowpane, storm window, screening, etc? What?

16. Did the object(s) have any sound? none heard What kind? How loud?

17. Please tell if the object(s) was (were) —

a. Fuzzy or blurred.
b. Like a bright star.
c. Sharply outlined.

18. Was the object —

a. /Self-luminous?/
b. Dull finish?
c. Reflecting?
d. Transparent?

19. Did the object(s) rise or fall while in motion? Described a trajectory involving a shallow arc as opposed to abruptly rising to a peak and gradually arcing downward.

20. Tell the apparent size of the object(s) when compared with the following held at arm's length:

a.	Pinhead	d.	Nickel	g.	Orange
b.	Pea	e.	Half dollar	h.	Grapefruit or possibly somewhat larger.
c.	Dime	f.	Silver dollar	i.	Larger

This is only an approximation due to the short interval of visibility.

Or, if easier, give apparent size in inches on a ruler held at arm's length.

21. How did you happen to notice the object(s)? objects were observed while operating a motor vehicle

22. Where were you and what were you doing at the time? enroute North on Vt. Route # 12 as operator of a motor vehicle

23. How did the object(s) disappear from view?

Either over the Easterly horizon or downward to a nearby low mountainous area

24. Compare the speed of the object(s) with a piston or jet aircraft at the same apparent altitude.

estimated to be in the vicinity of 2000 - 3000 feet per second*

25. Were there any conventional aircraft in the location at the time or immediately afterwards? If so, please elaborate.

not known - none observed -

26. Please estimate the distance of the object(s).

from 1/8 to 1/4 mile distant.

27. What was the elevation of the object(s) in the sky? Please mark on this hemisphere sketch:

200 to 300 feet, possibly slightly higher

28. Names and addresses of other witnesses, if any.

Richard S. Woodruff M. D. College of Medicine UVM, Burlington, Vt.

29. Please draw a map of the locality of the observation showing North; your position; the direction from which the object(s) appeared and disappeared from view; the direction of its course over the area; roads, towns, villages, railroads, and other landmarks within a mile.

enclos ure

* based on prior observation of and actual firing of tracer cal. .30 rifle ammunition.

30. Is there an airport, military, governmental, or research installation in the area? no

31. Have you seen other objects of an unidentified nature? If so, please describe these observations, using a separate sheet of paper.

no

32. Please enclose photographs, motion pictures, news clippings, notes of radio or television programs (include time, station and date, if possible) regarding this or similar observations, or any other background material. We will return the material to you.

33. Were you interrogated by Air Force investigators? By any other federal, state, county, or local officials? If so, please state the name and rank or title of the agent, his office, and details as to where and when the questioning took place.

Edward Knapp, Vermont Commissioner of Aeronautics, Montpelier, Vt.

Were you asked or told not to reveal or discuss the incident? If so, were any reasons or official orders mentioned? Please elaborate carefully.

no

34. We should like permission to quote your name in connection with this report. This action will encourage other responsible citizens to report similar observations to NICAP. However, if you prefer, we will keep your name confidential. Please note your choice by checking the proper statement below. In any case, please fill in all parts of the form, for our own confidential files. Thank you for your cooperation.

You may use my name. ( ) Please keep my name confidential. (x)

35. Date of filling out this report: 15 January 1965 Signature: R. Woodruff

Huntington Cen
Rockville
North Fayston
Middlesex
Montpelier
Riverton
New Haven
S. Starksboro
Northfield
Northfield Cen
South Northfield
Barre
Williamstown
Foxville
South Lincoln
GREEN MOUNTAINS
East Granville
East Brookfield
Middlebury
Bread Loaf
Lower Granville
Braintree Cen
East Randolph
Brandon
Pittsfield
Stockbridge
Gaysville
Pittsford
Chitt
Pittsford Mendon
Sherburne
West Bridge
Rutland
Bethel
East Bethel
Barnard
Pomfret
North Pomfret
South Pomfret
Dewey Quec
Woodstock
Tunbridge
Clarendon Springs

NICAP Massachusetts Subcommittee
13 Friend Court,
Wenham, Massachusetts

31 January 1965

SAF-OIPB
Department of the Air Force
Office of the Secretary
United States Air Force
Washington, D.C. 20330

Attention: Major Maston M. Jacks

Dear Major Jacks:

Thank you for your prompt return letter of 27 January informing me of the USAF evaluation of the UFO sighting made by Dr. Richard Woodruff and a Vermont State trooper - i.e. a probable observation of meteors, specifically from the Quadrantid meteor shower. Thank you also for the quick-reference sheet for meteor showers which will be easier to refer to than thumbing through reference books. I will send a xerox copy of your letter to Doctor Woodruff and the State trooper. I am sure they will be most interested in this official evaluation. I will ask for their comments concerning it and send a copy of such to you for information purposes. Meanwhile, whether these 3 UFOs were meteors or not, good sightings throughout the U.S. are increasing at a phenomenal rate as you are well aware of. Some of them are taking place in the Washington, Virginia and Maryland area - right in your backyard so to say! I realize that the agency controlling UFO censorship must feel that there are vital and justifiable reasons for the present official approach to the UFO problem. After all, what good would it do to create more anxiety in the world, etc. may be their philosophy. However, I sincerely hope that some kind of a public information program has been and is being prepared for when the full truth concerning UFOs must be told. What really disturbs me is that the public is not being prepared for the real facts behind UFOs and that officialdom seemingly is waiting until it has to do something in this area. This to me is very dangerous for reasons which should be quite obvious to you.

In response to the USAF evaluation, I would like to make a few comments concerning our subcommittee and our evaluation of this particular UFO report. On our NICAP Massachusetts Subcommittee we have an Aeronautical Engineer, an Advanced Radar Research Engineer, A Radio Engineer, A Chemical Engineer, A Radiation Physicist, An Expert in Photography, A Public Relations man and myself, the present Chairman. Some of these men hold key positions in the Electronics industry and are developing the Advanced Ground Electrical System for the USAF Minuteman Missile at Sylvania. One of these men has worked for the USAF on heavy Radars and has held a position at Harvard Observatory in the field of Radio Astronomy.

I mention these f ts to assure you that our ubcommittee is a technically-trained group who are genuinely interested in UFO investigation and evaluation - unlike the "Saucer Cultists" and others who have unfortunately created a "secondary UFO problem" in addition to the main one.

Meteors, of course, were immediate suspects but because of the high caliber of the witnesses involved and their description of the objects, it was decided that a UFO Report should be filed. The following facts tend to negate the Quadrantid meteor solution, although, of cousse, they do not in themselves prove that the objects were not meteors.

I. THE QUADRANTID METEOR SHOWER

A. DATE:

1. Maximum - January 3
2. Minimum - January 1 - 4

B. RADIANT POINT OF: (i.e. where they appear to emanate from)

1. General region of Constellations Bootes and Ursa Major.
2. On January 4th this radiant point's approximate hour of culmination(highest point above horizon) was between 10:00 AM and 11:00 AM in the morning at Randolph, Vermont.
3. At ± 5:15 PM, these facts should be noted re Radiant Point:

   a. It was located just above or below the approximate Northern horizon.
   b. Thus, if these meteors could be observed at all at this time, they would appear to emanate from the Northern horizon in most cases.
   c. BUT both witnesses observed the objects coming over the Western horizon and disappearing over the Eastern horizon.

C. FREQUENCY OF:

1. At ± 5:15 PM, the frequency of meteors sighted at this time would be at almost the lowest ebb because at this time we are facing in the opposite direction of the earth's motion in its orbit.
2. BUT the witnesses observed 3 in rapid succession!

II. CHARACTERISTICS TENDING TO RULE OUT METEORS IN THIS SIGHTING

A. SIZE: Between the size of a grapefruit or football held at arm's length. I have yet to see or hear about anyone seeing 3 meteors in a row with this apparent size!

B. DEFINITION: Sharply defined, unlike a glowing meteor.

C. TRAIL: No visible trail. Very unusual for a meteor, especially of this size!

D. SHAPE: Each of the 3 objects were identical in shape (and size). There was no change in shape or disintegration such as is usually especially noted in large meteors.

E. ALTITUDE: An apparent 200-500 feet over the highway.

F. DISTANCE: 1/8 - 1 mile estimated.

G. FLIGHT PATH: Each followed an identical Flight Path. Very unusual if they were meteors, especially meteors of this size which must be extremly rare. I do not think even large bolides are of this size.

Thus, you can see why a UFO Report was filed. In addition, if one takes into consideration the fact that both witnesses have probably seen many meteors before, yet did not even entertain the possibility and that similar UFOs are being reported in the New England States at this time, he would at least be suspicious of the meteor answer.

I apologize for the length of this letter and do not expect an answer. I imagine your office is very busy at the present time trying "to put out fires (?)" so to say. I wonder if this sudden burst of UFO activity has anything to do with the close approach of Mars in March?

Enclosed are several newsclips for your information. I am corresponding with the witnesses. Walter Webb of Hayden Planatarium was planning to interview them yesterday. Perhaps a full report will be in the making. If so, a copy will be sent AFSC (FTD). A ~~f~~ friend of mine who subscribes to a nationwide clipping service informs me that he received 5 large brown envelopes (9 X 12 size) full of UFO clippings last week. Electro-magnatic effects accompanied many of these sightings as well. A Sylvanian who is studying the effects of Electro-magnetic fields from H-Bombs on the Minuteman system is intensely interested in this aspect of UFOs and in his spare time is working on some theories as to what kind of a propulsion system would cause these side effects. I am finding a keen interest in UFOS especially among technically trained people some of whom have received "black market" information via Air Force contacts. The NICAP "UFO Evidence" has been examined by many highly-technical men where I am employed and has received very favorable comments. NICAP may have its faults but you must admit it is doing an excellent job in spite of its lack of resources. Well, I've rambled on enough and will close now. Thank you again for your prompt response. I will be sending in some more reports soon, some of which are old but nevertheless interesting and may be of some statistical value.

Yours sincerely
Raymond E. Fowler

Raymond E. Fowler
Chairman: Mass. NICAP Subcommittee

REF/ref

Mr. Raymond E. Fowler
13 Friend Court,
Wenham, Massachusetts

Major Maston N. Jacks
SAF-OIPB
Department of the Air Force
Office of the Secretary
United States Air Force
Washington, D.C.
20330

ROBERT B. AIKEN M. D. M P H
COMMISSIONER

RICHARD S. WOODRUFF M. D. C. M
CHIEF MEDICAL EXAMINER

STATE OF VERMONT
DEPARTMENT OF HEALTH
OFFICE OF STATE PATHOLOGIST
U. V. M. COLLEGE OF MEDICINE
BURLINGTON

February 9, 1965

Mr. Raymond E. Fowler
Chairman: NICAP Mass. Subcommittee
13 Friend Court
Wenham, Massachusetts

Dear Mr. Fowler:

Please excuse the delay in answering your letter of February 1st, but our medicolegal work has been so heavy these past few weeks that I have been out of the office a good part of the time and have not had an opportunity to respond as quickly as I probably should have done. With reference to the letter you received from Major Jacks of the Air Force, my only comment concerning this, is that I am amazed that the major could not come up with a better solution than this.

While I do not feel free to comment concerning Trooper Woodward's experience with meteors, although I am quite sure that he is able to recognize one when he sees it, I can say for myself that you were quite accurate in your answer to Major Jacks. I have seen numerous meteors in the past and, if I had thought that there was any possibility that the three objects we saw on that night were meteors, I never would have mentioned the matter. Also, your letter to Major Jacks enumerates quite well the various points concerning our "sightings" whereby a moving object such as a meteor could quite well be ruled out.

I shall acquaint Corporal Woodward of this response to your report and suggest that he might also see fit to write you concerning the Air Force diagnosis.

My one final comment on the matter is that while I make no speculations as to what the objects we saw might be, I do feel most definitely that they were not meteors.

I am enclosing photostat copies of a letter and news item showing the names and addresses of the individuals who reported having seen what appeared to be the same objects we viewed at that same time and hope that you will be able to obtain some replies from them which may aid in furnishing further light upon this matter.

Sincerely yours,

Richard S. Woodruff, M.D.
State Pathologist

RSW:ddc
Enc.

NICAP MASSACHUSETTS INVESTIGATING SUBCOMMITTEE
13 Pelend Court, Verdem, Massachusetts

SUBJECT: Addendum: UFO Report, Bethel-Randolph, Vermont - 4 January 1965

DATE: 12 February 1965

FROM: Raymond E. Fowler
Chairman: NICAP Mass. Investigating Subcommittee

TO: NICAP, Washington, D.C. cc: USAF (AFSC-FTD)
W. Webb

USAF EVALUATION: Ref. USAF OFFICE OF INFORMATION LETTER 27 January 1965
FROM: Major Hector M. Jacks

(Excerpt) - "The Air Force evaluates this sighting as a probable observation of meteors" (specifically of Quadrantids)

The Subcommittee sent a detailed analysis of the above USAF evaluation to Project Bluebook and to Dr. Woodruff, a prime witness in this UFO sighting. This analysis pointed out with documentation that the meteor evaluation did not fit all the facts. A copy of Dr. Woodruff's letter commenting on the USAF evaluation and the Subcommittee analysis is enclosed. For those who requires a copy of only this part of the Addendum some excerpts from his letter are printed below.

DR. WOODRUFF LETTER: Dated February 9, 1965

"I am amazed that the major could not come up with a better solution than this....if I had thought that there was any possibility that the three objects we saw...were meteors, I never would have mentioned the matter....your letter to Major Jacks enumerates quite well the various points concerning our sighting.... while I make no speculation as to what the objects we saw might be, I do feel most definitely that they were not meteors."

ADDITIONAL WITNESSES TO THIS UFO SIGHTING:

Charles Salman, Charles Hatch, Wayne Lane, Howard Brink
Between Bethel and Randolph, Vermont - Highway #12, about 5:00 PM.

(Statement by Salman for group) - "We were driving along the flat between Bethel and Randolph before you come to Kimley Bridge when all of a sudden an object crossed in front of us. It was reddish pink in color and seemed to the size of a tennis ball. It crossed from west to east and was about 75 to 100 feet off the ground. Before we made the corner to the bridge, a second one did across. We then went up the hill by the Badger's house and just at the top by Allen's barn we saw the third one. (He stated that he believed Dr. Woodruff might have been in one of the cars behind them at the time.)

Hugh E. Wheatly, Randolph Chairman of Board of Selectmen
Between Bethel and Randolph, Highway #12 -- About 4:50 PM

"...I was reluctant to tell anyone other than my wife until I read....report in the paper. I believe I also mentioned it to my two older sons who are in high school. I live in Randolph Center and work in Woodstock and thus travel the route every day. About a mile south of Bethel at approximately 4:50 PM, I noticed the first object. The two following appeared at even intervals of about 1 to 2 seconds apart. To me they appeared to be brilliant red and perfectly round. The size in comparison to the surroundings seemed to me about that of a baseball. They seemed to leave a short trail of sparks....I ruled out any type of tracer bullet since the ones I used gave off a long white trail to the point of impact. They appeared to me to have a trajectory away from me rather than [illegible] eastward, although they disappeared from my vision behind the eastern hillside....estimated that they appeared to be about two to three hundred feet off the ground and travelling about three to four hundred mph. I realize that the size, speed and altitude may differ (from Woodruff and Cooper) but I believe that I saw the same objects...It would certainly be interesting to know what we actually saw."

EXCERPTS FROM SUBCOMMITTEE ANALYSIS OF USAF EVALUATION:

QUADRANTID METEOR SHOWER

Northern = 1/3 Radiant Point: Bootes-Ursa Major Area
Southern = 1/1-4 Culmination: 11:00 AM on January 4th

At 5:00 PM: 1) Radiant Point just above or below approx. N. Horizon
2) But, all witnesses observed UFOs moving out of the West and disappearing over the Eastern horizon.
3) Frequency of any meteors sighted at this hour would be almost at lowest ebb as we are facing in the opposite direction of earth's motion in its orbit. But, witnesses observed 3 UFOs in rapid succession!

Other Facts leading to rule out meteors:

Size: Between the size of a baseball and a football at arm's length. Very unusual to see meteors this large - 3 in a row!

Definition: Round, sharply defined, unlike a glowing meteor.

Trail: Except for sparks, no visible trail. Unusual for large meteors.

Sharp: All sharp - no change or disintegration as noted in large meteors.

Altitude: several hundred feet Distance: 1/2-mile Flight Path: Same!

Respectfully submitted,
Edgar E. Cook
Captain E. Cook
Chairman: Natl. MUFO Subcom.

RETURN TO
Mr. Raymond E. Fowler
13 Friend Court,
Wenham, Massachusetts
(NICAP Massachusetts Subcommittee)

EW

AFSC (FTD)
Wright-Patterson AFB,
Dayton, Ohio

Attention: PROJECT BLUEBOOK

OFFICIAL FILE COPY

4 Jan
Fowler

FTD (TDEW)
Wright-Patterson AFB, Ohio 45433
19 February 1965

OFFICIAL FILE COPY

Charles P Olivier
President, American Meteor Society
521 North Wynnewood Avenue
Narberth, Pennsylvania

Dear Dr Olivier,

Our office is interested in meteor sightings from the New England area on the evening of 4 Jan 65. We would appreciate any reports which you may have occuring between 4:45 and 5:30 pm EST, 4 Jan 65.

Sincerely,

HECTOR QUINTANILLA, Jr
Major, USAF
Chief, Aerial Phenomena Branch

Observer [illegible] R.I.

Jan. 4,5, 1965

RA=3h 8m 37s Decl=-5°

SSE RA=2h 3m Decl=-5°

3°

20

No 1/2's

No

1 1/2 sec

—

1/2 sec

No

W

0.8

—

Seen by

UNIVERSITY of PENNSYLVANIA
PHILADELPHIA 4

Flower and Cook Observatory

1965-3-22

Major Hector Quintanilla,Jr.
Chief , Aerial Phenomena Branch,
Wright-Patterson. AFB;
Ohio.

Dear Major Quintanilla:

At last I have managed to get a report from New England covering the date you ask me about in a letter fully three weeks ago. It only came in this morning; I have no other reports covering vicinity, day, and hour limits.

As I have copied it, you can keep it in your files. So do not bother to return. I am sorry about delay but as all my observers work as volunteers, I have only moral authority over them.

Again I wish to thank you for your most valuable cooperation in sending us the fireball reports.

Most sincerely yours,

C.P.Olivier

C. P. OLIVIER
AMERICAN METEOR SOCIETY
521 N. WANAMAKER AVE
NARBERTH, PA

19077

I now at least it
Too late for your
report.

A Vermont UFO sighting by Dr. Richard S. Woodruff, State Pathologist, and a State Police official, was dated Feb. 16, 1965, in the last issue. The correct date is Jan. 4. Dr. Woodruff, the police official, and other witnesses saw three low-flying objects race above a highway at an estimated 2,000 mph.

April-May 65 Issue

NATIONAL INVESTIGATIONS COMMITTEE
ON AERIAL PHENOMENA
1536 Connecticut Ave. N.W.,
Washington 6, D.C.

Doctor, Trooper Agree

3 UFOs Went Flying By

Dr. Richard S. Woodruff, Vermont state pathologist, a staff member of the University of Vermont College of Medicine, and respected scientist, was traveling back to Burlington with a Vermont State trooper, after testifying before the Hancom case grand jury in Brattleboro.

It was Monday, between 4:30 and 5 p.m., on Vermont 107, between Bethel and Randolph.

Thursday afternoon Dr. Woodruff called a reporter on The Free Press, and said.

"I have hesitated to call. I know everything I say will be open to misinterpretation. But remember, two of us saw the same thing at the same time.

"As we were driving along, suddenly, just above the treetops, to our left, an object came rapidly into sight. It carried an orangish-red light about the size of a football.

"The trooper said, 'My god, did you see that?'

"Just then the second came into view. It flew the same course as the first, to our right above the valley, then disappeared swiftly into the sky.

"Then came a third, exactly like the first two. One, two, three, just like that.

"The trooper and I were spellbound. The unidentified flying object, or UFO as they are known, appeared to be round, but they were traveling so fast, we really couldn't say."

Dr. Woodruff assured the reporter, "I was not seeing things, and I am not too overly imaginative. And neither is the trooper."

Unidentified flying objects have been the source of much speculation. In a recent national publication, Sen. Everett Dirksn, (R-Ill.) said the American people should be told the truth about them.

The Air Force has repeatedly denied their existence despite hordes of authenticated reports from reliable witnesses.

Scientists at Cape Kennedy reported UFOs trailing a Gemini space capsule shortly after launching in July.

These sightings have never been confirmed by the Air Force.

Information Only
Source: Free Press, Burlington, Vt

4 ~~00~~ January 1965
Between Randolph and Bethel
Vermont

New England Newspaper Agency, Inc.
Box 2078, Boston 6 • Richmond 2-4200

Free Press (m)
BURLINGTON, Vt.
Circ. 34,204

JAN 22 1965

5 More Report They Saw Those Bethel 'Saucers'

Five men have written to Dr. Richard S. Woodruff, telling him they saw the three unidentified flying objects the same time he did on Vermont 12 Jan. 4.

Dr. Woodruff and a state trooper, traveling between Randolph and Bethel reported they both saw three noiseless objects, flying at treetop level, carrying orangish-red lights at 4:30 p.m.

Dr. Woodruff, who is state pathologist and staff member of the University of Vermont College of Medicine, said four men driving in one car had written they all saw the UFOs.

Another man driving alone also wrote to the pathologist, confirming what he saw.

Dr. Woodruff said there was absolutely no possibility of the UFOs being reflections from a roadside mirror, from window glass, or car lights, as one writer suggested to him.

The correspondents said they had no explanation for the objects but would certainly like to have the mystery cleared up.

Information Only
Source: Saucer News, Vol 12, #1, March 1965

Burlington, Vermont
3 January 1965

On the night of January 3rd, Dr. Richard S. Woodruff, a highly respected physician, was driving with a Vermont state policeman, near Burlington, Vermont, when the two men saw three reddish UFOs pass across the highway at treetop level. The objects were moving at such high speed that the observers could not give a detailed description....

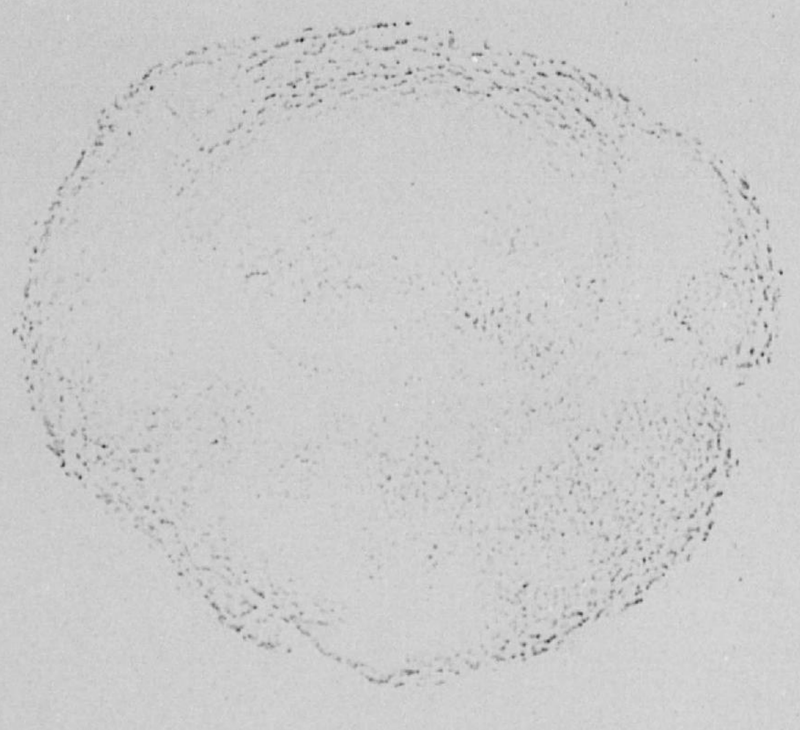
Information Only
Source: UFO Investigator, Vol III, No 2, April-May 65

Vermont
16 Feb, 1965

A Vermont UFO sighting by Dr. Richard S. Woodruff, State Pathologist, and a State Police official, was dated Feb. 16, 1965, in the last issue. The correct date is Jan. 4. Dr. Woodruff, the police official, and other witnesses saw three low-flying objects race above a highway at an estimated 2,000 mph.

Pathologist Views UFO

Dr. Richard S. Woodruff, Vermont State Pathologist, staff member of the University of Vermont College of Medicine, and a Vermont State Trooper were driving on Vermont Rt. 100 between Bethel and Randolph on 4 January 1965 when they saw 3 UFOs. In the Burlington Free Press, Dr. Woodruff was quoted: "As we were driving along—suddenly—just above the treetops to our left, an object came rapidly into sight. It carried an orange-red light about the size of a football. The trooper said: 'My God! Did you see that?' Just then the second came into view. It flew the same course as the first, to our right above the valley, then disappeared swiftly into the sky. Then came a third, exactly like the first two. One, two, three, just like that. The trooper and I were spellbound. The UFOs appeared to be round, but they were travelling so fast we really couldn't say . .. I was not seeing things, and I am not too overly imaginative. And neither is the trooper." No sound or contrail was reported, nor was there any electro-magnetic (EM) phenomena connected with the incident.



From opposite sides of the world come these very different tektites. At the left, shown natural size, is one from Paracala, Philippine Islands. At the right is a tektite, enlarged to twice its size, found by R. W. Wright at Magnolia, Texas. All pictures of individual tektites with this article are from the Smithsonian Institution, Washington, D. C.

Tektites and the Cyrillid Shower

JOHN A. O'KEEFE, *Goddard Space Flight Center, National Aeronautics and Space Administration*

THE LAUNCHING of more than 30 artificial earth satellites in the three years since October 4, 1957, has given new impetus to the study of the only known instance of a natural satellite, or rather a group of natural satellites, close to the earth. These were the Cyrillids, sometimes referred to as the Canadian fireball procession of February 9, 1913.

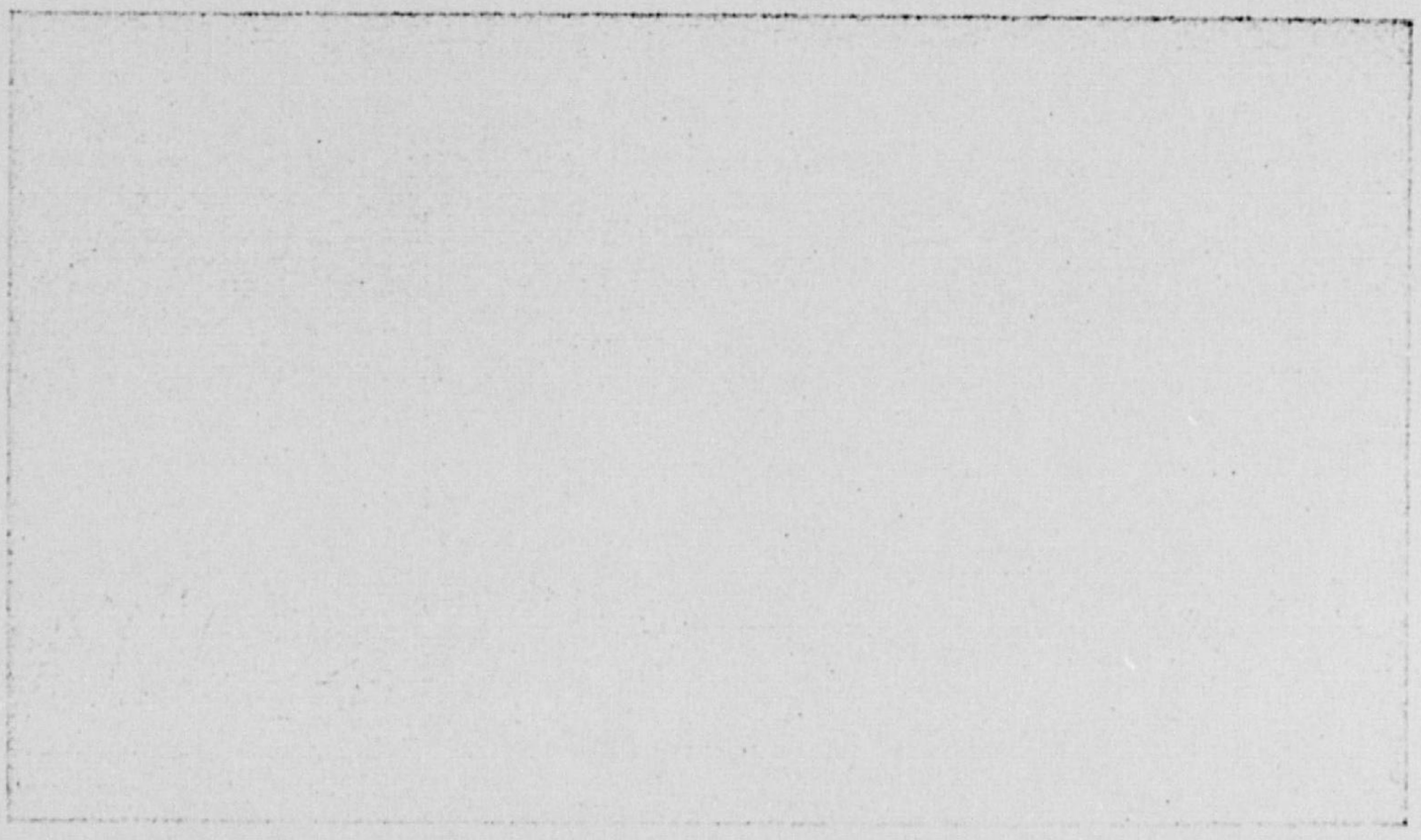
Many of that shower's phenomena are illuminated by the physical and engineering studies, especially of satellite reentry, that have been made in the last few years. The study of this shower also offers the possibility of explaining the origin of tektites, those strange and beautiful glassy objects found in many parts of the world.

The Cyrillids attracted the attention of astronomers when they passed over Toronto on that night in 1913. According to Prof. C. A. Chant of the University of Toronto: "At about 9:05 on the evening in question there suddenly appeared in the northwestern sky a fiery red body which quickly grew larger as it came nearer, and which was then seen to be followed by a long tail. . . . In the streaming of the tail behind, as well as in the color, both of the head and the tail, it resembled a rocket; but, unlike the rocket, the body showed no indication of dropping to the earth. On the contrary it moved forward on a perfectly horizontal path with peculiar, majestic, dignified deliberation; and continuing in its course, without the least apparent sinking towards the earth, it moved on to the south-west where it simply disappeared in the distance. . . .

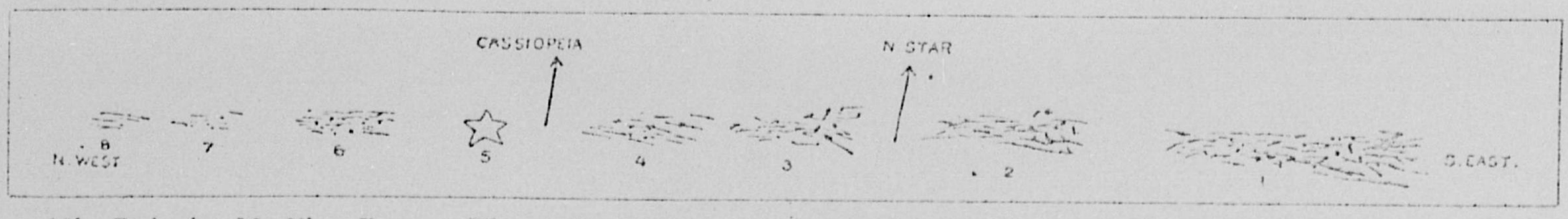
"Before the astonishment aroused by this first meteor had subsided, other bodies were seen coming from the north-west, emerging from precisely the same place as the first one. Onward they moved at the same deliberate pace, in twos or threes or fours, with tails streaming behind, though not so long nor so bright as in the first case. They all traversed the same path and were headed for the same point in the south-eastern sky. . . .

"Several report that near the middle of the great procession was a fine large star without a tail, and that a similar body brought up the rear. . . .

"Just as the bodies were vanishing,



As they passed over Toronto and in front of Orion, the Cyrillids caught the practiced eye of an artist, Gustav Hahn, and his wife. Now 94 years old, he was then an amateur astronomer and friend of C. A. Chant. His painting is courtesy "Varsity Graduate," University of Toronto.



Miss Catherine MacVicar Duncan, Thamesville, Ontario, who drew this sketch, reported hundreds of sparks in group 1, dozens in 2, fewer in the others. Of object 5, she said, "One big body floated along by himself. . . ." The last groups she noted to be much fainter than the others. Her location at Thamesville was about 150 miles southwest of Toronto and slightly west of the Chant trace. Hence the Cyrillids appeared to move toward her right. The eyewitness sketches with this article are taken from the "Journal" of the Royal Astronomical Society of Canada.

or shortly afterwards, there was heard in many places a distinct rumbling sound, like distant thunder or like a carriage passing over rough roads or over a bridge. In some cases three such sounds, following at short intervals, were heard; while a number of people felt a shaking of the earth or of the house.

"The entire time occupied by the display cannot be determined accurately, but [was] perhaps 3.3 minutes."

The observations at Toronto were supplemented by others from as far westward in Canada as the vicinity of Regina, Saskatchewan. In the easterly direction, Chant obtained accounts of the same group of bodies from Bermuda. He noticed that the regions from which he had reports lay along an arc of a great circle, with observers to the east of the circle seeing the shower in the west, and those west of the circle seeing it in the east. On this basis, Chant put forward the idea that the objects were natural satellites of the earth.

In the following years, new data filled out the arc over which the Cyrillids were seen. First, W. F. Denning discovered some shipboard observations that extended the arc to twice its original length, into the South Atlantic off Cape Sao Roque, Brazil. Next, W. H. Pickering located three more shipboard sightings which filled the gap between New York and Bermuda.

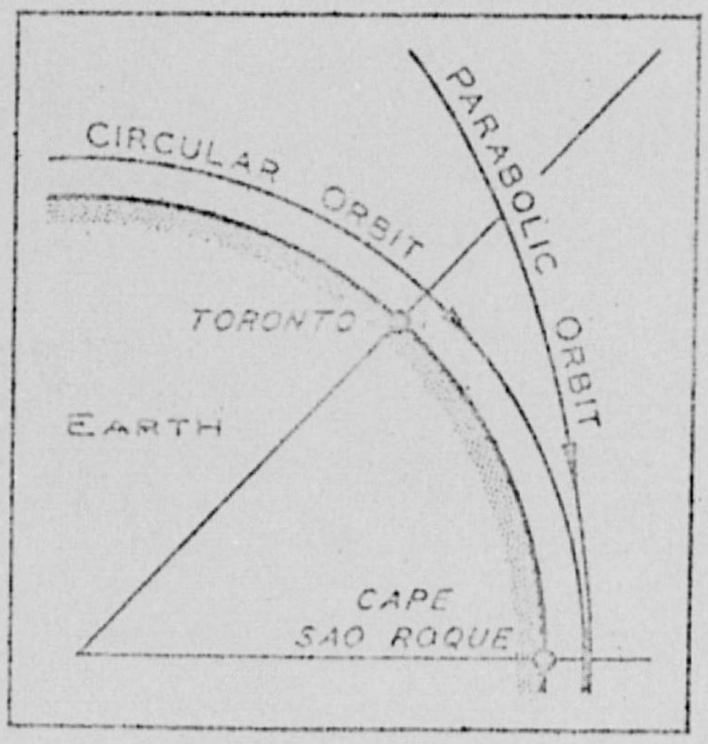
Finally, in the period from 1954 to the present, A. D. Mebane has located several dozen accounts in the files of newspapers in Minnesota, Wisconsin, Michigan, New York, Pennsylvania, and New Jersey. These last are especially welcome because they fill significant gaps in the picture given by Chant, and assure us that the phenomenon was actually continuous over its whole extent. In particular, they indicate that detonations of the kind heard in Toronto continued at least 200 miles to Towanda, Pennsylvania.

From the observations, it can be shown that the Cyrillids were moving about the earth in nearly circular orbits. To see this, imagine instead that they were moving in meteoric paths of low velocity with respect to the earth. Such orbits would be nearly parabolic in the vicinity of our planet. The diagram shows a cross section of the earth in the plane of the great circle along which the Cyrillids were seen and a supposed parabolic path. In this case, the orbital perigee would have been at Cape Sao Roque and the bodies would have been traveling parallel to the horizon, as observed there. At Toronto, on the other hand, meteors following such an orbit would fall at an angle of about 30 degrees with respect to the horizon. This flatly contradicts the observations, which, as Chant emphasized, point with remarkable unanimity to horizontal flight in this area.

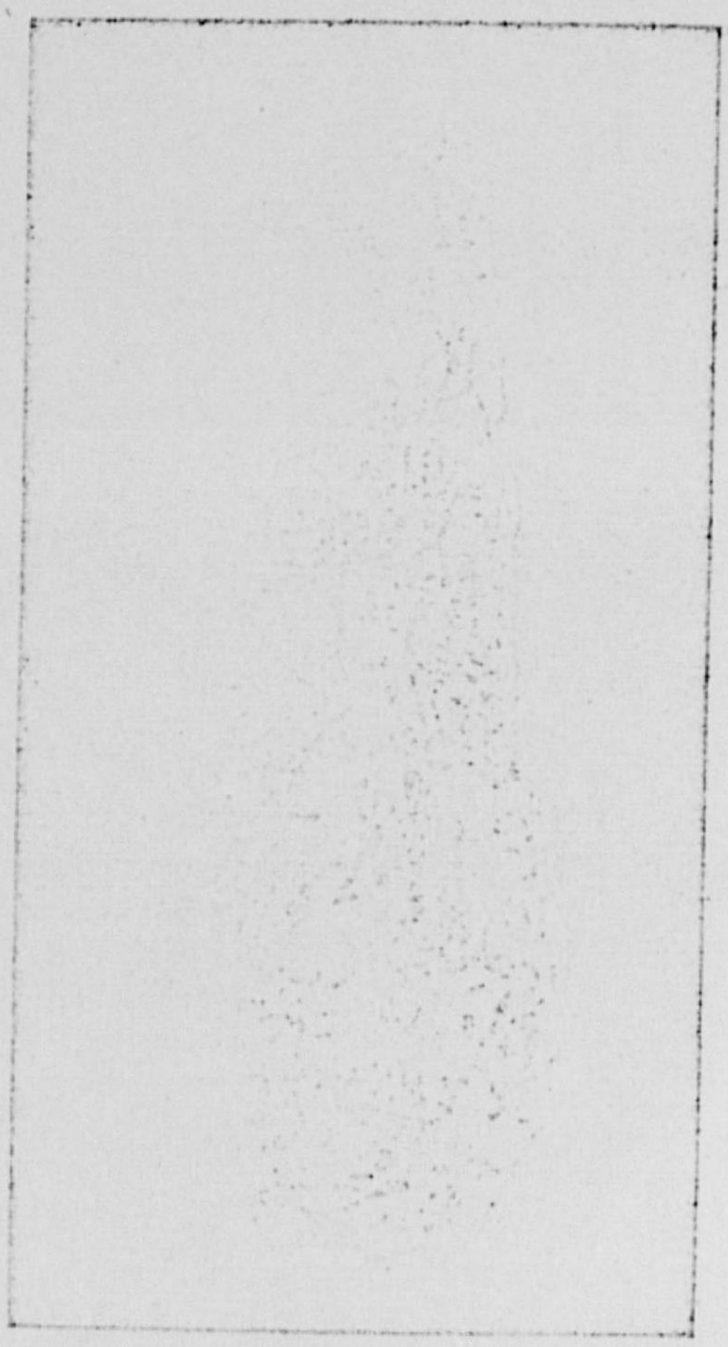
Further, the fact that the individual meteors were seen for periods of a minute or so indicates that their flight was nearly horizontal. Meteors are generally invisible above heights of 100 kilometers and below 30 kilometers. If the Cyrillids had been traveling downward at an angle of 30 degrees to the horizontal, their visible paths would have been some 140 kilometers long. Their period of visibility would have been only 12 seconds, at the parabolic velocity of 11.2 kilometers per second, ignoring atmospheric deceleration.

Obviously, the parabolic solution, with perigee near Cape Sao Roque, will not work. And if we move the perigee northwest along the path, then the meteors would have reached the earth's surface too soon and have been unobservable from Brazil. If we move the perigee farther to the southeast, the angle at Toronto gets even steeper. Increasing the velocity has the same effect, as the orbit becomes hyperbolic. If we lessen the velocity, however, the orbit becomes satellitic. This last is the only possible way to reconcile the orbit with the observations.

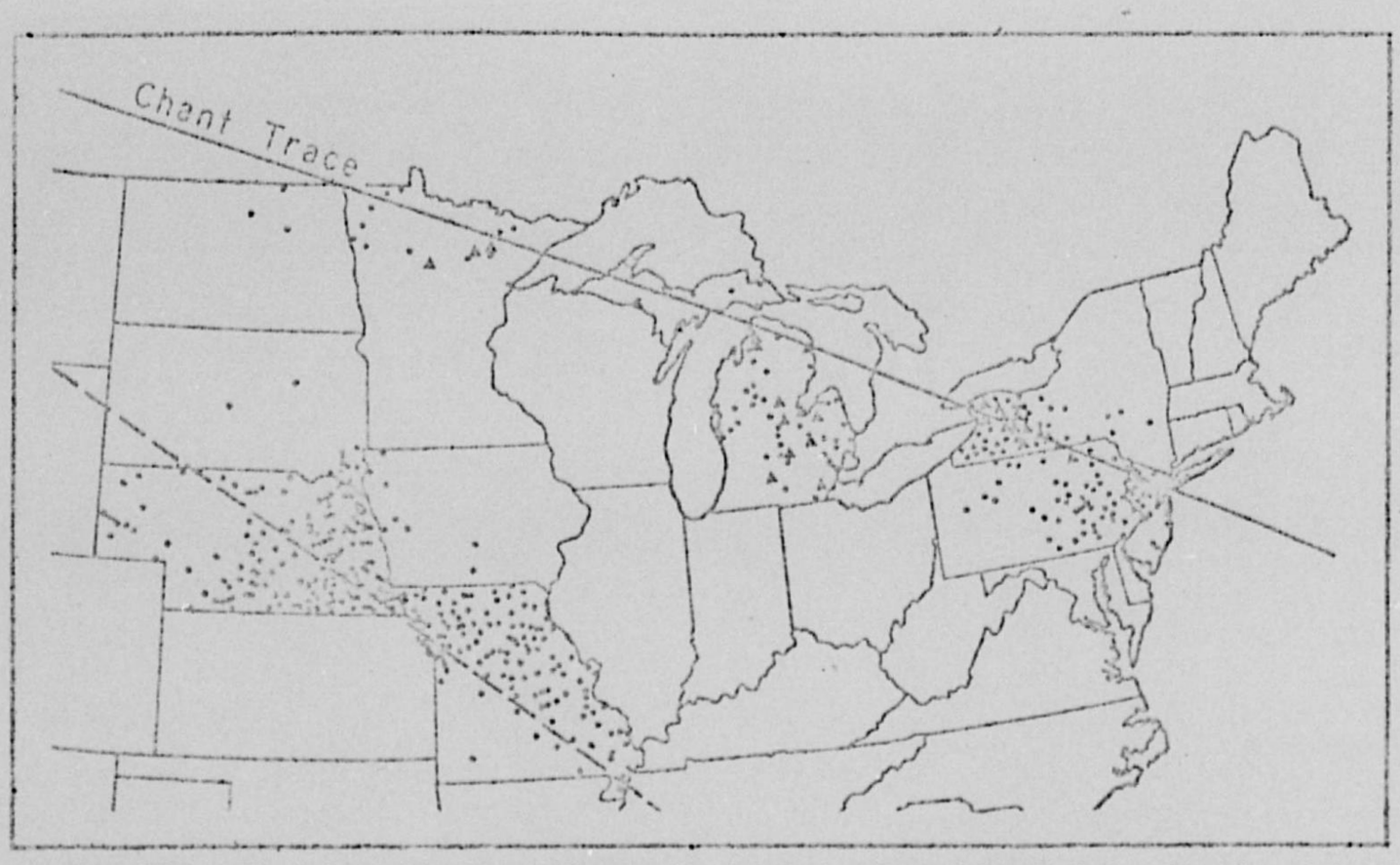
From the physical point of view, the narrowness of the belt along which the Cyrillids were seen is hard to understand unless they were following one another in similar orbits. If this was an ordinary meteor shower, the swarm causing it would have to be very thin — about 100 miles across — and some two or three thousand miles long. Furthermore, the swarm would just have happened to strike the earth so that its plane coincided



Sketched here, not to scale, are a parabolic and a circular orbit in the plane of Chant's great circle. Over Toronto, nearly 50 degrees from Cape Sao Roque, the parabolic arc descends noticeably. But the observers' reports of nearly level flight fit only the circular orbit, which is parallel to the earth's surface.



This is a moldavite, from Netolitz in southern Bohemia. The two-times enlargement shows its broken and pitted fused surface. Tektites are glassy, and characterized by low indexes of refraction, less than those typical of man-made glass.



To the author for this research, A. D. Mebane lent his entire collection of positive and negative replies to extensive inquiries along the Chant trace from Minnesota to New York City. Triangles show positive observing reports. In the Midwest region of a second possible fall, the round dots show the wholly negative results of a search conducted by the author and his correspondents.

with the center of the planet. Because of the improbability of such a shower structure, and our preceding arguments, we conclude that the objects of the meteor procession of February 9, 1913, were in fact satellites of the earth.

The name Cyrillid is chosen in view of the nature of the bodies as earth satellites. Having been in orbit around the earth, they could have no true radiant, and hence cannot be named, like the Leonids, after the constellation of the radiant. Being associated with no comet, so far as is known, they cannot be named, like the Bielids or the Giacobinids, after a comet. The Perseids, on the other hand, which appear about St. Lawrence's day (August 10th), were traditionally called the Tears of St. Lawrence. On this precedent is based the name Cyrillid, the 9th of February being St. Cyril's day.

Two attempts have been made to find evidence of a second revolution of the Cyrillids. The map at the right is from examining about 200 United States metropolitan newspapers, principally dailies from about 120 cities — practically the entire collection of the Library of Congress. Two doubtful stories fall off the chart, but on the great circle established by Chant. They were reported in newspapers of February 15th in New York and Philadelphia from the crews of ships docking there. Both give incorrect dates for the shower, and one is obviously inaccurate. Whether these points are included or not, it is clear from the map that accounts of the shower are to be found only along the Chant trace.

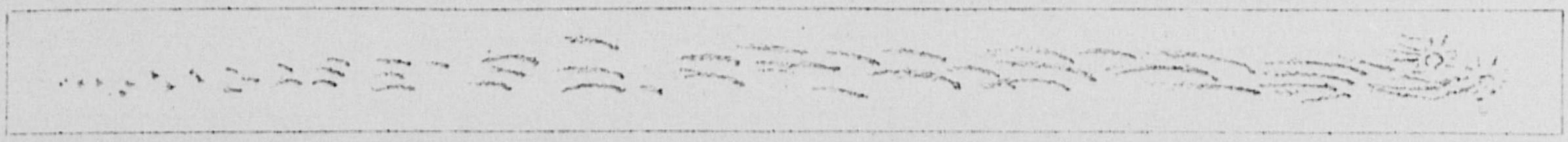
Assuming that the Cyrillids were earth satellites, we might expect some of them to make more than one trip around. The next revolution, with a period of 91½ minutes, would have carried them over the Middle West, above the populated regions of Nebraska, Iowa, and Missouri. In the chart above, the results of a concentrated search along this projected path are compared with the work of Mebane along the Chant trace. Many of these newspapers were examined by me; the rest by reliable investigators recommended by state historical societies. I verified my ability to locate such items by checking newspapers along the Chant trace, even locating a few stories that had been overlooked by the editors with whom Mebane corresponded. But in the area of the expected second passing, none of us was able to locate a single article referring to the shower, with the trivial exception of some reprintings of a wire-service dispatch from Buffalo, New York.

Results of a search through newspapers published at the time of the 1913 meteor procession. Triangles locate observers who reported seeing the shower; dots indicate papers that carried no local reports.

These negative results, many from areas of clear weather on that night, lead to two important conclusions: They reemphasize the idea, first stated by Chant, that the Cyrillids were visible only on and near a great circle; and they make it very unlikely that any substantial part of the Cyrillid shower survived for another circuit of the earth.

The second conclusion gives us a significant clue to the origin of the Cyrillids. It means that they had been moving around the earth as a group of bodies for very few revolutions, perhaps only one before the passage over Toronto on which they were observed. Suppose they had been *individually* in orbit for many revolutions before they were seen. Because they would have different sizes and shapes, the drag by the earth's atmosphere would be different for each of them and would slow some more than others. Several mathematicians working on the orbit of Sputnik I discovered that orbital lifetime of a satellite is inversely proportional to the drag coefficient.

Since it is reasonable to suppose that the drag coefficients differed from one another by as much as a factor of two, some of the satellites would make twice as many revolutions as others. Thus, the entry of the cluster into the lower atmosphere would be spread over a number of revolutions equal to at least half the total number of circuits made by any part of the cluster. Numerical integrations have failed to show any way in which all the members of such a shower could disappear in one revolution.



Part of the display seen by Col. W. R. Winter from Bermuda. As they moved across the sky, two large bodies broke into smaller parts which developed tails of gas and sparks. The slowly traveling procession, which took approximately two minutes to pass a given point, contained some 100 fragments. The curvature of the tails, also mentioned in Col. Winter's written report, was believed by Chant to have been an illusion.

The most probable explanation, it appears, is that the Cyrillids were formed from a single body, which had made a considerable number of revolutions around the earth. Eventually, perhaps as a result of lunar perturbations, the perigee of the body came into the lower atmosphere. The orbit then contracted, in the manner which has become familiar to all of us from artificial satellites: the semi-major axis and eccentricity of the orbit decreased.

In each succeeding perigee passage, the atmospheric heating became greater, not only because the successive passes were slightly lower but, above all, because each revolution lasted longer than the previous one as the orbit's eccentricity diminished steadily.

Eventually, the heating became very great, and the body began to melt. Drops were swept from its surface. Some of these followed the main orbit out to apogee; others, formed earlier, were retarded more. In accordance with the now familiar paradox of drag retardation, these got *ahead* of the main body and preceded it on the next (final) pass. Together with more drops formed on the final pass, they constituted the bodies of the shower. The main mass was perhaps identical with the "fine large star without a tail" mentioned by Chant as ending the procession.

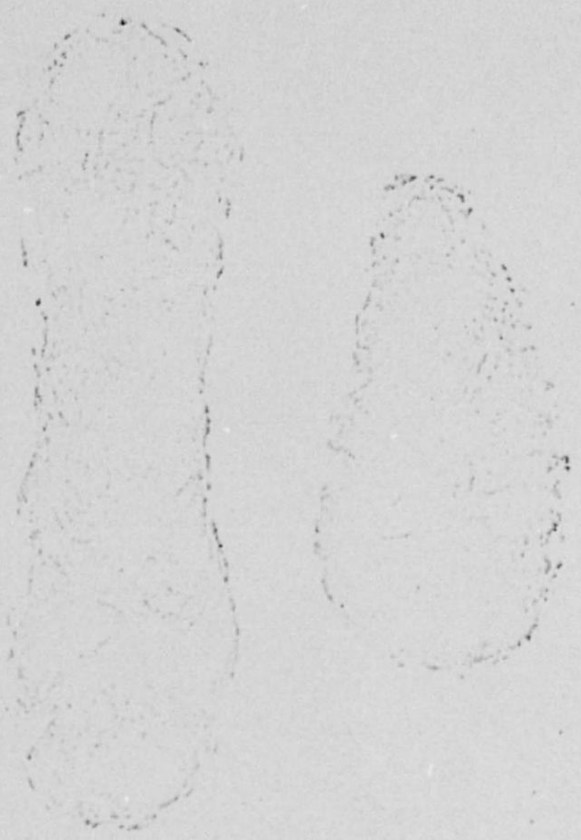
It is very unlikely that fracture played a significant role in the breakup, even if a pressure of 2,000 dynes per square centimeter acted on the body. This is a tenth the pressure a skier might exert on snow, and is not enough to fracture any ordinary solid substance. Over a distance of 1,000 kilometers, however, work amounting to 2×10^{11} ergs would be done, enough to melt a layer of stone two centimeters thick. Hence, melting is a much more probable mechanism for the breakup than is fracture.

Detailed calculations have been made on this basis, using the theory developed by E. Opik. One of the most striking results is that only bodies moving in grazing satellite orbits can yield drops the size of tektites. Such large drops (up to 15 centimeters in diameter) require a very delicate equilibrium. Their surface tension is not adequate to resist drag forces as powerful as those acting on a typical meteorite coming into the atmosphere.

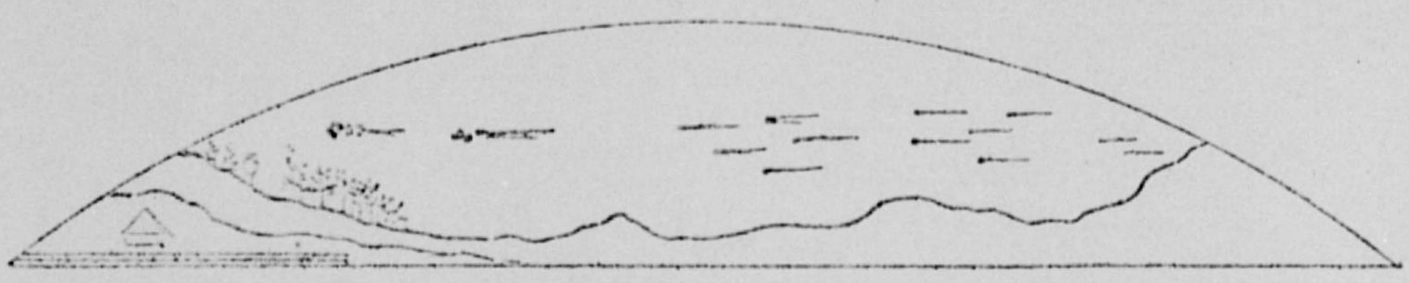
The critical point is that at which the body has encountered a total mass of air equal to its own mass. For a rapidly descending object, this point is reached at a much lower level than for one moving nearly parallel to the earth's surface. At this lower level, the denser air produces a strong drag, tending to split large drops. Hence, the droplets formed from a typical meteorite are much smaller (of the order of half a millimeter or less) than those from a re-entering artificial satellite. Small meteorite droplets have actually been recovered by E. L. Krinov in the U.S.S.R. (SKY AND TELESCOPE, September, 1959, page 617). The larger drops have been observed (but not actually recovered) during the descent of Sputnik II, according to L. G. Jacchia.

Opik's theory also permits us to make a rough calculation of the temperatures, rates of flow, thicknesses of the liquid layer, and other quantities, during the production of the drops. The values found appear to be reasonable, agreeing with the physical characteristics of the tektites themselves. Opik also provides for calculating the masses of the bodies from the integrated luminosities. Despite the rather fragmentary information on Cyrillid brightnesses, it appears that they had individual masses in the range of tektites.

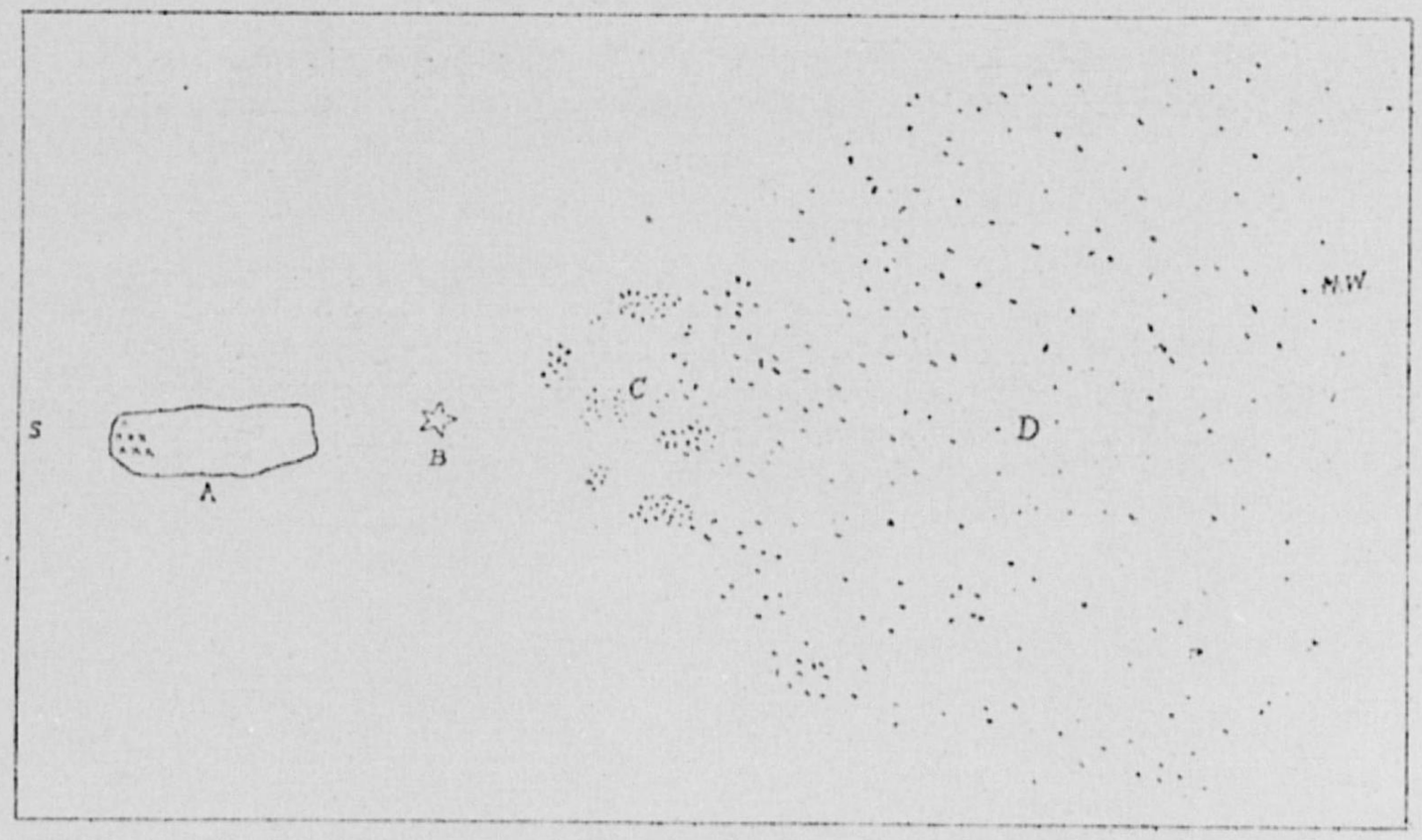
From detailed studies of the chemistry of the latter, certain conclusions can be drawn. Their iron is all, or nearly all, in the reduced state (ferrous oxide). With solar furnaces working at the fusion temperatures of tektites, F. Senftle and his coworkers at the National Bureau of



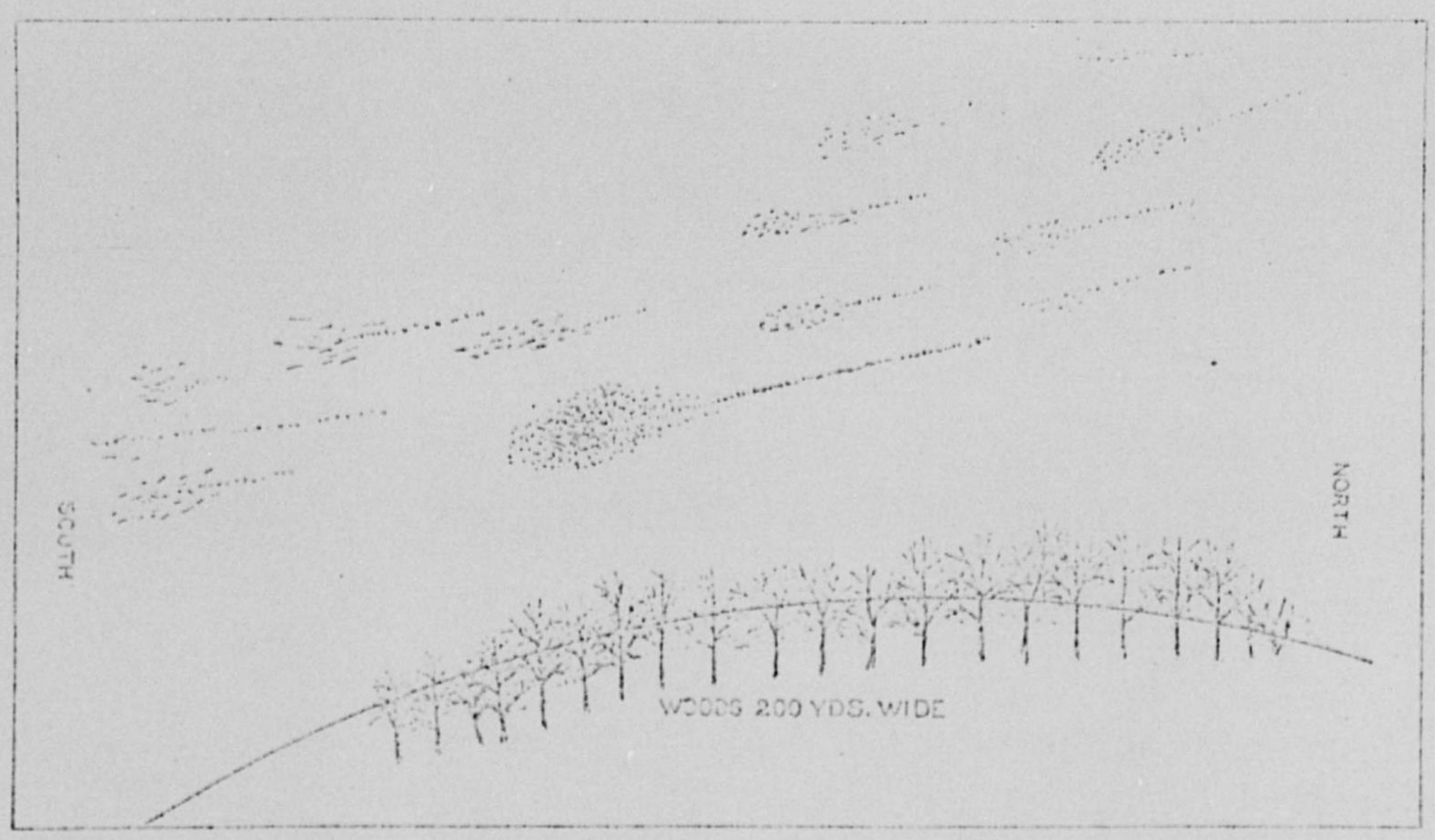
The dumbbell and drop forms of billitonites, found in the Malay Archipelago and named for the Island of Billiton, are shown actual size.



While snowshoeing in Parry Sound, Walter L. Haight was astonished to see groups of dull reddish meteors moving from the west in apparently level flight. He sketched two groups of four or five bodies followed by a few scattered ones, making a total of about 14. He was most impressed by the slow, measured pace of the flight, estimating its duration as 1½ to two minutes. Parry Sound is located about 120 miles north and slightly west of Toronto, quite far from the Chant trace.



From Fenlon Falls, 68 miles northeast of Toronto, Walter H. Stevenson counted seven bright, white "stars" in the first group, A in his diagram. They were closely followed by a reddish glow, like the glare from a fire. A bright white "star" at B, estimated to be nearly as brilliant as the planet Venus, preceded several reddish clusters marked C. A shower of red meteors, D, concluded the spectacle. The objects had "about the angular speed of a flying crow" and passed less than halfway up the western sky. The entire display lasted an estimated three minutes.



Seventy-four miles northeast of Toronto, at Centreton, John T. Ormiston compared the lengths of the meteor trails with the trees 200 yards in front of him. The woods subtended an angle of about 55 degrees, and by comparison the longest meteor was some 25 degrees.

Standards have found that only a few minutes are required to reduce ferrous oxide from ferric oxide. In the same way, they have shown that the almost complete lack of magnetism in tektites suggests a heating time of at least a few minutes. The lack of water points in the same direction.

On the other hand, V. Barnes has established that some fine filaments of nearly pure silica that appear in tektites tend to disappear after half an hour's heating. This ties down the heating time of tektites to roughly five to 15 minutes, which is also how long the Cyrillids were hot.

It is even possible to form an idea of the pressures that prevailed during tektite formation, for they contain bubbles in which the pressure is less than a thousandth of an atmosphere.

The association of tektites with showers of the Cyrillid type is thus supported by evidence from the size and form of tektites, their temperature of fusion, the duration of heating, and possibly the pressures involved. And the spotty distribution of known tektites over the earth's surface is consistent with falls of the Cyrillid type and not with those of the showers produced by ordinary meteor swarms.

By contrast, theories of the origin of tektites from terrestrial material, say by meteoritic impact, have serious trouble on most of these points. It is hard to see how an impact could yield velocities sufficient to propel tektites for thousands of miles, but not enough to distribute them over the whole earth; and we fail to find definite centers from which the concentration decreases in all directions outward.

It is hard to understand the lack of water and magnetism in terrestrial matter, or the conversion of ferric to ferrous iron within the very brief time available for heating the surface material. But most difficult of all is explaining the formation of large drops in the relatively steep descent of a meteorite, if tektites are thought to be meteoritic in nature. It is also difficult to account for the thorough melting of a substantial chunk of glass in the brief time of fall.

On the whole, I feel that the evidence strongly supports the idea that tektites form in showers such as the Cyrillids, and the ultimate origin of the body that initiated this shower is of great interest. Perhaps it could even have been a chunk thrown from the moon by meteoritic impact. The idea of a lunar tektite origin was suggested in this magazine by H. H. Nininger 18 years ago (February, 1943, page 12).

In many parts of the world, brown, green, and black tektites have been found, being named for the locations where they were originally picked up. These drops were found in Australia, where there are estimated to be several million. They are called australites, and have a common tektite shape, that of a button or a lens with a flange. Similar numbers of tektites lie elsewhere, but their distribution is spotty.

Q. Where in the sky is Hubble's variable nebula?

A. In Monoceros, at right ascension $6^h\ 36^m.4$, declination $+8°\ 46'$ (1950 coordinates). Also known as NGC 2261, this fan-shaped nebulosity has the variable star R Monocerotis at its tip. For a Palomar photograph, see SKY AND TELESCOPE for January, 1954, page 79.

Q. I am an amateur astronomer studying French. Is there some popular astronomy magazine in that language you would suggest for reading?

A. *L'Astronomie* is a well-illustrated periodical, with articles by both professional and amateur astronomers. It is published by the Société Astronomique de France, 28 Rue Serpente, Paris 6, France. For nonmembers, a year's subscription (10 issues) costs 33 NF.

Q. What basic set of eyepieces is suggested for a 6-inch, f/8 reflector on an altazimuth mount?

A. A $1\frac{1}{4}$-inch ocular is useful for star fields, clusters, and nebulae; a 1-inch or $\frac{3}{4}$-inch for general views of the moon and planets; and a $\frac{1}{2}$-inch for lunar and planetary observing under good seeing conditions. With reflecting telescopes, Kellner and orthoscopic eyepieces are generally recommended.

Q. What is meant by star names such as 6 G. Sagittarii or 34 G. Piscium?

A. *G.* indicates that a star number is the one assigned in B. A. Gould's *Uranometria Argentina* (1879). This work consists of a catalogue and charts of southern stars to magnitude 7. In each constellation, the stars are numbered in order of right ascension.

Q. How are daily sunspot numbers determined?

A. By adding the number of visible spots to 10 times the number of spot groups. This total is multiplied by a constant, for most observers not far from unity, to bring the daily number into average agreement with a standard series, such as the Zurich sunspot numbers. Much care and observing experience are required to obtain consistent results.

Q. What is an H-R (Hertzsprung-Russell) diagram?

A. It is a graph in which the vertical scale represents stars' absolute magnitudes, the horizontal scale spectral classes. Intrinsically bright stars are near the top of the diagram, faint ones below; hot, blue stars are toward the left, cool, red ones to the right.

Q. How fast does an asteroid appear to move with respect to the star background?

A. At opposition, the westward motion of a typical asteroid is about 10 to 12 minutes of arc per day.

W. E. S.