

Report on a Survey of the Membership of the American Astronomical Society Concerning the UFO Problem: Part 3⁽¹⁾

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Abstract—Refereed journals, to which scientists turn for their reliable information, carry virtually no information on the UFO problem. Does this imply that scientists have no views and no thoughts on the subject, or that all scientists consider it insignificant? Does it imply that scientists have no reports to submit comparable with UFO reports published in newspapers and popular books? The purpose of this survey was to answer these questions.

Note: Sections 1-3, 4.1-4.3, and the Appendices were published in Vol. 8, Nos. 1 and 2 of the Journal of Scientific Exploration. Sections 4.4-4.9 appear below, concluding the report.

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4.4 Daylight Objects

These cases are subdivided into groups.

Small Objects

DO1. *Place, date, unspecified.* Respondent notes briefly a daylight observation of a bright object, which was not Venus, but which he could not identify for himself.

D02. *London, England, 1966 ± 1, summer, 4:00-5:00 p.m.* Respondent was on his way home from school. It was a bright afternoon with a clear and cloudless sky. Respondent reports seeing a bright small or distant object seen, he presumes, by reflected light. The object was either very distant or stationary since it remained (implicitly in the same position) for about 10 minutes. It then apparently moved off very rapidly, moving in a straight line, and disappeared from view.

The object was mentioned in the national newspapers the following day.

D03. *Pine Bluff Observatory, Wisconsin, 1969, March, about 7:00 a.m.* Duration of observation 5 minutes. Respondent preparing to go home, exhausted, at sunrise after observing all night. Noticed a bright light resembling Venus

TABLE for Case DO3

	a	b	c	d	e	f	g	h
Prior	10^{-9}	10^{-9}	.333	.333		10^{-9}	0	.333
Post	0	.1	.6	.1	.2	0	0	0

about 150° away from the sun in the northwest $m_v \approx -4 \pm 2$. Sun rising on the opposite horizon. Object "very stationary."

Respondent rules out meteors, aurorae, lightning, reentering satellites, balloons, etc. because object stationary. Sure it was natural but too tired to follow up sighting.

D04. *Waltham, Massachusetts, Brandeis Physics Building, 1967 (month unknown, about 2:00 p.m. EST.* Five or more scientists saw a luminous object in the daytime in the sky over Boston for a period of 10 minutes. Weather: clear air, visibility unlimited. Observed to east, elevation $20-30^\circ$, moving apparently upwards. Diameter less than 5 arc-min. Probably reflecting.

Object believed to be a weather balloon (item d in list of post-probabilities) at a distance of 3-10 miles.

TABLE for Case DO4

	a	b	c	d	e	f	g	h
Prior	.01	.3	.05	.3	10^{-6}	10^{-10}	.17	.17
Post	0	0	0	.99	0	0	0	.01

D05. *Algonquin Radio Observatory, Ontario, Canada, 1969 \pm 2.*

"The object appeared while I was on an observing run at the Algonquin Radio Observatory, which is situated in a Provincial Park in a relatively isolated part of the Province. The time was about 5:00 a.m., the sky was light, just before sunrise. I was inside the control building, engaged in conversation with two other people, and had a view of the radio telescope, the woods, and a reasonable area of sky through a large window. A small (about 10 arc-min?) bright (surface brightness intermediate between the moon and sun) object appeared from the right-hand side of the window (roughly from the northwest) and moved very rapidly across the sky, passing behind the radio telescope, in a curved trajectory. I cannot recall the details of its disappearance, whether behind the horizon, the trees, the edge of the window or none of these. The entire event was without noise, and lasted only a couple of seconds. I rejected immediately the possibility that it was an aircraft, because of the combination of speed and angular size, and the absence of an accompanying sound; also the possibility that it was a fireball because of the curved trajectory.

"My reaction was one of considerable astonishment—I had never before seen anything similar, and have not since—and the reaction of the two people that I

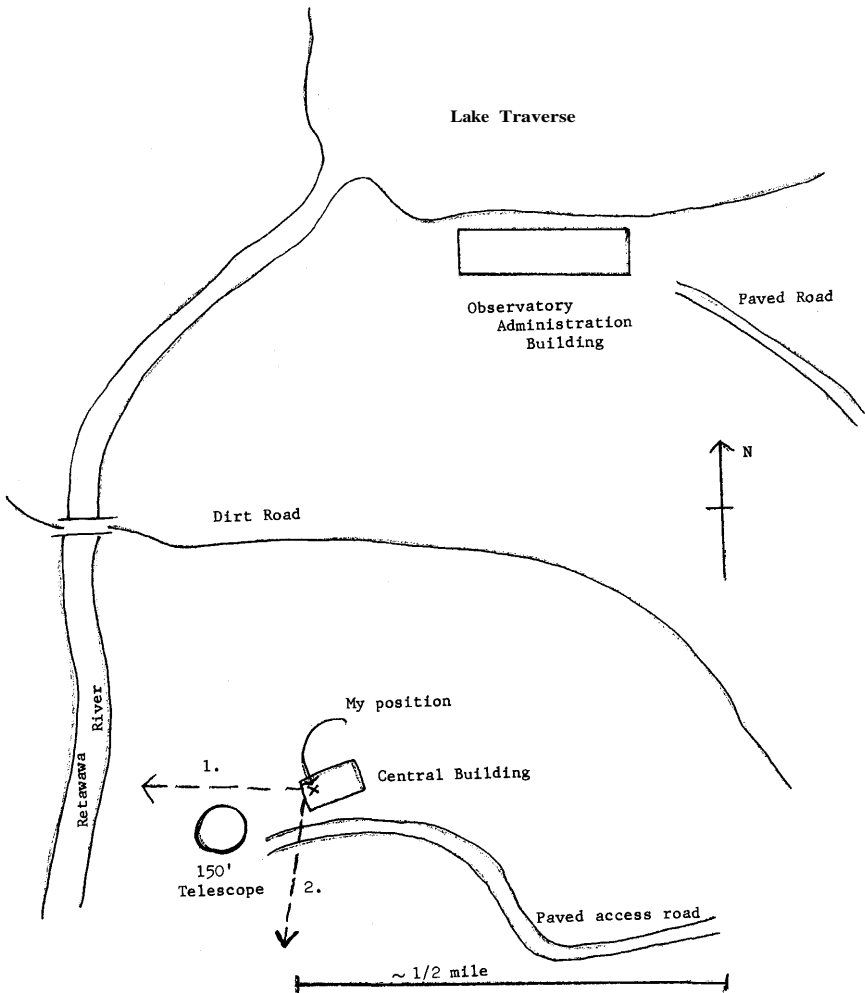


Fig. for Case DO5

was talking to at the time, who had their backs to the window, was that I had been working too long."

The sky was clear and the air was still. The sun was rising to the respondent's left and the object was to his right moving to his left (see sketch). The object is described as being self-luminous.

In the list of priors, *g* is specified as "psychological effect"; in the list of posts, it is specified as "fireball."

TABLE for Case D05

	a	b	c	d	e	f	g	h
Prior	.15	.15	.2	.2	.1	.05	.05	.1
Post	0	.6	.05	.1	.1	0	.1	.05

Disks

D06. *Place, date, unspecified.* In commenting on Question 7 of the first questionnaire, respondent stated that he had on several occasions witnessed events which he could not identify and which may be related to the UFO phenomenon. He continued as follows:

"In all but one case that I recall, I could indeed suppose a 'normal' explanation . . . airplanes, without sound, meteors, balloons, etc. The best case—the silver discs—occurred in the desert in summer 1955—I suppose it was a strange refraction effect . . . It is too long ago to recall."

D07. *Toledo, Ohio, date unknown, 11:25 a.m.* Respondent was watching TV, and looked out of the window. He saw a strange object which he watched for about 5 minutes and then called for someone else to see it. Just before the other person arrived, the object disappeared.

The object is described as being seen at an angular elevation of between 50° and 70° , however, the distance of the object is quoted as 100 yards and the altitude as 2,000 feet, so the estimates are not consistent. The object was seen in a southerly direction, looking out of the window above a neighbor's house. The sun also was almost directly south at an elevation of about 70° . The sky was clear with a few clouds. The respondent states that he could not see the object clearly since "the sun's reflection" (off the object?) "would not give a clear outline." The object is described as being a long slender bright metallic object with no lights. (See sketch.) The respondent could not ascertain a color. Al-

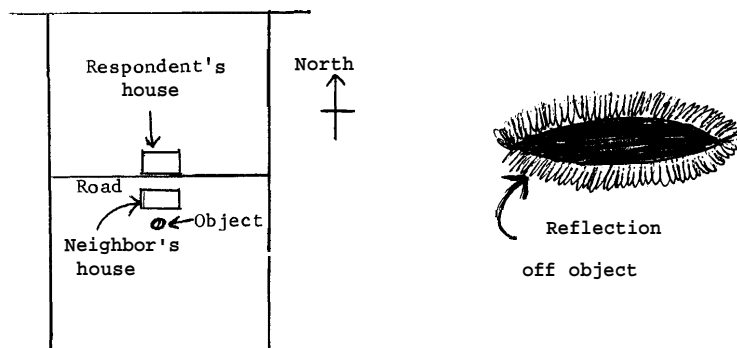


Fig. for Case D07

though the object appeared to be solid, and to reflect sunlight, its outline was fuzzy. Its angular size was estimated as somewhat larger than one degree. The object was first observed hovering in a steady manner, but it then shot straight up and disappeared.

DO8. *Wroclaw, Poland, 1957 or 1958, summer, about 5:00 p.m.* Respondent was walking on the street when he heard people shouting "UFO flying over city," and noticed a very bright point about 45" above the north-northwest horizon. The sun was about 30" above the west horizon. Respondent walked to his observatory, arriving there in about 10 minutes. He then observed the object, for about 20 minutes, through a small telescope (Steinheil lens 16.5 mm diameter, 120 mm focal length) with orthoscope eye pieces used for routine sunspot observations. He observed a sharp uniformly bright disk of diameter 5 arc-min. Measurement was possible by using calibrated network of lines in focal plane of the telescope. Five arc-min was the maximum angle of diameter and presumably corresponded to the closest distance between the object and the observation site. After 15 minutes of observation, the angular diameter decreased to less than 1 arc-min and the object disappeared in the fog over the south horizon. All attempts to identify the object failed. No satisfactory explanation was found. The nature of the object remains unexplained. When observed through the telescope, the object appeared to be yellow rather than bright white, perhaps due to the high magnification used (200x). The object appeared to be solid and was sharply outlined. It was comparable in brightness to the sun and is believed to be selfluminous since it was too bright to be just reflecting sunlight. Moreover, the object did not show any "phase" changes which would be expected for a reflecting sphere in the given geometrical configuration. All that was observed was a uniformly radiating sharp disk. The movement was steady, similar to the movement of a jet airplane at high altitude, with one significant difference: there was no white trail behind. The elevation above the horizon was changing from about 30" over the north-northwest point to about 55" at west and then decreasing again to about 30° when it passed in the south direction. The highest point of the trajectory apparently corresponded to the closest distance to the observer. The measured size of the object at this point (west) was 5 arc-min. For a suggested altitude of about 5 km, the respondent estimates the speed to have been 200 to 300 mph. With this estimate, the diameter would have been about 7 meters.

In listing the "post probabilities," the respondent identified g as an optical mirage. He attributes the difference between the post probabilities and the

TABLE for Case DO8

	a	b	c	d	e	f	g	h
Prior	.05	.05	1	.15	1	.5		.05
Post	.02	.2	.2	.1	.1	.15	.15	.08

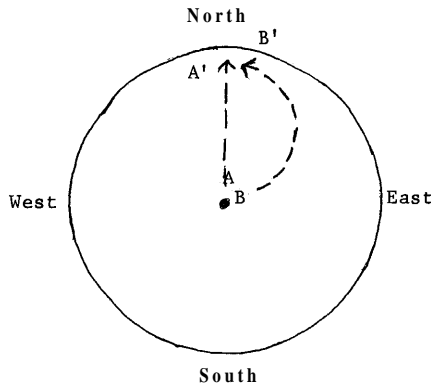


Fig. A for Case DO9

prior probabilities to further study of the subject in the few months interval between completing the first form and the second form.

DO9. Newark, New Jersey, summer, 1958 or 1959, about 6:50 p.m.

"At about the age of 13 I observed on two successive dates three oval objects. Two were white. One, about 1 1/2 times the size of the others, was red. It was daylight and completely clear. One of the white objects appeared to go through a banking maneuver. During this period the view of the object changed so that I could see it edge on. The shape was 'classical cigar shape.' No markings, exhaust or sound. . . "

Objects were first seen at about the zenith. "AA' marks the path of two objects both oval, one white, one red. BB' marks the path of a third object, white and identical to other white object. This BB' object was seen to go through a banking maneuver in the NE and then rendezvous with the other two objects as they all continued to proceed north. The banking maneuver of one white object took place at an elevation of approximately 45°."

The sky was completely clear and it was a few hours before sunset. Similar sightings were made on two consecutive days, at almost exactly the same time (6:50 p.m.) both days.

The bottom view and side view of a typical object is as shown below:



Fig. B for Case DO9

TABLE for Case DO9

	a	b	c	d	e	f	g	h
Prior	.15	.5	.15	.15	.02	<.01	.01	.01
Post	.1	.2	.2	.3	.1	-	-	.1

"One object was red, oval, smooth with no visible features. Its apparent size was about equal to the size of the nail on your index finger if held at arms length. The other two objects were white, oval, featureless, identical to each other and about 2/3 the apparent size of the red object. None of the objects appeared metallic and none appeared to have 'hot spots' from reflected sunlight. The appearance was rather like the result of shining a soft, frosted light on to a clean, smooth, porous, matte surface and holding this surface (cut in the shape of an oval) against the blue sky. No sound was heard relative to the passage of these objects and no exhaust trails were visible."

The objects are elsewhere described as "discernible, oval disks," and apparently solid. They may have been self-luminous or may have had a dull finish.

"Objects were first sighted forming a rather close triangle at the zenith. Within a matter of 10 seconds or so one of the white objects and the red object began to move steadily toward the north. The other white object moved away from the other two and began to head ENE. At an elevation of about 60" it began to turn toward the north and in so doing appeared to execute a banking maneuver, its oval shape slowly changing until I could see it almost edge on. In this position it appeared flat on the top and bottom and rounded on the edges not unlike the profile of a cigar. It continued its maneuver heading toward the north where at an elevation of about 25" it rejoined the others. All three then shot north toward the horizon, and at great speed.

"The objects were sighted again the following evening (we were on the look-out for them). Again the sky was clear and the moon was again not up. Their behavior was almost the same as on the previous evening but this time one red and one white object flew from the zenith toward the east while the other white object went north. I do not recall any banking this time. It was cloudy for the next several nights."

DO10. Near Cloudcroft, New Mexico, October 11, 1974, 1610MDT. Observation lasted 8-10 seconds. Respondent was driving a truck home from Sacramento Peak Observatory. He rounded a corner on the mountain road, about 1.5 miles southeast of Cloudcroft (elevation 8,800 feet) and noticed an object moving near the ridge. It was bright daylight and the sun was to the west of and to the rear of the observer; the sun was to the west of the object.

The following account was provided by the respondent, based on notes which he made within 15 minutes after the sighting: "Object was observed from both inside and outside of vehicle by observer both with and without eye-glasses.

TABLE for Case DO10

	a	b	c	d	e	f	g	h
Prior	.1	.05	.1	.1	.05	.1	.05	.45
Post	0	0	.1	.2	.2	.1	0	.4

"Object was moving from southeast to northwest apparently near a wooded ridge. Path of motion was apparently level and straight until last 2 or 3 seconds of observation at which time object turned upwards, accelerated rapidly in a vertical direction and became too small for observer to resolve in a matter of a

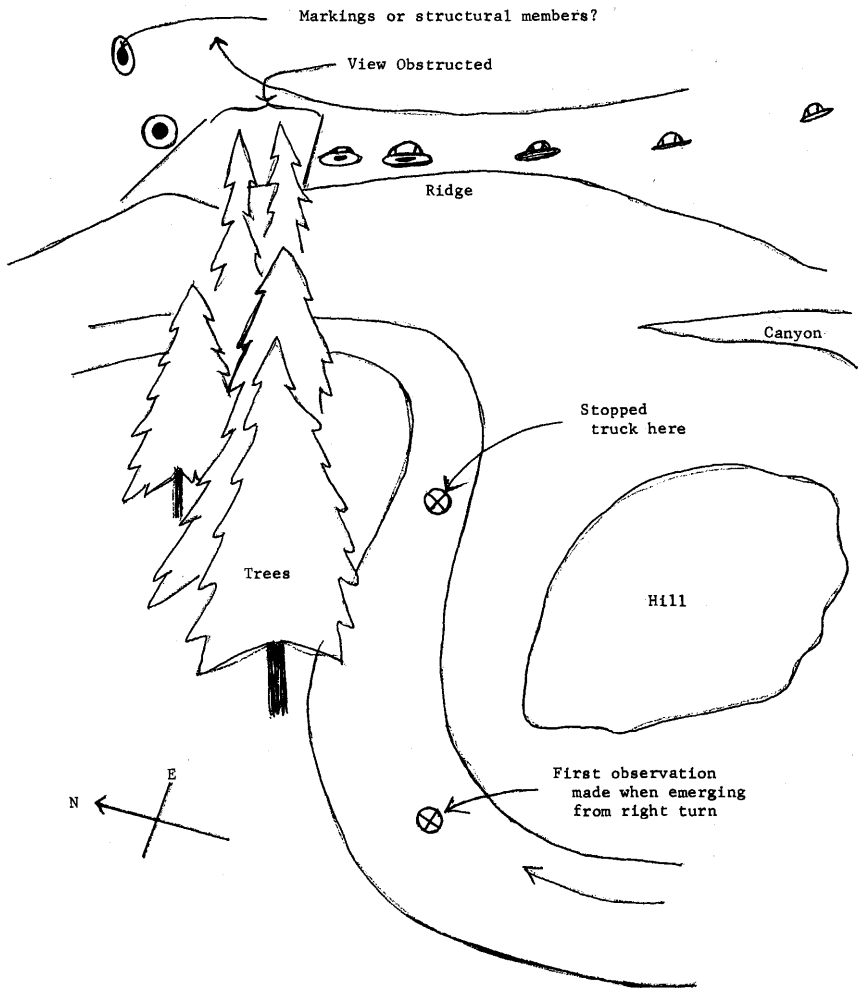


Fig. for Case DO10

few seconds. (Rapid motion and acceleration of an object through air and no sound heard!)

"Estimated distance from observer: ≥ 0.25 mile.

"Apparent angular diameter of object: 5-6 solar diameters.

"Color: Flat silver-gray with darker markings/structures (?) as indicated in sketch. No other color on or surrounding object.

"No flashing of reflected sunlight observed. Sun to rear of observer.

Object observed against thin cirrus background. There were also a few scattered cumulus clouds in sky. Object was at no time obscured by cumulus clouds.

"There was no spinning or motion about any axis of object. Plane of object apparently changed allowing observer to see the markings/structures mentioned above. These markings are indicated on sketch."

"Object was first detected as observer rounded a right turn in road. Observer applied brakes on truck immediately but then decided to accelerate in order to see beyond trees in observer's foreground but engine did not respond. Immediately stopped vehicle and got out and sighted object again as it apparently turned upward and vanished. Automobile engine was not running; it definitely did stall; ignition still on and tape deck still playing. I definitely remember tape deck *not* shutting off even when engine stalled. The vehicle is a 1972 International 112 ton pickup with automatic transmission, so the first hard application of brakes would not have stalled the engine. The truck engine has never in the past stalled."

The respondent has added the following information. There was no road traffic before or after the incident. When the vehicle stalled, it was traveling at 30-35 mph. It had never stalled before (in four years) and it never stalled subsequently while in respondent's possession (1 112 years). The tape deck kept running without a change of speed. There was an interval of 3-5 minutes between the departure of the object and the truck being started. The object exhibited no rotation, no wobbling and no sound. It did show a slight tilt.

DO11. *Catalina Observatory, Arizona, March 24, 1967, 10:45 a.m., for about 50 seconds.* Respondent reports as follows:

"On the night of March 23/24 I had observed until about 4:00 a.m. using the Catalina 61 inch telescope. I was not the principal observer that night and so I was not quite as exhausted as I would have been otherwise. My normal sleep schedule was for school and daytime work at the Lunar and Planetary Laboratory, so despite my fatigue I awoke at a little after 9:00 a.m. on the 24th, unable to go back to sleep. I fixed a light breakfast and after eating it I sat down to study in the lounge area at the north end of the dormitory. The coffee table and couch were set in the room so that I faced the large windows on the northwest and northeast faces of the building. I had a loaded 35 mm camera with a 28 mm lens sitting on the coffee table because I expected to take some pictures of the sources of smog in the valley below and take others of the local scenery. . . . It was a bright and beautiful day with scattered clouds. After some 15 minutes to

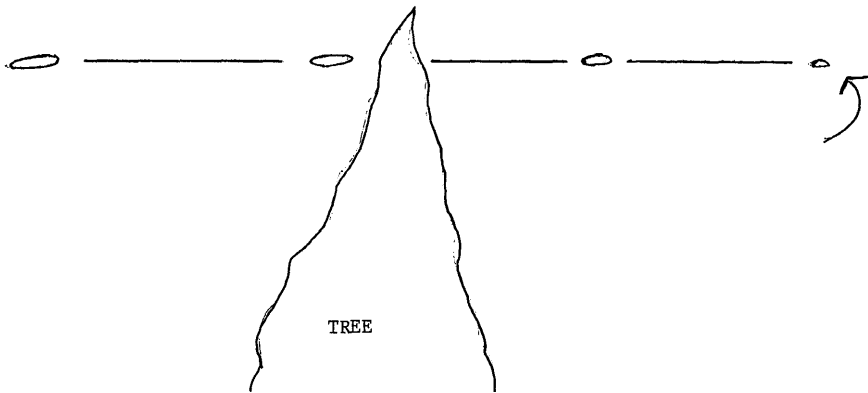


Fig. A for Case DO11

a half hour of work in a somewhat unsettled manner because of my fatigue and excitement from observing, my attention wandered several times. I am not sure whether I first noted the UFO because of its motion at the edge of my field of vision or because I was going to look up anyway at the very nice nimbus and cirrus clouds. I first fixated on the UFO when it was nearly in the center of the single window on the NW face of the dormitory. At first I thought it was a small plane like some I had seen around that time, painted white with little contrast. But the shape was not right and the angular rate was too large for the angular size. Also there was no visible shadow of the usual monoplane upperwing. In fact there were no shadows visible at all, not even on the underside of what should have been a fuselage. The speed was too great for a balloon, except possibly at very close range. After perhaps 10 seconds of observation I realized that I was looking at something very unusual. I briefly considered taking a picture, but the small angular subtense of the UFO, its lack of detail and the wide angle lens on the camera all argued against spending the time to adjust the manual f-stop and shutter speed and to check to make sure that the film was fully wound. The rapid angular rate of the UFO and its decreasing subtense decided against photography. Within 20-30 seconds after making this decision the object was barely discernible against clouds in the NE. About midway through this observation I was convinced this was an extraordinary object because of the sharp well-defined edges, the lack of sound, the lack of shadings in tone and lack of shadows, and mostly because the object appeared to change shape as an aspect effect. On initial viewing it was quite elongated,

TABLE for Case DO11

	a	b	c	d	e	f	g	h
Prior	.05	.75	.02	.02	.005	.15	0	.005
Post	.03	.25	.25	.25	.02	.10	.05	.05

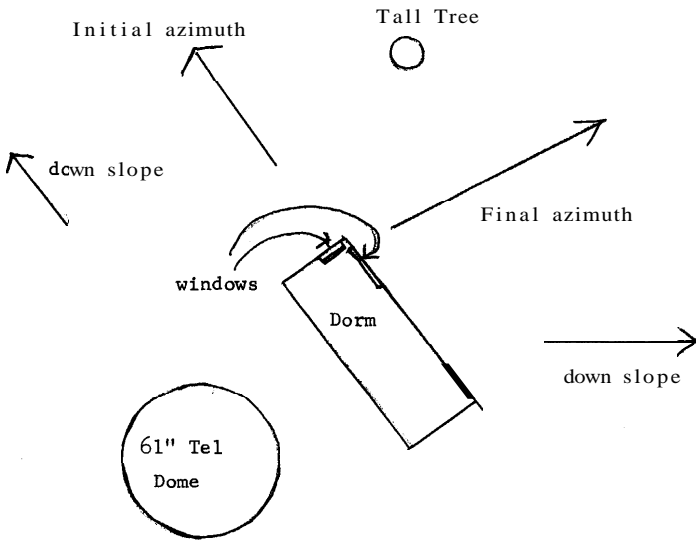


Fig. B for Case DO11

then gradually appeared more circular as it moved away. My binocular vision indicated a distance greater than a hundred meters and this was confirmed when it passed behind a tree at about 70 meters distance. There was no sound at all and in the quiet of the morning on the mountain it was easy to hear very faint sounds outside the dorm. I was very unsettled by this experience, being as it was so strongly manifest that the object could not have been any conventional aircraft or balloon. If I can believe the object was very close to the clouds in the NE or had penetrated them when it was lost from view, then from their estimated distance of 20 km and the time required to get there of about 40 seconds, I estimate a speed of about 500 meters/second. In round numbers the speed is about 2,000 km/hr or better than Mach 1.5. There was no sonic boom. But the distances may be off so these numbers may be off.

"The slow rate at which the aspect or axis ratio changed would suggest that the object was at a significant fraction of its final viewing distance when it was first seen. For example, the initial distance could have been 10 km and the final distance 20 km. This assumes straight line, constant velocity of motion with the long axis in the direction of motion. All together the analysis gives an estimated initial distance of about 10 km. This means a size of about 70 meters and a velocity of about 300 m/sec or about 1,000 km/hr. This is Mach 0.9, just about airliner speed. If the UFO was simulating an airliner for the benefit of the Mt. Lemmon radar site (a few km west of the observatory) then it all would fit.

"The angular size of the UFO was large enough so there is no doubt in my mind; this was not an aircraft or balloon.

"Near the end of the sighting I lost the UFO against the white clouds, regained it, then lost it again.

"The dorm looks out over a valley to the North; the dorm is at about 8,200 feet altitude on the mountain. The wind was from the WSW, 35 mph; clouds were moving slowly to the South.

"I was wearing my glasses at the time. With them my tested light contrast resolution is better than 30 arc-sec. Testing has shown that I can recognize a plane, balloon, etc. with an angular size of 3-4 arc-min with no difficulty. The measured size of the UFO was 3/16 in. at arms length or 26 arc-min in length. (I used a scale in inches present in the dorm during the time of observation.)

"It was just a white oval in the sky with no detail, just a sharp boundary against the dark blue sky. The brightness of white was more than expected for normal white paint; it was nearly a 'Lambert' surface. The motion was *very* constant, apparently in a straight line, as shown in the figure."

"The object did not leave a vapor trail."

The object was sharply outlined and appeared to be solid. It was either reflecting or possibly self-luminous.

The observation was reported to three UFO investigators, including a member of the Colorado Project staff.

DO12. *Elmhurst, Queens, New York City, June, 1960, about 6:00 p.m.* Respondent was observing the Echo satellite at sunset, when he observed a rapidly moving red object flying east at about 10 arc degrees/min. When the object first appeared, it was approximately 45" above the western horizon. The object passed almost overhead and was last seen at an elevation of about 45" in the northeast. The duration of the sighting was about 5 minutes. The object was brighter than any star, but could have been either self-luminous or reflecting. The motion was steady without erratic behavior, and the object was definitely resolved as a disk, but no other features were visible. The size was estimated as 1/4 degrees in diameter.

The location of the respondent was very close to La Guardia Airport, but the object in no manner resembled any aircraft with which he was familiar.

Additional Comment, received June, 1977

The respondent reporting TR1 points out that this report (DO12) "has all the earmarks of TR1."

See also DO16 for another report of a "disk-like object."

TABLE for Case DO12

	a	b	c	d	e	f	g	h
Prior	-	-	.5	.5	-	-	-	-
Post	-	.5	-	.5	-	-	-	-

Miscellaneous Objects

DO13. *San Diego, California, 1972, summer, day time.* Respondent was floating on his back in a swimming pool. Residential neighborhood. Observed circular shadow 1/2 degree in diameter on cirrus cloud at approximately 20,000 feet for approximately 40 seconds. Shadow was sharply outlined, estimated diameter 170 feet. Shadow moved slowly in a straight line northwest across cloud. When the shadow came to the leading edge of the cloud, the cloud was no longer visible, but no aircraft or any other object came into view.

TABLE for Case DO13

	a	b	c	d	e	f	g	h
Prior	.2	.6	.05	.05	.04	.02	0	.04
Post	0	1	0	0	0	0	0	0

DO14. *Escondido, California, late 1950's, midday.* "Probably was a U.S. missile; no positive identification. Observed midday in late 50's, Escondido, CA, elongated (no wings) object moving silently and very fast Northwards. Just before disappearing behind hill emitted smoke but something continued (probably was staging or destructing). Reported in local paper—was observed by a number of people. The problem is that it was over an inhabited area heading roughly toward Riverside. Do not believe a missile would be (intentionally) launched in that direction—likely a SAM or airborne missile launched in the wrong direction or out of control (lots of military installations in that area). No official explanation that I know of. Probably not worth attempting to follow up—but it was an impressive sight."

DO15. *Sacramento Peak Observatory, New Mexico, about 1963.* Respondent and several other persons, including other solar observers, saw a number of bright globular objects or lights pass from west to east past the sun's vicinity in the sky. The objects were spherical or globular in appearance and became visible when they entered a circle of 10°-15° radius centered on the sun's center and disappeared when they left this circle. Unsuccessful attempts were made to photograph the objects with a coronagraph. Size estimated at less than 3 arc-min diameter, and speed about 10" per minute. Report sent to NORAD. One proposed explanation was that the objects were part of some experiment being conducted at White Sands Missile Range or Holloman Air Force Base, but no such experiment was in progress.

TABLE for Case DO15

	a	b	c	d	e	f	g	h
Prior	.02	.5	.1	.3	.08	<.01		<.01
Post	0	.64	.02	.02	.02	<.01	.30	0

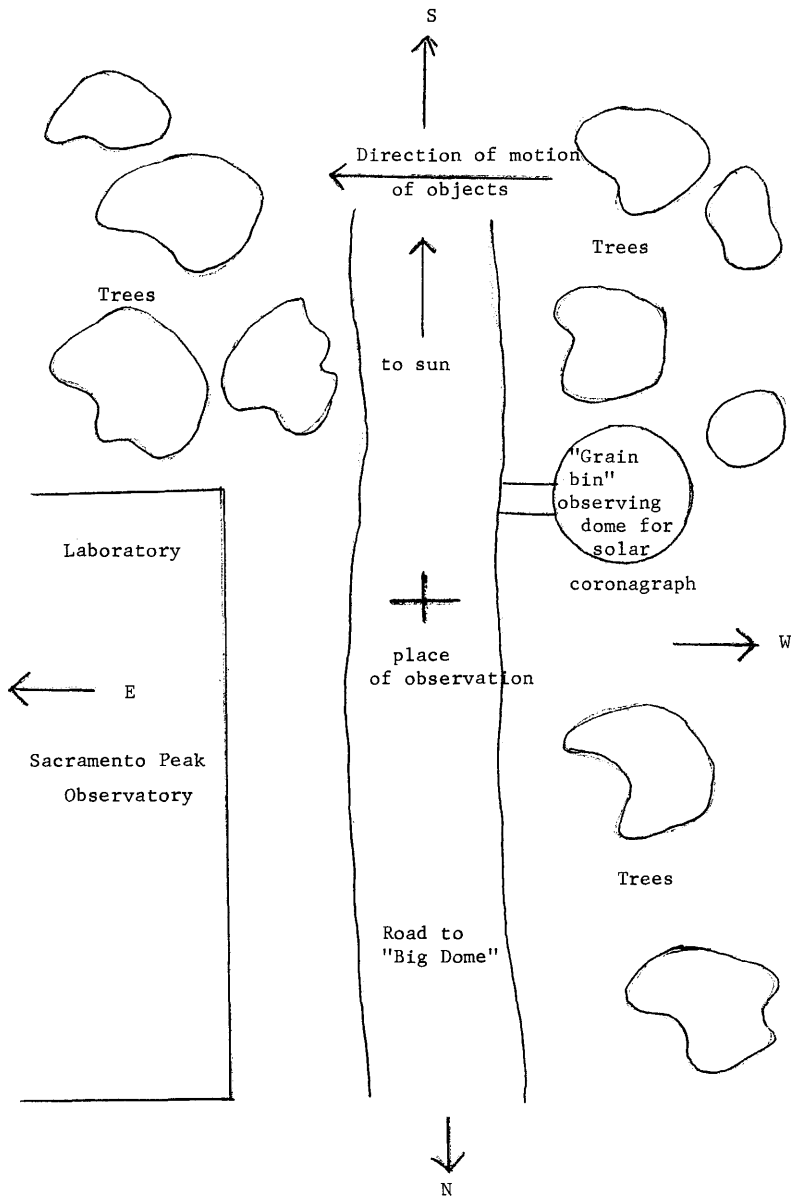


Fig. for Case DO15

Probable explanation believed to be that the objects were migrating weed-seeds or insects borne on the wind, (Such objects sometimes spoil coronagraph observations.) Phenomenon described as "striking and beautiful."

Concerning post probabilities, g identified as "scattering from airborne weeds or migrating insects."

DO16. *Arlington, Virginia, 1969, summer.* Observation lasted from 1830 to 1835 EDT. The respondent describes the event as follows:

"In the summer of 1969 I was taking our Irish Wolfhound for her evening walk when I noticed, to the Northeast, a bright, disk-like object apparently hovering just above the treetops. The object was luminescent, pale blue, and appeared to move slightly to and fro. After calling this to the attention of my wife who was accompanying us, I watched the phenomenon for several minutes. It did not change in position or shape. Then we noticed that while it was slightly above the treetops, it was also slightly above a thick electrical cable running between power poles. Moving back and forth to determine parallactic effects, we decided that the phenomenon was probably associated with the power cable rather than being farther away, although we could not be certain. We then walked on. The phenomenon has not been observed again although we have frequently looked for it.

"Arguments for its being a coronal phenomenon: it appeared close to a power line, its parallax seemed to show that it was close to the power line, coronae are known to occur in the vicinity of power lines.

"Arguments against its being a coronal phenomenon: the powerline was not, as far as we know, an HV or EHV line but simply one of the ordinary lines found running above city sidewalks and supplying power to households, street lights, etc.; the phenomenon, if associated with the line, did not occur close to the supports but closer to the middle of the segments, where one would not expect to find a coronal discharge; the line was not open but seemed to be well wrapped with insulating material; the 'object' *was*, I must admit, shaped like a galaxy seen edge-on.

"In our opinion, the phenomenon was a coronal discharge of a most unusual and difficult-to-explain kind."

The object was seen slightly north of west at an altitude of about 50° . It was still daylight and the sky was clear. The moon was not visible and the sun was behind trees. A sketch of the object is as below.

The object was sharply outlined and appeared to be self-luminous. Its angular diameter was about $2.5''$.

In a later communication the respondent adds the following comments:

"The phenomenon has not been seen again, and I am inclined to think that it is a hitherto unobserved phenomenon caused by a combination of unusual weather conditions with a fault in a power line. However, the weather at time of observation seemed perfectly normal, and the power line has not been treat-

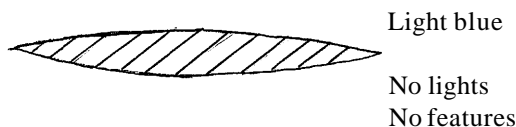


Fig. for Case DO16

ed, as far as I know, by the power company. The phenomenon is and will probably remain unexplained. I do not think it was a UFO."

[This object could have been grouped with "disks."]

TABLE for Case DO16

	a	b	c	d	e	f	g	h
Prior	0	.1	.4	.4	0	0	0	1
Post	0	.3	.5	0	0	0	0	.2

4.5 Photographic and Photometric Cases

Several respondents described photographic or photometric records, and three kindly provided copies of their material (PH4, PH6 and PH7).

PH1. Respondent states that he photographed an object in daytime from a commercial aircraft at 33,000 feet. Although at the time he felt that it was a man-made device, the object was never identified.

PH2. *Nassau Station of Warner and Swasey Observatory, July 26, 1965, 0210 U.T.* Respondent investigated a plate exposed for one hour during the night, exact time unknown. The plate showed five images ranging in position from RA = 17h 18m, Dec = -16°.5 to RA = 17h 13m, Dec = -16°8. Since the photograph was taken with an objective prism, it was seen that each image was that of a xenon flash spectrum. Four images were in a straight line but the fifth was out of line.

Respondent believes that the images may have been caused by a xenon flash lamp on an airplane.

TABLE for Case PH2

	a	b	c	d	e	f	g	h
Prior	.029	.1	.04	.8	.03	.001	0	0
Post	0	.05	.05	.889	.01	.001	0	0

PH3. *Ojai, California, August 26, 1974, 11:47 p.m.* Weather very clear and calm. Moon low in southwest, waxing gibbous. Respondent was performing Stromgren four-color photometry on several stars in Andromeda. At S.T. 21:10:30, the data rate through the V filter (λ 4600Å, ~300Å half-width) jumped by a factor of three. The other filters behaved normally, and there seems to be neither a stellar nor experimental explanation. The signal-to-noise ratio was about 100. The telescope (24 in. reflector, one arc-min aperture) was directed ENE at an altitude of about 60° (about two hours east of the meridian, at declination + 40°). The pulse-counting system was cooled to -70°C.

TABLE for Case PH3

	a	b	c	d	e	f	g	h
Prior	.01	.04	.1	.4	.4		.05	
Post	0	.75	.01	.14	.001	.0001	0	.1

Possibly a small satellite crossed through the line of sight. (The major objection is that the effect lasted for three observations of ten seconds each, but did not slop onto the observation of a different filter at either end.) But quite likely a spurious instrumental glitch. [Note that, in 30 sec., a satellite has moved many tens of degrees across the sky. The aperture of the telescope was one arc-min.]

In list of priors, (g) is identified as an optical illusion or an hallucination.

PH4. *Rutland, Vermont, 1972, July.* Respondent writes:

"I was up in Vermont taking pictures of the constellations for use in my science classes. I myself never saw anything; however, development of the slides showed a reddish star, very bright, south of Orion, somewhere near Lepus. I do not recall any lights on the distant mountains nor any airplanes. However it is possible that these may be the reason for the blur in the same spot on the two slides. My own opinion is that this probably was not a UFO."

Respondent added later that he believes the object to be probably a searchlight.

Detailed study of the photograph showed that there were many faint images, and two or three bright ones, below the Orion constellation. Although three or four of the stars had a *prima facie* similarity with the Lepus constellation, the positions did not agree in detail, and the similarity must be taken to be fortuitous.

[My guess (P.A.S.) is that the night sky below Orion was obscured by mountains and that the images below Orion were due to electric lights.]

PH5. *Place, date, on file.* "In _____ I took a photograph of the sun as it set from _____, on Kodacolor film. When the picture was printed I noticed a peculiarity. Although the sun was suitably dimmed by the filters (it was a beautiful photograph), there were a number of bright specks (white) on the print. At first I took them to be dust on the negative, but a closer examination revealed that all had 'ionization trails' parallel to the horizon, pointing randomly in one or the other direction. Looking at the negative I saw the same images right on the film. Later that year I showed the photograph to _____ at _____. He was not overly impressed and said there must have been a leak in the filter. He suggested I repeat the process and see if I got the same effect. Unfortunately the 3 in. and its accessories with which the photo was taken were destroyed by Hurricane Agnes before I got around to it."

PH6. *New Mexico, January 3, 1972.* The respondent provided me with a film made in the course of a flight by an Aerobee rocket for astronomical observations. A camera with telescopic lens was mounted in the nose of the rocket and coupled with a 16 mm camera loaded with black and white film.

Upon inspection, it was found that 80 or 90 frames showed circular images, looking somewhat like the full moon except that the size varied from a maximum of 1/4 the frame size to a point which was barely detectable. When the film was projected, it gave the impression of several spheroidal objects going through rather complex trajectories in the neighborhood of the rocket.

Since the attitude control system of the rocket had failed, it was impossible to determine the absolute direction of each object. When the film was shown to Professor George Abell, he immediately guessed that the images were due to small particles illuminated by sunlight, and appearing as disks since their images were out of focus.

There were two tests of this hypothesis. One was to check that the images were not strictly circular, but polygonal, corresponding to the iris aperture. The second test was to determine whether shadowing of each image was always symmetrical with respect to the center of the frame. Upon examination, both these tests gave positive results. We therefore concluded that the images were due to dust particles (or possibly flakes of paint, etc.) originating from the rocket and illuminated by sunlight.

It seems possible that the preceding photograph (PH5) may have been due to the same cause. It is also possible that case DO15 is another manifestation of the same phenomenon.

PH7. *Tucson, Arizona, November 26, 1969.* Observing site: backyard, relatively dark with no nearby streetlights. Enclosing wall five feet high. Western horizon very clear. Tree to the south partly blocking view.

Description of events (as written by respondent in his notes on December 1, 1969): "I entered the yard from the house at 6:15 p.m. (± 5 min) toward the end of twilight. Many stars were visible in the clear sky, and the limiting visual magnitude was about 4.0. Alpha Aquilae (Altair) was clearly visible just west of the zenith. I looked to the zenith and at once noted a very bright object of stellar magnitude about -3, without any shape or form and making no discernible sound, moving steadily westward. It was very obviously orange-red in color (more vividly colored than Mars, which was visible to the south west). My first thought was that this object was a satellite because its velocity was not much different from low-orbit satellites (though perhaps just a bit faster). The brightness was not too different (though a bit brighter) from earlier Echo satellites. The distinct red-orange color distinguished it from any satellite I had ever seen before, however, so I watched the object as it passed the zenith and moved into the western sky.

"As the object approached an elevation of about 30" above the western horizon, its velocity decreased until it came to an apparent stop at about 30" eleva-

tion. It remained in this position for about two minutes, during which time it faded to about -2 stellar magnitudes for about 30 seconds, and then brightened to its former value. Then, two luminous objects dropped down from the parent light, and faded out in about 3-4 seconds after having fallen about 1 degree from the parent object. After the two objects dropped away, the parent object faded after a few seconds and became invisible.

"I returned to the house and attempted to phone H and M to tell them about this, but could reach neither of them. After about five minutes, a second object was seen at the zenith, also moving west, by my wife, _____. I managed to reach M by phone but gave him mistaken directions on where he should look for the second object. I returned to the yard and saw the second object, fully as bright and vividly colored as the first one seen a few minutes earlier, move to the approximate altitude of 30° above the western horizon, dim, brighten, drop two luminous objects, fade and disappear, just as the first object had done.

"While I was on the phone with M again, my wife sighted a third object, moving slightly south of the zenith this time, but directed toward the same position in the sky where the first two had stopped and ejected the smaller, less luminous objects, and then disappeared. I got my camera from another room, took a straight back chair and went to the yard. Some time exposures were made with the camera propped against the chair and hand held. These were only partly successful because the chair was not steady enough, so I went to the house again and got a tripod.

"After the third object dispatched its two fainter objects, it faded after about ten seconds, and then appeared to move off to the north rather quickly, covering about 3 degrees in about five seconds time. The object was faint, however, about 5th magnitude, and was not seen with certainty. By this time the sky was very dark and 5th magnitude stars could barely be seen from the yard.

"At about 6:45 p.m., the fourth and fifth objects of this type were seen simultaneously. Number four was moving east to west, crossing the N-S meridian about 10° south of the local zenith and moving toward the disappearance points of the previous three objects, and it had the same brightness and color as the previous three. Crossing the meridian at about the same moment, but much further south was object number five, also bright and orange-red. It moved in a very different pattern from the other four, however, and I began a time exposure. The object moved behind the tree in our yard, but the tree limbs are bare and it proved to be only a minor obstacle. The first time exposure was cut short for a reason I don't remember, so I started a second one which showed most of the object's motion. It moved in an apparent ellipse, taking about 5 minutes or less to complete the circuit. During this exposure, the shutter of my camera (Bulb, since the camera doesn't have a Time setting) was accidentally released and closed, so I cocked the shutter again and opened it, resuming the second part of the exposure on the same frame. The resulting trail of the object shows a break corresponding to about 10 seconds in time. After moving around the ellipse, the object came to a stop, remained motionless for about two minutes, discharged two luminous objects downward (also red-orange in color, about

first or 1.5 stellar magnitudes bright), and promptly faded out of visibility. This happened about three or four minutes after object number four had faded out in the same place and in the same way the first three had expired. No sounds were heard, except when two airplanes went across the western sky during event number 4.

"The last observation terminated at about 7:00 p.m. (± 5 min) MST.

"I went to the front yard with the camera in order to try to pick up the next object in the eastern sky to ascertain the origin, but the sixth object never came. The front yard is badly illuminated with Hg-vapor lamps and visibility is poor, but second magnitude stars can be seen in spite of the high level of illumination.

"Camera description: Yashika 635/twin-lens reflex roll film camera, using 120 film. Exposures made on Kodak Verichrome Pan 120 film, on two separate rolls, processed by an automatic machine at the Lunar and Planetary Laboratory, University of Arizona on Dec. 1, 1969. The camera has an 80 mm focal length lens, used full aperture ($f/3.5$) on bulb exposure, with the shutter release hand-held.

Notes accompanying photographs:

Negatives processed in an automatic machine which left the films rather dirty and also left water or chemical streaks.

Frame 1 shows a short part of trail of object.

Frame 2 blank—not printed.

Frame 3 shows final moments of object 2.

During time of exposure no *apparent* motion of object, but it faded for a few moments, brightened, and discharged two luminous blobs which fell downward. Picture shows one faint streak (and hint of second streak) made by the falling luminous object prior to burning out. Camera hand held.

Frame 4 shows object three during large part of its travel. Interruption near lower end of trail made by covering camera lens with hand for five seconds. Camera on tripod but shutter release hand-held. Trail irregular in density.

Frame 5 shows object five describing elliptical path almost due south of observer. Motion clock-wise. Interruption at left-hand end caused by finger slipping from shutter release, closing shutter. Shutter recocked and released. This operation moved camera causing double images of house and leafless tree. Bright object above path believed to be Mars.

Figure 6 shows last moments of object five with image of Mars near center of frame. Shutter held open continuously. At end of life of object, discharged two glowing objects that fell, but these are not obvious on the picture.

The five plates following this page are those referred to on pages 23–26

Additional Comment, received June, 1977. A correspondent has kindly pointed out that the behavior described in this report is similar to an event which he observed, and which he determined to have been a hoax. A candle was mounted at the junction of two wire struts, the extremities of which were attached to a plastic garment bag. The hot air caused the object to float and

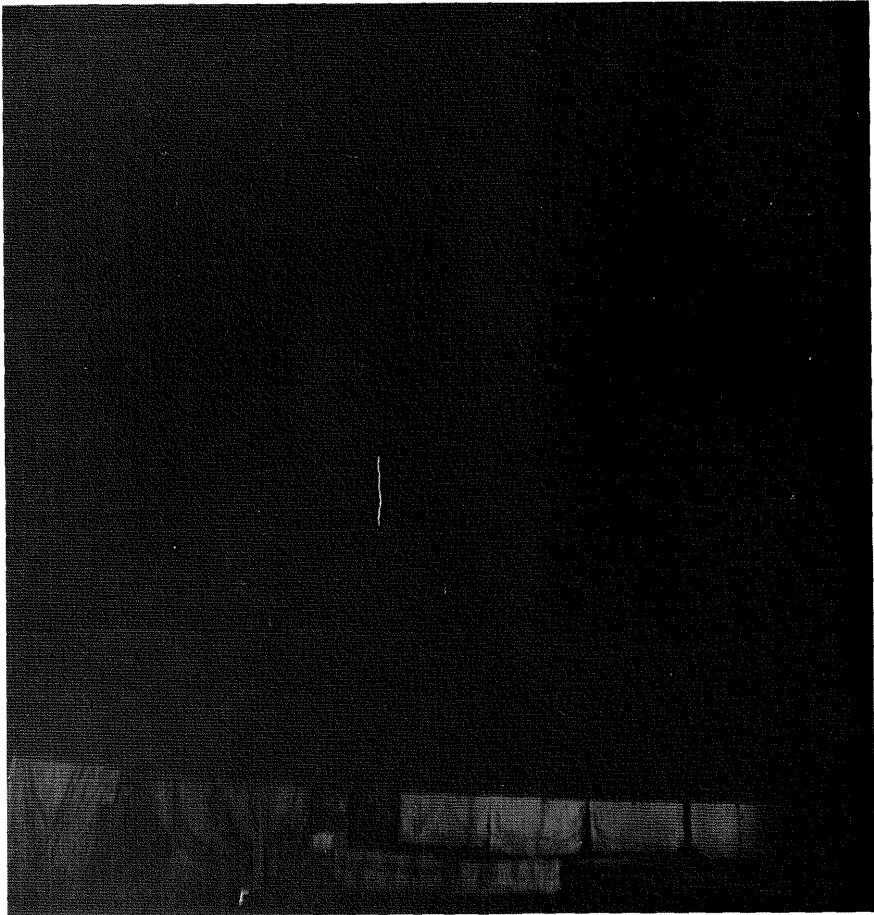


Photo for Case PH7, Frame 1

move somewhat as described in this case. Drops of hot burning wax fell away just before the candle gutted and extinguished.

4.6 Radio and Radar Reports

RA1. *Off Cape May, New Jersey, February, 1951.* Respondent was operations officer on a U.S. ship when radar tracked a solid object, *not a false radar echo*,* at speeds up to 3,000 mph (5,000 km/h). Object halted suddenly and climbed vertically above Nantucket and out of radar coverage at above 150 miles up.

*Respondent's emphasis.

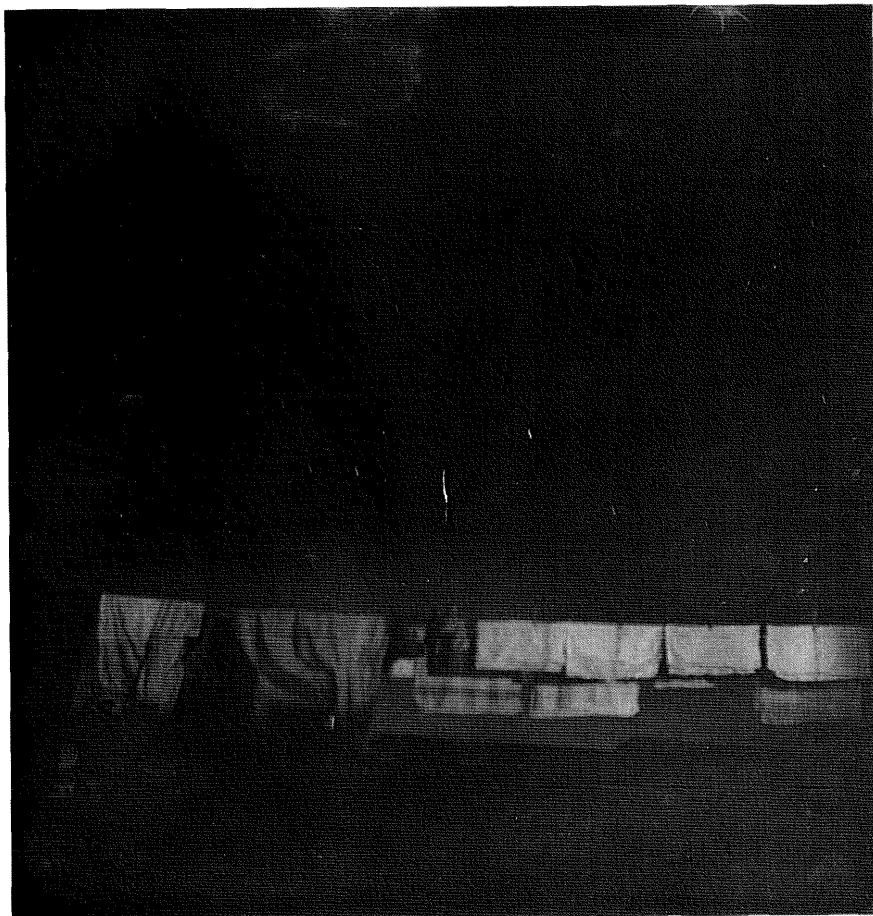


Photo for Case PH7, Frame 3 (No Frame 2)

Additional Comment

The respondent has kindly provided the following supplementary information:

At the time of this event, he was a lieutenant in the Navy with nine years' Combat Information Center experience, and was an Air Controller. Their ship was equipped with the newest radars.

One radar was of type AN/SPS-2A (7 megawatts, 1,300 MHz). It was a search-type radar, which gave direct plots by PPI tube. However, it also had the capability of tracking a specified target. By following a "fix" and timing its movement, one could determine velocities to within about 1 percent accuracy.

Another radar, model SP, was similar to a fire-control radar and was designed to give azimuth, elevation and distance data for a specified target. It was computer-driven and gave immediate altitude readings.



Photo for Case PH7, Frame 4

RA2. Boulder, Colorado, January 11, 1961. Professor James W. Warwick of the University of Colorado provided information about two unusual radio observations which have in fact been described in technical publications.

The first event occurred on January 11, 1961, and lasted from 0402 UT to 0443 UT.

This event (Warwick, 1963a) was reported as follows:

“... we have observed what are undoubtedly man-made transmissions, produced in a manner unknown to us (see figure). [*Figures in text cited but not reproduced here.-Ed.*] This last record includes the discrete source Cass A, showing the directivity of the antennas, and the sensitivity of the receiver. The unknown source surely must be artificial to have such sharply-defined band edges which persist stably for almost one hour. The source was extremely intense, appearing at 0405 UT on the backlobes of the antenna pattern, where the response is about 13 dB below the main beam. At 0419 UT, the antennas were



Photo for Case PH7, Frame 5

swung to the south point on the horizon. The unknown source maximized at an azimuth of about 65 degrees at 0427 UT. The antennas were then returned to the radio star at 0432 UT, by which time the unknown source could no longer be detected on the backlobe. The antennas were again rotated to the south, where the source appeared near 90° azimuth. During this interval of almost one hour, the source moved steadily towards the south, and remained near the horizon. R. H. Lee, of the Observatory staff, who is an expert shortwave listener, describes the sound of this emission, through a Collins receiver operating on a simple vertical whip, as 'white noise source peaked at about 29.75 MHz . . . approximately what might be expected from a broad source in a single tuned circuit.' No aurora was visible."

These records were made automatically by the University of Colorado tracking, phase-switched, swept-frequency interferometer at Boulder, Colorado. The local time was about 9:00 p.m. so the sun was below the horizon.



Photo for Case PH7. Frame 6

The object was of smaller angular dimensions than about 3° (in smallest direction; it could be larger in the orthogonal direction; but the respondent thinks it likely to have been roughly isometric, $3^\circ \times 3''$).

Warwick comments on the post probabilities as follows: "d and f could be switched—if you were firmly of the opinion that extra-terrestrial was viable; I am putting 'O' here only because of my prejudice that it is not."

TABLE for Case RA2

	a	b	c	d	e	f	g	h
Prior	.01	.85	.05	.07	.02	—	—	—
Post	.001	0	0	.999	0	0	0	0

RA3. *Texas, New Mexico, Colorado, Hawaii. May 16, 1960.* This is the second event reported by Professor J. W. Warwick of the University of Colorado.

1960, May 16, 0350 UT to 0410 UT. This event (Warwick, 1963b) was detected by radio telescopes at Lake Angelus, Texas; Sacramento Peak, New Mexico; Boulder, Colorado; and Hawaii. The event is described as follows:

"The Boulder data include at least one case where, unlike the record of December 19, 1957, the detailed similarity of the records at the different stations is so striking as to leave no doubt at all of the reality of an external, widespread source. This is demonstrated in fig. [*Figures in text cited but not reproduced here.-Ed.*] showing records from four stations of the total power in a 40° beam centered on the zenith, plus an interferometer record made in Boulder at the same time. A search of the IAU Quarterly Bulletin of Solar Activity for solar flares or radio emission at this time revealed nothing, although the sun was active on May 15, 1960. An SC geomagnetic storm began at 14h UT on May 16, 1960. The Hawaiian record was made in daylight, yet does not show the burst enhanced in comparison with the evening records from Boulder and Sacramento Peak. The absence of a deflection on the interferometer records means that the emission covered several fringes of the interferometer beam. Because the sensitivity of the interferometer beam is high, we may assume that the emission covered a substantial part of the sky, probably at least one antenna beamwidth. On the total power side of the Boulder interferometer record, the source equals the galactic background in amplitude. The event seems to have peaked in intensity at the longitude of Boulder, to have covered at least ten degrees in latitude with undiminished intensity, and to have been recordable over almost 60 degrees in longitude and 20 degrees in latitude, with identical detail in the variations. At Boulder, in any case, a large part of the sky was illuminated. A scaled interferometer operating at 36 MHz detected no trace of the emission.

"Since local time in Hawaii was 6 PM, it is at least probable that the sun had effectively set at 18 MHz. The observed radiation (hypothetically solar in origin) may have been trapped under the ionosphere at some point remote from Honolulu, and propagated to the several stations. This seems unlikely, inasmuch as the emission arrived zenithally, and did not have a well-defined direction of arrival. It is possible that a very intense source of low-frequency noise interference propagated to the different stations of the I.F.D. net. Then also, we should expect to observe a definite direction of arrival. The alternative appears to be that a large and bright source of radio waves, pulsing intensely and simultaneously, covered an area commensurable with the North American continent. Since the only geophysical or solar event with which to associate the emission appears to be the geomagnetic storm beginning ten hours later, perhaps the geomagnetic storm plasma cloud generated the emission. If the emission is Cerenkov emission, very energetic electrons are required; if it is synchrotron effect, the magnetic fields are strong, and if it is plasma oscillation, the electron densities are large compared with ionospheric values (say,

TABLE for Case RA3

	a	b	c	d	e	f	g	h
Prior	.01	.85	.05	.07	.02	—	—	—
Post	0	0	0	0	1	0	0	0

10^7 per cm^3). Plasma oscillations in a cloud somewhere in the earth's vicinity appears the most likely candidate as a source."

The data for this event were prepared months after the occurrence, when the tapes from which they were traced were collected in Boulder. There is no evidence to indicate that at the various stations the different operators were aware of anything unusual then being recorded. No direction is known for the source of the signals: the source appears to be overhead at all four stations. The size is estimated as 5,000 miles minimum, but the actual value depends on the unknown distance to the source. No motion of the source was detected. (Motion could not be detected on the interferometer since no fringes were visible.)

Warwick comments: "The object was larger than a 40" x 40" antenna beam, and was observed simultaneously with identical antennas located over a spread of longitudes of 75° ; a conservative estimate would be that it subtended at least 90° over a base line 5,000 miles long—how it flickered in exact synchronism (within ≈ 1 min.) is, to say the least, extraordinary."

4.7 Tracking Station Report

TR1. *Bethpage, New York, August 25, 1960.* "In 1960 and 1961, while operating an optical satellite tracking range for Grumman Aerospace Corporation, my group and I observed on numerous occasions an object traveling almost exactly opposite to Echo I, about half the angular rate, light straw color. One excellent timed photograph was made with 300 mm f2.5 tracking camera (ballistic). Kodak royal x pan film. Pulsing shutter. Absolute time recoverable to $\pm .01$ second. Good star background.

"Investigated by H and Major F of WPAFB (Blue Book). H has original negative. I believe H regards this as one of his most interesting cases.

"Intensive reduction of plate indicated possible 300 st. mile altitude for object. Theorized at the time that object might be recaptured Lunik II based on free-free return trajectory and subsequent earth capture. No other substantiation.

TABLE for Case TR1

	a	b	c	d	e	f	g	h
Prior	—		.25	.25	.25	.25	—	—
Post	—	.8	—	—	—	.2	—	—

"Air Force records made available indicated similar sightings at similar time periods all over U.S. Much confirming correspondence from overseas. Still a mystery!"

The color of the object was straw to carrot color. In brightness, it approached the equivalent of +1 visual magnitude. It was like a bright star, probably being seen reflecting sunlight.

Respondent enclosed a copy of a proposal to the Air Force for "Optical Surveillance of the Retrograde Satellite." The Air Force (Foreign Technology Division at Wright Patterson) never responded.

Respondent gives a list of 22 sightings taken from the Grumman Tracking Range Pamphlet put out by Grumman Aircraft Engineering Corporation dated 9/26/60. He also enclosed a list of 32 additional sightings compiled by Wright Patterson Air Force Base.

4.8 Investigations

Four respondents provided or drew my attention to accounts of cases which they had investigated.

IN1. Investigation of Visual Observations made by Astronauts.

Professor Franklin E. Roach kindly drew my attention to an investigation of astronaut observations which he had conducted as part of the Colorado Project. An account of his investigations is included in the Condon Report as Chapter 6 of Section III (Condon and Gillmor, 1969, pp. 176-209). The "Summary and Evaluation" of this account reads as follows:

"Many of the engineering problems involved in putting men into orbit would have been alleviated if it had been decided to omit the windows in the spacecraft, although it is questionable whether the astronauts would have accepted assignments in such a vehicle. The windows did make possible many planned experiments but the observations discussed in this chapter are largely sporadic and unplanned. The program of engineering, medical and scientific experiments was sufficiently heavy to keep the astronauts moderately busy on a regular working schedule but left reasonable opportunity for the inspection of natural phenomena.

"The training and perspicacity of the astronauts put their reports of sightings in the highest category of credibility. They are always meticulous in describing the 'facts,' avoiding any tendentious 'interpretations.' The negative factors inherent in spacecraft observations which have been mentioned in this chapter would seem to be more or less balanced by the positive advantages of good observers in a favorable region.

"The three unexplained sightings which have been gleaned from a great mass of reports are a challenge to the analyst. Especially puzzling is the first one on the list, the daytime sighting of an object showing details such as arms (antennas?) protruding from a body having a noticeable angular extension. If

the NORAD listing of objects near the GT-4 spacecraft at the time of the sighting is complete, as it presumably is, we shall have to find a rational explanation or, alternatively, keep it on our list of unidentifieds."

IN2. *Place unspecified, 1940's. Respondent writes:*

"I can report a minor incident which I had not thought about in years until I read this questionnaire. One afternoon in the 1940's in the early days of the excitement over 'flying saucers.' I had a visit at my house by a man from New Jersey. I made no record of the event and the passing years may have dimmed my memory of details. I think his name was _____ or something like that. I noted it over articles in the early publications devoted to flying saucers, as they were then called.

"He had a curious 8" x 10" picture which he claimed he had made of lights in the night sky. He seemed sincere and not any kind of a nut. The lights were nearly evenly spaced in a linear pattern with diminishing intensity in regular sequence. The angle with the horizontal was a little curious, but he claimed that he had photographed them in a dark sky. I thought at once of regularly spaced street lights receding into the distance. In the back of my mind was the then famous case of the 'Lubbock Lights.' So I tried to explain, as probably M would have done, that he had a temperature inversion and a mirage. The picture was made near some city in New Jersey. The man seemed satisfied. We parted and the incident passed out of my mind."

IN3. *Off West Coast of Vancouver Island, British Columbia. May 14, 1975, approximately 21:15.* The respondent supplied the following two statements which had been submitted to him, together with his evaluation:

Statement by Captain-, Master, CSS "P", Regarding UFO Sighting. May 15th, 1975.

"At 21.12 last evening, Thursday 14th May, I went to the bridge to speak to the Third Officer. The vessel's position was approximately sixty miles west of Cape Beale, running sounding lines. The course was 090°, wind ESE ten knots, heavy low cloud, cloud ceiling about 1,000 feet with light drizzle. No shore or ship lights were visible. The 'P' was displaying navigation and survey lights.

"At 21.30 I sent the Third Officer down for coffee, which left myself and the helmsman on the bridge.

"I paced the breadth of the wheelhouse several times when my attention was attracted by a bright light, ahead, falling from the cloud cover. I immediately thought of a flare, but it was falling too quickly. My second thought was that it could be a meteorite, but it was too big. I then became convinced that it was a large aircraft falling in flames.

"A split second later the object stopped its descent and became stationary at a distance I guessed to be one half mile and at a height I estimated to be 200 to 300 feet above the water.

"The object, brilliantly lit, appeared to be round or oval in shape. Its top half was white and its lower half a pulsating red. In the brief time I had to study it I could not see any lights as such. The whole object appeared to be uniformly illuminated.

"It soon moved off and I watched it disappear (its red base was visible for some time until obscured by rain), at a distance of about seven miles, and I estimated the total time of the sighting to have been 20-30 seconds.

"Whilst stationary its position was about two points off this vessel's starboard bow, and it made off into the wind in an ESE direction at a tremendous speed.

"Attached report from Helmsman,—
(Signed)

Master, CSS 'P'"

Statement by _____, Seaman, Regarding UFO Sighting

" I _____, while performing my duties as Helmsman on the bridge of Canadian Hydrographic Survey Ship 'P' at approximately 2145 hours on May 14th, 1975, witnessed the appearance of a UFO.

"The 'P' was doing a geophysical survey and I was steering a course east off the West Coast of Vancouver Island near Barkley Sound. I had been on the wheel since 2100 hours, and the Captain had just relieved the Third Mate, _____. It was growing dark outside with the visibility approximately two miles and it was raining.

" Captain _____, the only other person on the bridge, brought my attention to a brilliant flashing orange* light descending from the sky between one and two points off our starboard bow. The object levelled off above the water then sped away from the ship maintaining a constant altitude until it was lost from sight. It re-appeared very indistinctly in the distance for a couple of seconds then was not sighted again. The object was in sight for approximately twenty seconds in total.

"This experience was unique to me, and I consider it unexplainable in terms of my own experience."

(Signed)

"*For 45 minutes previous to the appearance of the object my vision was concentrated mainly on the ship's orange course digital read-out. This would have a bearing on my perception of the colour or colours of the object."

(Initialed)

Letter from Respondent to Captain _____, Master, CSS "P"

"Dear Captain _____:

"A copy of the UFO sighting reports of Seaman _____ and yourself has been forwarded to us by Dr. _____ of the Department of the Environment. We have taken the liberty of making duplicates of the correspondence and forwarding it to: _____. He has been making a scientific study of UFO sightings for a number of years, and is perhaps the most highly qualified person in the world on this subject.

"We are able to say only a few things about what you did *not* see, according to the data in the reports. Of course the weather at the time rules out seeing anything astronomical, except if there was a fortuitous break in the heavy overcast. The position we calculate for the 'P' at the time of the sighting (60 n.m. W of Cape Beale) is about +48°47' N, 126°44' W. At this position on May 14, the sun set at 19:57 PST = 20:57 PDT. From the report of Seaman ____ ("... it was growing dark outside...") we have assumed you were keeping Pacific Daylight Time, which would put the sighting about one hour after sunset. The heading of the 'P' and the bearing of the object, plus the time of sunset, eliminate the sun as a contender. The 4-day old moon set about 2h and 40m after the sighting, but was astern of the vessel when the UFO was seen.

"Does the 'P' have a radar, and if so was it in operation on the evening of May 14? Do you know of any ships nearby at the time which could have observed the UFO by radar?"

"One explanation which comes to mind to one who was not at the scene, is that you saw a helicopter with the landing light on, and with the rotating red anti-collision beacon flashing on the belly of the fuselage. Of course this does not account for the apparently high speeds observed, or the uniform illumination to which you refer.

"You and Seaman ____ are to be commended for the care you took with your reports. Personal discussion is always better than letter writing with this type of thing, however, and so feel free to drop in at the Observatory next time you are in town,

Sincerely,"

IN4. *Duhamel, Alberta, August 5, 1967.* Respondent kindly made available a report which he had prepared in the course of his official duties. This report is now reproduced with names of individuals replaced by A, B, etc., and names of organizations by P, Q, etc.

Onsite Inspection of Reputed UFO Landing Marks at Duhamel, Alberta, by A. October 2, 1967

Introduction

At 0900 hours on Friday, August 11, 1967 I was requested by B, acting under instructions from P, to carry out an inspection of certain marks in a pasture near Duhamel, Alberta. Local reports and opinions were reputed to relate these marks to the landing of one or more UFOs.

As Duhamel is a small hamlet near Camrose, Alberta, the use of a staff car would have meant that the inspection became a weekend affair. Coincidentally, a Q aircraft was operating on that day from R airstrip, and it appeared logical therefore to request that Q arrange to fly me to Camrose, and subsequently return me to R that same evening. The necessary clearance took rather more than two hours to arrange, and involved numerous expensive phone calls. Excellent service was provided by Q once clearance was obtained, but in any fu-

ture hurried inspection trip, thought should be given to local charter if the inspection area is not too remote from R.

The delay enabled me to hold brief discussions on the inspection problem with various R staff members, and also to speak on the telephone to C, an R helicopter pilot, who had been instructed to join me at Camrose to act as the S onsite inspector. I left R soon after mid-day, and arrived at the Camrose airstrip some two hours later. D, who piloted me on the way up, was to make arrangements for the return half of the journey, the aircraft to be at the landing strip sometime after 1530 hours. Shortly after the departure of the aircraft C, his son, and an R photographer joined me at the airstrip and, using C's car, we set out to the reputed site, collecting a representative of the Camrose Canadian paper on the way.

Information from Local Residents

C is to obtain detailed reports from local representatives, and the summary I give here is merely that obtained in brief discussions during the onsite inspection. Due warning is therefore given that the juxtaposition of comments and names of individuals must not be taken as reflecting my opinion of the veracity or reliability of individual "witnesses." My objective is merely to give the background as it appeared to me during a brief visit.

It appears that for several weeks there have been reports from this area of "strange phenomena." One report, to be followed up by C, is that two local girls (schoolgirls?) living a mile or so away from the reputed landing site had actually seen a UFO, largish, creamish, standardish, at a range of not more than two or three hundred yards, bobbing up and down near the ground "as if to attract attention." (Note that this description could be taken from any of many previously published reports.)

On Friday, 4th August, there was heavy rain in the area of Duhamel. On Saturday morning, according to E (who owns the reputed landing site), E went out to this pasture to bring in his cows. He states that he had not been into the pasture in the previous week, as he only goes there when for some reason his cows do not come home by themselves. He immediately noticed a circular mark some thirty feet in diameter on a region of relatively high ground. He maintains (a) he does not believe in UFOs, (b) the marks could not have been made by any of his equipment, (c) he thought at the time that the marks could have been caused by some strange lightning phenomenon, (d) he thought no more about it, had not heard rumours of UFOs, and only commented on it casually to a neighbor (not interviewed yet) who said, "Oh, it must be a flying saucer." This neighbor, according to the tale as told to me, then informed F, a local school teacher and UFO enthusiast. It appears that F then became the *obvious* prime-mover in the growth of the story and its distribution to the Press, a UFO society in Edmonton, and in due course to the CBC. During the next day or two F and several others visited the pasture, and located three more similar marks. Further, he or his party removed sample material from the marks, and (reportedly) shipped them to the UFO society in Edmonton. '

Representatives of the Camrose Canadian visited the site on Tuesday, 8th August, and took photographs of the tracks, one photo being published in 9th August issue of the paper. It is believed to be at this stage that contact was made to S, since the Telex instructing T to delegate an inspector—C—was dated 9th August. This same Telex advised C to contact R, who would arrange inspection with him. As indicated above R was not advised before the morning of 11th August.

Onsite Inspection of the Marks

By the time the inspection team visited the site, it had been, literally, a seven day wonder. Thus the two pastures concerned had been visited by droves of people, including many who drove cars across the pasture making a variety of car tracks in all directions. Strangely enough, this assault on his pastures does not appear to have caused E any concern, and he maintains an attitude of non-chalance towards the whole business.

Despite the passage of one week, including heavy rain in the early part of the week, and the droves of visitors, the reputed UFO landing marks remained quite clearly impressed in the ground. Although I must admit to a first impression of disappointment that I had been brought so far to look at so little, detailed study of the marks and reflection leave me more than a little puzzled.

As measured by the Camrose Canadian, the mark varies from five to seven inches wide, and the smallest circular mark is 31 ft. 9 ins. in diameter. Three of the rings are essentially circular—very closely so I would say—while the largest mark is slightly elliptical, varying from 34ft. 5ins. to 36ft. 3ins.

A description but *not an explanation* of these marks is to say that they appear almost identical to the marks one would expect by a very heavily laden wheel with rubber tire moved in an almost complete and accurate circle. Strangely, each circular mark was incomplete on the western (?) side, the circles being only approximately three-quarters complete. There was no evidence whatsoever of a single tire track leaving any of the circles. The marks were predominantly in the form of crushed and discoloured pasture grass, but where cow dung lay in the mark this dung (reasonably fresh apparently at the time) was compressed in much the same way as would be done by a wheel passing over it. In the dung there was some evidence—which we were informed was clearer the previous weekend both on the dung and grass—of tread (?), lugs (?) or similar protrusions on about a three inch repeating pattern.

My impression, which may be quite incorrect, was that the mark was made by rolling contact of some kind. My main reason for this impression is that although there was some slight variation in the ground level the high points were no more compressed than were the low points. Nevertheless, one must bear in mind that a week had passed since the marks were made, and this would give some time for recovery of the ground which *could* confuse this type of evidence.

There was no evidence whatsoever of any effect by the UFO outside the circular track mark itself. This applies both inside and outside the circle. No ex-

haust blast, no scorching, no disturbance of the loose surface material. Inside the track itself, there was some evidence that small clumps of material had been removed by the object making the marks—merely thumbnail size pieces of vegetation removed.

The most striking feature of the circular marks, other than the close circularity, was that they were quite distinct from the car and truck tire marks made during the week since discovery. The marks were, in general, very uniform in width and far more sharply impressed in the ground. They stood out in quite sharp contrast to the vehicle tracks in immediate proximity to them.

A radiation count was obtained in the circles, over the tracks, and remote from the tracks. The beta count ranged in the 100 counts per minute zone, low fifty to high 200 cpm. This is effectively normal background.

Discussion

Despite the similarity of the circular marks to the pattern of a tire track, the four circles were strikingly different from truck tracks. Taken in conjunction with the previously reported "sightings" in the area, the initial discovery of three more marks, and the casual air of the farmer while his farm became the scene of much visiting, and the speed with which the news media were informed, one must consider the possibility of a deliberate hoax. Such a hoax need not have been perpetrated by any individual who has become obvious in the investigation. Nevertheless, I must admit that I was unable to find *anything* which would lend strength to this supposition. I believe such a track could be produced by a deliberate hoax, but the hoaxers would require some equipment and a great deal of determination. It would be fair to say that if the mark was produced by rolling contact (a wheel), the load on the wheel even allowing for the rain on the Friday would require to be *at least* three times the load on a truck wheel. If the track was produced when the ground was very soft after rain, I do not see how the hoaxers could have produced these marks in isolation, without leaving some evidence of their approach to the area and departure from it.

Let us assume that the track was produced by a *wheel*. Then one must assume that the hoaxers could induce a wheel loaded to roughly half to three quarters of a ton to move in a virtually exact circle. This could be done by a single wheel mounted on a rigid radius arm moved about a fixed center. One circle did have a small indentation in the center, but the others did not. An alternative would be two wheels moved on a single axle, pivoted about its center. Such an axle would have to be over 30 ft. long, and this seems unlikely. A third alternative would be a rather well organized Honda rider going round in a circle several times. At the moment the evidence is against this as there was no sign at all of single tracks anywhere in the field.

Next, consider the UFO possibility, i.e., something coming vertically down onto a relatively narrow ring support—either metal, or, a faint possibility, a flexible skirt. In order to produce the visible marks, the load per unit area would have to be roughly three times that produced by a truck tire. If we take

the load per wheel as being 500 lb. for rough calculations, with an area of contact of four inches by two inches, this would give a loading of just under 63 psi. Reduce this down to say 50 psi, which I consider the absolute minimum needed to produce the visible marks. For simplicity, take a visible mark thirty feet in diameter and of average width five inches. This would give a total area of contact of 5,400 square inches, or a total load for the UFO of 270,000 lb. This load of 135 tons would be in right ball park for a large aircraft, or presumably, small space craft.

Conclusions

My conclusions from this rather quick investigation are:

- (i) The possibility of hoax can neither be confirmed nor denied.
- (ii) The marks in the ground could have been produced by a wheel in rolling contact, but this wheel would probably require a load of at least half a ton and the wheel would have to be moved in a rather exact circle.
- (iii) The marks could have been produced by a vehicle sitting on a circular base—possibly flexible, provided the vehicle weighed at least 100 tons and possibly nearer 200 tons.
- (iv) There is some evidence that "strange phenomena" have been seen recently in the area. This could be a lead-in to a hoax, or be genuine.
- (v) The marks were sufficiently unique in my experience for me to state categorically that if I saw similar marks elsewhere my tendency to treat the matter as a hoax would be sharply reduced. I have not, however, heard of similar markings in any previously reported UFO landings. It might be worth enquiring of the competent authorities whether or not similar markings have been observed elsewhere.

Additional remarks (July 21, 1975): There were seven distinct marks of approximately 30 ft. diameter.

TABLE for Case IN4

	a	b	c	d	e	f	g	h
Prior	.4	.2	.1	.1		.1		.1
Post	.5		0	0	0	.01?	0	.49

4.9 Cases in Scientific Literature

Several respondents drew my attention to material, originating with astronomers, which is in the scientific literature and appears to be relevant to the

UFO problem. Some of the respondents had been directly involved in these cases but others had not been. Two of these cases, of anomalous radio observations, are reproduced in this report as RA3 and RA4, and a third case is reproduced as IN1.

SL1. Kandilli Case

More than one respondent drew my attention to a photograph of the sun in H α light which was made at the Kandilli Observatory on August 23, 1966, at 0927 UT. According to the account published by Dizer (1967), "two artificial satellites crossed in front of the solar disk. Each was seen visually as a small dark spot, one following 17 minutes in time after the other." The second object appears in a photograph of the sun which is reproduced in the article. The exposure time was 1130 second and the filter was a Halle H α filter centered 0.3 Å on the short wavelength side of the H α line at 6563 Å. This observation and photograph were subsequently discussed by Slabinski (1967a, b, 1968), Meeus (1967), Harris (1967) and Soy Turk (1967). The consensus of this discussion is that the object could not have been an artificial satellite. One of the respondents pointed out that "the object could easily have been a one-meter diameter balloon at 15 km altitude."

SL2. Observations of Unusual Light Variations from the Night Sky.

A respondent drew my attention to a report (Elliot, 1972) describing observations of light from the night sky. The equipment involved simple optical receivers and electronic equipment designed to detect fast pulses.

On one occasion, the equipment indicated a series of pulses, each about 100 μ s wide, occurring at regular intervals of 10 ms. The pulse train lasted for 255 seconds and then abruptly ceased. After 16 minutes and 45 seconds, the pulses began again, and lasted for 270 seconds. The author and his colleague examined the sky but could not determine the origin of the pulses. The pulse shape suggested that they were flashes from a xenon flash lamp.

A second strange event was an abrupt decrease by 20% of the DC photometer current. This abrupt decrease coincided with a large burst of static from the radio (tuned to 1.03 MHz) and an instant of "clicking" that indicated many pulse coincidences being recorded by the event recorder.

The third strange observation was the appearance of a strong signal at 208 Hz and a weaker one at 416 Hz (but no third harmonic) which appeared for about 2 hours on one night only. The spectrum of the night sky normally shows 120 Hz and its harmonics of 240 and 360 Hz (from fluorescent lamps operating on 60 Hz electric supply), and occasionally signals at frequencies such as 112 Hz and 135 Hz which are attributed to off-frequency generators used in night-time mining operations in the area.

The respondent determined that there was a semi-regular Air Force program of night photography using millisecond strobed lights throughout Arizona.

References

- Clemence, G. M. et al. (1969). *Icarus*, 11, 440.
- Condon, E. U., Project Director, and D. S. Gillmor, Editor. (1968). *Scientific Study of Unidentified Flying Objects*, Bantam Books, New York.
- Dizer, M. (1967). *Sky and Telescope*, 33, 123.
- Elliot, J. L. (1972). *Atmospheric Fluorescence as a Ground-Based Method of Detecting Cosmic X-Rays*. SAO Special Report No. 341, Smithsonian Astrophysical Observatory, Cambridge, Massachusetts.
- Good, I. J. (1950). *Probability and the Weighing of Evidence*. Griffin Press, London.
- Harris, A. (1967). *Sky and Telescope*, 33, 212.
- Hynek, J. (1972). *The UFO Experience*. Henry Regnery Company, Chicago.
- Jacobs, D. M. (1975). *The UFO Controversy in America*. Indiana University Press, Bloomington, Indiana.
- Kuettner, J. P. et al. (1970). *Astronautics and Aeronautics*, 8, No. 11, 49.
- Meeus, J. (1967). *Sky and Telescope*, 33, 212.
- Menzel, D. H. (1953). *Flying Saucers*. Harvard University Press, Cambridge.
- Menzel, D. H. and Boyd, L. G. (1963). *The World of Flying Saucers*, Doubleday, Garden City.
- Sagan, C. and Page, T. (1972). *UFO's—A Scientific Debate*. Cornell University Press, Ithaca.
- Slabinski, V. J. (1967a). *Sky and Telescope*, 33, 135.
- Slabinski, V. J. (1967b). *Sky and Telescope*, 33, 212.
- Slabinski, V. J. (1968). *Planet. and Space Sci.*, 16, 818.
- Soyturk, E. (1967). *Planet. and Space Sci.*, 15, 1799.
- Sturrock, P. A. (1974a). *Evaluation of the Condon Report on the Colorado UFO Project*. Institute for Plasma Research Report SUIPR 599, Stanford University, Stanford, California.
- Sturrock, P. A. (1974b). *Astronautics and Aeronautics*, 12, No. 5, 60.
- Sturrock, P. A. (1987). *Journal of Scientific Exploration*, 1, 75.
- Warwick, J. W. (1963a) *Radio-Astronomical and Satellite Studies of the Atmosphere*. Ed. Jules Aarons, North-Holland Publishing Company, Amsterdam, 1963, 400, Figure 3.
- Warwick, J. W. (1963b) *Radio-Astronomical and Satellite Studies of the Atmosphere*. Ed. Jules Aarons, North-Holland Publishing Company, Amsterdam, 1963, 400, Figure 7.
- Ziman, J. M. (1968). *Public Knowledge: An Essay Concerning the Social Dimension of Science*. Cambridge University Press, Cambridge, p. 9.